A few years back I was turned onto a book, *This Is Your Brain on Music: The Science of a Human Obsession*. This excellent tome undertook explaining music, how we perceive it, where it comes from and what it means to us. And, maybe not surprisingly, the book’s author, Dr. Daniel Levitin, had spent time as a musician, producer and engineer before studying cognitive neuroscience and earning his PhD. He’s currently a Professor of Psychology and Neuroscience and the Director of the Laboratory for Music Perception, Cognition, and Expertise at McGill University in Montreal. He’s been a consultant to artists such as Stevie Wonder and Steely Dan and has worked in the studio with Blue Öyster Cult, Jonathan Richman, MDC and more recently with Canadian artists Diane Nalini and Dale Boyle. His recent book, *The World in Six Songs: How the Musical Brain Created Human Nature*, traces the evolution of the human brain and music and divides songs and music up into distinct archetypes. As he says, “It’s about, ‘Why music, why we have it - and there’s still some neuroscience in there.’” I’ve long held a mistrust of how academics (and many authors and music critics) perceive the art of music recording, so to be able to sit down with someone who understands this facet and also has insight into the operation of the human brain was an opportunity too good to pass up.

### Dr. Daniel Levitin

*This is Your Brain Creating and Recording Music*

interview and photos by Larry Crane
It's very rare that people working in the academic world at your level have had the professional experience of making records. You started out as a musician, if I remember correctly, and you were working in the San Francisco Bay Area?

Yeah. I was in a band called The Mortals, and we changed our name at some point to Judy Garland. We just thought that it would be surreal to be named after someone else. We actually became pretty well known in the Bay Area. We had our demo tapes played on the commercial radio stations, not just the college stations. We had made the demo tapes at a studio called Bear West [Studio], which was owned by Ross Winetsky. The house engineer at that time was Mark Needham. This was in '82, so he had already first-engineered records by Phanom Sanders and Jorma Kaukonen. But it wasn't a great studio.

Where was that located?

It was on Howard Street about three blocks from The Automatt [in San Francisco]. The Automatt was the big game in town. It was this three-room studio and Huey Lewis, Starship, Santana and Journey records were done there. But we had Bear West for 35 dollars an hour, and we snuck in on that because the owner, Ross, gave us a break. Mark did all the engineering. As I've written, I was the only one in the band that wasn't getting high in between the takes. What makes Mark a great engineer and producer is that he understands that he's not the artist. Right? A lot of us have trouble...

...letting go of that part?

Right. He is an artist, but a lot of us have trouble understanding the role. He came to the band early on in the sessions and said, "What do you want the drums to sound like? What kind of effects do you want on the vocal?" The [other members] had no interest in that and I did. I became the default producer of those demos even though I didn't know what that role was. When I started producing other bands, I got to The Automatt - to a studio that had a full complement of people, like a first engineer and a tape op, a second engineer and (in a few of the sessions) a third engineer. One day Paul Mandil - he was a second engineer at The Automatt, working with [producer] Sandy Pearlman - and I were hanging out before a session and he was aligning the 24-track Ampex machine. I was asking questions about what the bias current was, how you do it and why you do it, and he said something that I've never forgotten. I wasn't really sure of what the various roles were in the studios and who had the status and who had the prestige, not that I was preoccupied with that. There clearly was some sort of pecking order.

Right. [laughter]

I could see it, because if somebody wanted a sandwich it was Paul who went out to get it. Yet here he was doing this crucial operation of aligning the machines. If that was done wrong the session was worthless, right? It was his job to fill in the track sheets for what takes were what. I thought, "How could it be that this guy who's really got his finger on the pulse of everything is also the guy who goes to get sandwiches?" [laughter] But Paul said something that I never forgot. Paul said, "A lot of second engineers treat that job as inconsequential and only as a stepping stone. That's the wrong attitude. It's a profession. If you're the tape op/second engineer there's a lot to do. If you take pride in your work, you're really making an aesthetic and technical contribution to the record. Don't be in that job wishing you were doing something else, because you'll never be good at it and you'll never get to that something else. Be in that job, learn all you can from it and really pay attention to what your role is." He said every time he walked into a new studio - if he was taking a tour as a visitor or if he was going to work there - the very first thing that he wanted to see was the patchbay.

Oh yeah.

You say, "Oh yeah," but I know a lot of first engineers and a lot of producers who go right to the equipment rack or...

But if you can't figure out how to hook it up... [laughter]

Yeah, exactly. He said, "The patchbay tells you how much thoughtfulness went into the studio design, and you know what you're going to be able to do with that room." I asked Paul and other engineers like Mark Joffrey Norman, Ken Kessie and Rick Sanchez to teach me how to engineer. They said, "Why do you want to do that?" and I said, "Well, for one thing it pisses you off when I put my hands on the knobs [laughter] and so I really want to know what I'm doing when I do it. For another thing, there are going to be times when I can't afford to hire you or you're not available. But mainly I want to know what it is that you can do as an engineer so that I don't ask you to do something that's impossible." I have to admit I never became a good engineer. I became a competent engineer and a competent mixer.

When you see people who have really honed their craft, what they bring to the table is far outside of just what the gear is...

Oh yeah. I had this very humbling experience. I had been engineering and producing for about ten years and I had been doing some of my own mixes. I had gotten some demo money from Arista and we went up to The Site (a room George Massenburg helped build a couple miles from George Lucas's place [in Marin]). I remember we had one song that everybody knew was going to be the hit. There was this great Neve - I think it was 8808. I spent a typical eight or ten hours mixing our 48-track masterpiece. It just felt short of being right. So I went home and I slept on it. I came back the next day and I spent another few hours tweaking things and I printed the mix but it didn't sound like a record. I called Bob Mischak, who at the time was one of the hot mixers in the Bay Area. He had done Huey Lewis's "The Power of Love." I asked him just as a favor. In six hours he tore the mix down, pulled everything out of the patchbay and started all over. There he was using the same knobs, the same faders and all the same outboard gear. He used everything I had used. But the mix he came up with blew mine away, and he did it in a third of the time. I thought, "This is it. It's not the equipment. It's not the room."

I always tell people, "It's your ears and the way you react. It's like playing music." You hear something then you react to that in some way.

It's just so humbling to see that. Around that same time I had a kind of complementary experience as a musician. I was spending a lot of time in The Automatt or at The Record Plant in Sausalito, and Carlos Santana was often next door in an adjacent room. One day we bumped into each other in the kitchen and I asked him if I could play his guitar, because he has such a unique sound. I thought, "I know how to play the solo from 'Black Magic Woman' note for note." He said, "Sure," so I picked up the guitar and it sounded just like when I played it on my Strat. I said, "I'm sorry to trouble you, but my Strat's in the next room. Would you come over and play my Strat?" He walked over and he picks up my Strat and plays around with the controls for about 15 seconds and then he plays - and damned if it doesn't sound just like him. [laughter]

You were working along in the Bay Area for ten or so years at that point. Where did it lead from there work-wise?

In 1983 or '84, 415 Records - which at the time was a subsidiary of Columbia/CBS - hired me as an A&R person. I did a little bit of A&R/management type of stuff and developing new bands. CBS occasionally would ask me to go to New York or L.A. and hear a band, just to get another set of ears. But the studio work I did was always in San Francisco. At some point I started going down to Stanford [University] with Sandy Pearlman to sit in on classes. Sandy had a master's degree and I had no degree, but we were both interested in the brain. We'd sit in on classes at Stanford on neuropsychology and the professor was cool - Karl Pribram, a well-known neuroscientist. I found myself getting more and more interested in the classes and less interested in producing. It was around 1969 and '70 when the record companies got sold - one company got sold to a distillery and another to a gaming and consumer electronics company. What we were hearing from the executives at MCA and at Sony was that they weren't so much interested in nurturing talent anymore. They wanted the quick buck. A lot of people I knew and I was working with didn't want to be part of that kind of system. If you are in it just for the money, you might as well be selling toilet paper. I kept growing frustrated, seeing artists I believed in going nowhere and artists that I didn't believe in making a ton of money. There was always a fair amount of randomness in who got the success, but it got to the point where the record companies weren't even pretending they were after art anymore. A friend of mine, Stacey Baird, left the business, went to law school and became a lawyer under the Clinton administration with the EPA. Ken Kessie, who was a
great engineer, dropped out and starting doing video production. I thought that I didn't want to spend the rest of my life working on records that I believed in, not being able to support myself or being able to look the artist in the face and tell them they would be able to support themselves from their music. 

The heartbeat of the music biz.

I didn't really know what I was going to do at that point. I didn't consciously stop producing - I just started thinking about doing other things. One of the things I did was I taught a course at Stanford on music production. That was really fun. I liked being on the college campus and I started sitting in on more classes. At some point I was taking more classes and producing less. When I was in graduate school, Stevie Wonder called and asked me to help him produce a compilation album - it wasn't like we were recording new tracks. He wanted somebody to sit next to him and go through his entire recorded repertoire and decide which tunes would go on this anthology. The album that came out was called Stevie Wonder - Song Review. It wasn't supposed to be a greatest hits necessarily - it was supposed to be more like an overview of the whole of his career.

When you started going to Stanford, did you have any college credits?

I had some credits from MIT, Stanford and a few from Berkeley. At some point I decided to just enroll and take classes for credit. I was 35 at the time and I only enrolled half time because I wanted to do well in my classes. I hadn't been in a classroom for 15 years. I was afraid if I enrolled full time I wouldn't be able to keep up. Then I worked in laboratories at Stanford - psych laboratories, neuroscience labs - and picked up a lot of skills. It was then that I realized what a research career was all about and what researchers really did, and I thought, 'That's pretty cool.' I never really understood what it meant to have a PhD. I thought it meant that you were taking more classes [than] a Bachelor's, but in fact you don't do very many classes for a PhD. You mostly do research. I didn't really know what research was, but I learned how to design experiments. It's been really rewarding - I don't regret it.

It's a different world. Making records is such a loose, "anything goes"...

It sort of is, but if you go back to what Paul Mandl was doing, where he would document every patch cord that he put in and he would document every track - "This is vocal take number eight, and we switched microphones and went to the hyper-cardioid setting." You might want to go back to that later and you've got to know that stuff. Research is a lot of documentation. I spend much more time actually documenting what I'm doing than actually doing anything. When you publish a paper there has to be sufficient detail about what was done so that anyone else in the world can replicate the experiment if they want to. You've got to say, "The subjects were in a room that was ten by ten with a nine foot ceiling."

These days are you playing music or recording or anything? Is there time?

Yeah, I am. I produced the last three albums by a Quebec blues artist named Dale Boyle - a great singer and songwriter. He won the Lys Award for Best Blues Album - a Canadian award. I mixed a couple of records for Diane Natali, a Canadian jazz singer. I've got a little studio at home and I've been working on recording demos of my own songs on and off. Sandy Pearlman comes in sometimes and helps me produce them. I play in a band here on campus with some other professors - a cover band. We're called the Diminished Facilities.

[Laughter]

About a month ago I had this awesome experience. There's a neuroscientist at NYU named Joe LeDoux and he's a world expert in emotion, though he doesn't study music and emotion. He put together a benefit concert for people with perceptual processing disorders and he got Rufus Wainwright and Lenny Kaye (Patti Smith's guitarist), Gary Lucas (Jeff Buckley and Captain Beefheart guitarist) and Steve Wynn from the Dream Syndicate - he had all these guys who had volunteered to come in and play for the benefit. He asked me if I would play a couple of my tunes. So I got to play at the gig with this house band. And I am sitting there thinking, "Fucking Lenny Kaye is playing my song and he's into it?" Steve Wynn is playing on my tune and Gary Lucas is wailing on it!" It doesn't get better than that. Next, I've got a gig coming up in New York City with Rosieane Cash where it's just the two of us. It's "An Evening with Daniel Levitin and Rosieane Cash" where we're gonna talk a bit about music and the brain and then we'll play some tunes together.

That's fun.

The research, oddly enough, has rejuvenated my music. My launch for The World in Six Songs was last year in New York City, and Rodney Crowell and I played six songs at the Lincoln Center Barnes & Noble. It was one of the high points of my musical life. Being able to be there with Rodney, one of my favorite songwriters, and play on his tunes - it was just unbelievable. The other high points would probably be playing Carlos Santana's guitar, which even though it wasn't what I expected, it was amazing - producing a Blue Oyster Cult Record.

It's a real rush.

I get better gigs now as a guitarist than I would if I wasn't a scientist and writer. I wouldn't otherwise have found myself able to play with Rodney, Rosieane, Lenny and Gary.

Do you find that a lot of musicians have read your book?

Yeah, they have. Pete Townshend recommended it on his website. I know Paul McCartney read it. I keep hearing from people who say, "Roger Waters read it."

Sting read it and contacted me on account of it. It's amazing. But not everybody likes it.

What?

I heard through a mutual friend that McCartney found the first two chapters a bit uncomfortable, because he's assiduously avoided learning music theory and how to read and write [music] because he's afraid it would constrain his ideas.

You'd think at this point he'd know that he's got his ideas in place.

Engineers and artists are really ultimately different in one respect. In that I think artists are more in touch with "the mystery" and it's an engineer's job to make sure there is none. [Laughter]

That makes a lot of sense, but a lot
us have come at recording from being artists. I'm a musician. You're a musician.

Right. But if you're recording yourself and you're the only one in the room and you're playing and running Pro Tools, don't you find that there are two different parts of your brain that you're trying to access?

Oh yeah. I hate Pro Tools interfering with the playing and the music - but I don't hate Pro Tools.

It's interesting you say that, because for me I find that I appreciate and love Pro Tools and Logic, but I find it impossible to navigate those interfaces when I'm also trying to be artistic. More and more, if I am recording someone else, there is no question that that's what I'll use. If I'm recording myself I use my Tascam DA-88, because I don't have to think about multiple modes and pages.

Sometimes I need the computer to do certain things, but other times I feel like I'm shifting between the sides of my brain.

You are. I did this event in New York a few weeks ago with Paul Simon where we were talking about music and the brain, sort of like what I'm going to do with Roseanne. We were at the Rubin Museum of Art in Manhattan. Paul was talking about how whenever you're writing you're also editing, because ideas come out and you keep them or you don't keep them. The interesting thing is we know now there is a part of the brain that does that editing, and it's in the prefrontal cortex, right here behind your eyebrows. It's a part of the brain that's most highly developed in humans. Most species can't really do this kind of editing. They don't really evaluate alternatives, hence the donkey stuck between two bales of hay. They don't have the neural structures necessary to say, "I could do this or this, and here are the pros and cons."

What things should we know about the part of the brain that does this editing, as far as being creative and working with music?

Well, either because of genetics or because of training, not everybody is a good editor. All of us who have been in studios know an artist who doesn't know their own good from their bad. Among other reasons, that's why we have producers. Or take somebody who does know good from bad in others, but can't see it in themselves - what I would call a "self-monitoring deficit". There are a lot of individual differences for how rapidly someone can switch from one mode to another. There are some people who can switch back and forth between the art and the technical or the creative and the editing very rapidly. Other people are slow switches. I happen to be a slow switcher. What you want to be creative is to be non-judgmental. You
from reading your work is that we don't rescan the world every millisecond and rewrite what we perceive. We fill in the blanks with assumptions, so to speak, of what the world is around us. Working as a producer, I sometimes feel like people aren't really listening.

I think, especially if you are in a room for hours listening to a snare drum, you lose perspective. I know and I'm sure you know and your readers probably know that you have to have a stack of reference CDs that you bring with you and you put on every few hours to remind yourself of what you're doing. Everybody knows that you have to do that when you enter the mastering room or when you enter the mix room. But I think you need to do it at every stage.

Listen to other music and get your bearings

Not because you're trying to make your record sound like that record, but you need to sort of pull yourself into reality. I usually bring records that I've been listening to my whole life - not records that are new favorites, but things that are goal posts or landmarks in my musical brain. It's just like if a painter is in an unfamiliar environment and the lighting is odd, they might look at a color palate to remind themselves, "This is a red that I know and this is how it looks under this light." So, "Here is a bass sound that I know, and here's what it sounds like, I'm not necessarily trying to emulate that bass sound, but I want to know where I am in the big space." We also - as you said - do fill in missing information. The brain is the product of tens of thousands of years of evolution - that's really what my second book is about. The first book is about what your brain is doing when you listen to music today. The second book is about how your brain got that way and how the brain and music co-evolved, and the development of each influenced one another throughout our history going back 150,000 years. The brain is an exquisite change detector, so as soon as that snare drum sounds a little different you notice. If it doesn't, it sort of recedes into the background and you don't pay attention to what it's doing. That's why we like real drummers.

Because there's always a little shift

Yeah. Even the best of them are hitting a different part of the head with a little bit different force and, as you pointed out - throughout the session, even throughout the song, the head is going to change. The way it sounds at the end of the song is going to be different than the beginning, in spite of the drummer trying to be consistent. That kind of stuff keeps the ear and the brain interested. It's why with drum machine music, many people find it less expressive, although it turns out that drum machines aren't as perfect as you think.

Sensible?

There was a study that was reported at an AES convention about 10 years ago. Marius Peron had done tests on ten different drum machines for their tempo consistency. [The paper is Checking Tempo Stability of MIDI Sequences.] It turned out that they varied by four to six percent. They use cheap clocks.

That's weird. [Laughter] But if you do have a drumbeat that is nearly perfect you hear, recognize it and sort of forget about it as other things happen. You put it out of your mind, and the other parts of the music flow around that.

That's why technos music does what it does, although the music of indigenous peoples has been doing that - and that's not perfect. There's something about the rhythm and the constancy of it and the complexity of it that causes people to entrain and become hypnotized by it - entering these altered states of consciousness.

What is the brain doing in a situation like that?

Well, one of the things we know is that the neurons begin to fire synchronously with the beat, so the actual rate of firing of your neurons is such that if you go in there with a drill and stick an electrode in there, the neurons would actually fire in synchrony with the music. That, for reasons we don't fully understand, sets up an altered state of consciousness.

Is that sort of like hypnosis?

Yeah. But remember, being in those altered states or being hypnotized - it's not always the same. Sometimes being in a trance - if you want to generally call these things that - causes you to have a heightened sense of awareness. Sometimes it's a dulled sense of awareness. We would call both of them a trance. When you're meditating you're supposed to be hyper-aware, but you could also be in a kind of stupor influenced by drugs or by music - less than fully aware. But music's ability to do this is universal. It's been doing it for tens of thousands of years. It doesn't prove anything, but it suggests an evolutionary origin to music. It's not just a recent invention and it's not accidental.

Well I think in your first book you allude to the idea that possibly music predates language as well. Do you feel that music has had something to do with the brain developing?

It's unknowable maybe, but there's some tantalizing evidence that music is older. Clearly music and language have both been around for a long time, and the fact that they're still both around means they're doing different things for us. You were asking about people who read the book. I heard from Peter Himmelman a few weeks ago. He had records out on Epic in the 90s - he wrote the theme for Judging Amy and other big TV shows. He was saying that he had gotten down in the doldrums thinking that a life spent in music is not important, but my second book, The World in Six Songs, got him thinking about how old music is and how much it means to people all over the world. It kind of gave him a renewed sense of meaning. That's the best possible outcome for me! I didn't imagine that people could read my book and go, "This helps me justify what I'm doing."
There can be a cultural devaluation of putting your life into music. I think everyone can relate to their parents going, "Ugh, you just want to play guitar? Get a real job." Yet it's something that goes back all through the history of mankind.

The people who we know who are super successful musicians - they never even ask that question. Stevie Wonder never asked whether he was going to do music or not. There was no question. He may ask whether he's going to make a record this year or not, but the question about whether he's going to devote his life to music - that just never comes up. It's like a biological need. Joni Mitchell is a painter and a musician. She does the painting for herself. I think she's sold a few of them, but only reluctantly and only recently. She's been painting for 40 years and she says that she considers herself primarily a painter. She has this biological need to paint, and painters have that. She has some kind of a biological need to play music too, and I think that she would do it whether she made a living at it or not. In fact, I know she would because she's painted all this time and never made a living at it. Stephen King says the same thing about writers. You know, "Writers write. They can't stop themselves." Whether they're making a living at it, has nothing to do with it. There are people in the "middle class" who have the luxury of being able to do other things. They are the ones who ask themselves, "Do I really want to do this? My parents are saying this isn't a good idea." What do you say to them? I think one way to think about it is - what separates us from the animals is art. There are other things, but art is a way that we distinguish ourselves as humans and it's a uniquely human undertaking. It adds meaning to our lives and contextualizes our lives, and I think it's a noble pursuit if you can do it. I think in terms of studying it on the scientific side, it's a way to understand ourselves as a species. Music and art have been with us since the beginning. Look at the cave paintings. There's this drive. How can we understand who we are and what drives us and motivates us and makes us think the way we do? Well, we can look at human artistic experience, where it comes from and what it's all about. Music is especially interesting because it's a way of communicating, but it's a special form of communication. We use music to communicate about emotional things, not factual things. Helen Vendler, a famous poetry critic at Harvard, says that poetry is not a news report. The same thing applies to music. You don't listen to music to hear about the literal events. You go to it to get an emotional interpretation of the events from the writer's perspective, what it felt like to be there. Music, poetry and art are supposed to represent an episode, occurrence or an event metaphorically, through analogy or some kind of beauty of expression that helps it to become more memorable and more evocative. Another thing that seems to distinguish us from animals is our emotions. Animals can have emotional states - they're hungry, they're sated, they're happy and they're despondent, but they're not aware of their emotional states the way we are. They don't talk about them or communicate them. They signal their emotional states. An animal signals when it wants to mate or when it's injured, but we're talking about a qualitative difference in human emotion, and art is the language of human emotion. That's why we do it.


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