

>> Hi, I'm Steve Mencher with another of our Music and the Brain Podcasts and today I'm joined by David Huron, professor of music and head of the Cognitive and Systematic Musicology Laboratory in the School of Music at Ohio State University and he is also affiliated with OSU's Center for Cognitive of Science, and he's the author of "Sweet Anticipation: Music and the Psychology of Expectation". Welcome.

>> David Huron: It's great to be here, thank you.

>> I'm very curious what kinds of questions you would consider in a laboratory of cognitive and systematic musicology?

>> Many of the questions that we deal with relate to music and emotion. So, how is that music evokes emotions? Why do people willingly listen to music? What is the attraction of music? How do people learn music? Where do the skills come from? In what ways do people differ from culture to culture in the way they experience sounds, so you might have the same piece of music and two different people, even from the same culture, are having different experiences, so we look at the kind of experience that people have and then try to understand that from the perspective of evolutionary psychology and brain science.

>> Now you very generously started off your lecture by thanking your graduate students, your team that works with you in the lab and I almost got a picture in my mind of all of you sitting around and kind of trying to figure out, like what are we going to look into next. Do you get a lot of input? Do you toss around the ideas and then decide we're going to go and look this, we're going to look at that?

>> I come from an arts and humanities background, so I don't come from a science background and in the arts and humanities, the tradition in scholarship has been the lone isolated scholar working in the Ivory Tower producing a work of genius that they voiced onto the world, and despite our emphasis on human interaction and social interaction, cultural [inaudible] what's surprising is that we have really little history of people doing collaborative research, and one of the things that I have been very impressed by is how scientist, they really seem to have mastered how to go about doing collaborative research. So, what's perhaps unusual about my lab, even though it's situated in a school of music, is that we've really taken onboard the scientist pension for collaboration and working as a team.

>> That's sounds fabulous. In thinking about cognitive musicology and you started to answer this already, but I want to know obviously you must have a background as you say you came from the humanities, perhaps from what I might call regular or what our understanding would have been of musicology looking at the composer's looking and see what their influences were, how the music turned out that they wrote, things like that. So, cognitive musicology, is it a relatively new field?

>> The psychology of music has existed for more than a century. So, these are not new questions that people are addressing. I think what's changed is that, in the past, explaining music has predominately being a question of doing historical research and stylistic research and trying to

understand where pieces of music came from and how they originated and so on. What's different now, I think is that we've grasped certain problems like the problem of why music will make the hair on the back of your neck sometimes stand up on end; if you follow these problems through, sometimes they lead you away from the kinds of skillsets that you developed as a student, so away from the sort of historical or hermeneutical or the traditional humanities ways of approaching things, and if you're really serious about trying to answer the question, you end up having to learn a whole new set of skills, so you end up learning endocrinology and neuroscience and so on. The last biology course that I took in my life was in 10th grade and I've learned an awful lot since then, but it's been all motivated by very specific musical questions, and once you hang on and hang on tight to that question, you never know where it's going to take you. The next thing you know, you're dealing with convoluted statistical procedures and so on; you would never have imagined that you have got to that point, but if you're serious about addressing the question, you have to be willing to augment your toolset, your skillset to be able to allow you to address those in a meaningful way.

>> I had forgotten, by the way, what hermeneutical means. Can you help me with that?

>> Oh, I suppose a simple way of defining it is the study of meaning, and so you might analyze a text merely from the perspective of what is the meaning of the text, or what is the meaning that's trying to be conveyed.

>> Sure, now I'm not trying to flatter you, but we've been doing this for two years, this Podcast series and I got the sense as other people have marched through here, that you were kind of a beacon in the field, that people really have a lot interest in your work, a lot of respect for your work. I'll ask you what you think that they see that's special, that's different, that provides a kind of a touchstone for a lot of the work that a lot of the other people are doing right now?

>> I don't think that I'm anymore of a touchstone than many other people I could name and the discipline. There's some really terrific work that's happening and it's very exciting to be involved in that. One of the things that's compelling about the area of music on the brain is that the rate at which we're gaining new insight is so incredibly fast. I would say that the amount of knowledge is doubling about every say eight years, which means that if everything that we've learned since, say 2002, is equivalent to everything that we'd learned prior to that. So, it's the sort of thing that you wake up in the morning and you think: Oh boy! I get to do this today, as opposed to: Oh, I have to do this today. May be what's perhaps a little different, and I'm not sure that I'm any different, is that I'm pretty passionate about what I do, and I love it. I can't imagine anything more exciting to do. I'm grateful that it is possible to even do this sort of work and lead the kind of life that one can lead doing this.

>> Fabulous. Let's dive in to some specifics now. In the book you talk about a lot of things, but there are some key elements that you start with, and I'm talking about your book "Sweet Anticipation". You talk about the ideas of surprise in music, predictability, tension and I know

you're using the English language and these words have specific meanings outside of music, but let's take surprise for a start. When you talk about surprise in music, what are you specifically talking about?

>> So, it well it's very easy to demonstrate, if I go da-da-di-da-da-di. That could be surprising simply because we've heard a major scale so many times with the pronouncement, the next to last note, leading onto the "do" that happens afterwards, you're brain has heard that and has experienced that so many times that any deviation from that is going to be surprising, so surprise will happen in all sorts of guises it can be visual surprises, it can be the surprise of being touched unexpectedly. It's not all just jokes or something that cause surprise, but in the auditory world, we're very tuned in; large portions of the brain are oriented towards the role of prediction. When you think about how that can enhance survival and organism that can predict the future has an enormous advantage in preserving life. It's such a general principle that brains are so oriented towards making predictions that it spills over into something as esoteric and cultural as music. People's brains when they're listening to music are on a knife's edge. They're constantly predicting, albeit unconsciously, exactly what's going to happen next. You can hear that even in the way if you listen to my voice, you're listening to the words, the sequence of words, all the time you're anticipating what the next word is going to be in the sentence and blips-nirps if I start deviating bleg, blem, bloop, bleep; see the things, your brain is going to immediately recognize these as violations, so in speech as in music, brains are very strongly oriented towards forming these expectations and being very sensitive to deviations from those.

>> In terms of predictability, I was thinking of another set of questions around it and let me pose them to you. I used to work in a classical music program on the radio, and as producers people said: Well, we enjoy modern music, but our audience we're not so sure that they're going to enjoy modern music, because if we put on some 20th century music, for example that sounds different, that sounds unpredictable to them where they don't know what note is coming next or what kind of thing is coming next, that might scare the audience away. So, do you think that predictability has something to do with the kind of music we enjoy, the kind of music we gravitate toward?

>> Sure, the experimental evidence and support on that is really quite compelling. Although, it's very disconcerting to read this research, because I think we all have some sense of how important novelty is in our lives and so we tend to object to the very notion of somehow the only things we're really interested are familiar pieces of music and so on, but actually novelty has a pretty tough time in the research. I can make a distinction between two forms of novelty; in research you can present stimuli or can present sound passages in ways in which people are aware of the manipulation, they're aware that you're playing things that they've already heard or that these things are novel, and then there are other experimental techniques we can use in which people are unaware of these things. So, they're actually being exposed to familiar things or unfamiliar things in ways that they're not consciously aware of, and what we find in the research, and again it's very compelling, is that people only seem to prefer novelty when they're consciously aware of it. So, we

tend to backslide into familiar patterns of things and we tend to overestimate how much we think novelty is important in our lives. Think of an example of this as going to your favorite restaurant, you probably have a favorite restaurant and there's probably one thing on the menu there that you really love, and you go to that restaurant and you think: Oh, every time I come here I always get this dish, and you just start looking at the other things on the menu and you start thinking: Oh, I should really try something different. Of course if you go to the restaurant often enough you probably do try some of these things and inevitably the experience is: Oh, it's just a little disappointing, I'm glad I tried something new, but really I should have had, you know, whatever that dish is. So, that's where it comes home to roost that familiarity does play a big role, that's not to say that novelty isn't important, but the research suggests that novelty in music listening is not as important as people say it is.

>> Now, here's an experience that I had at a European music festival and tell me if this is a continuation of our discussion, where Krzysztof Penderecki was there he presented a brand new piece, the audience listened to it, they nodded their head, they applauded politely, and then he said: Okay, now we're going to play it again. And apparently, I was told this wasn't so unusual in Europe and the group started in again and played it again, and I found for myself that I had a very different perception of the piece that second time around, and it was familiar in some ways and I think I could say honestly that I enjoyed it a little more that second time. Is that something that fits it with our discussion?

>> I'm delighted that they're doing that. So, actually again the research does show that that's the case, so playing a piece that you don't like or that you have some reservations about a second time. There are certain circumstances where I will just simply confirm your reservations and you'll come to despise or dislike it in some ways, but familiarity does play a big role and incidentally, I'm delighted that they're doing that in Europe because that use to be the norm in concerts. The old fashion "encore" was literally just "play it again". If you go back to the 19th century and, let's say that you lived in Cleveland or something like that and you're listening to Brahms third symphony or something like that, if the orchestra had learned to play this and this was the first time you'd ever heard Brahms third symphony, the likelihood was that you were never going to hear it again. You might hear it as a piano duet or piano arrangement or something like that, but the actual symphony with the full orchestra playing, this was your one opportunity, since the local orchestra had learned to play it, for goodness sakes play it again, since we're not going to have much of an opportunity to hear it again.

>> Okay, I just heard your fabulous lecture about music and sadness and I did want to get to that before we said goodbye. So, you have been considering the question, you know: What makes music sad, and why do we enjoy it? And when you started off you talked today with a quote from Oscar Wilde, can you tell me that?

>> Oh, I'm not sure I can remember it right off the top of my head, but Oscar Wilde who of course is a famous literary critic and drama critic,

but he was also an amateur pianist and I think there's a passage from one of his writings where he says: "In playing Chopin I feel as if I am weeping over sins I hadn't committed and mourning over losses that were not my own". And I think that actually from the research that we've done pretty well encapsulates, it's a good summary of the research that we've done. There's a kind of sham loss, a sham psychic pain that's going on there where the brain, at least a part of the brain, is being fooled into thinking that something terrible has happened, all of the cues are there indicative of grief or sadness and we're empathizing with these things, but at the end of the day, the more conscious cognitive part of the brain is assessing the situation as: Gee, you know, there's nothing bad in my life. And, you end up with this cathartic experience which we've been chronicling.

>> Now, is this in some way specific to music? Now, I'm curious about this, because obviously catharsis is something that was studied at great length by the Greeks and they talked about it in terms of their plays and it's been talked about in terms of all sorts of art and literature. So, tell me what might be specific about this kind of catharsis and this kind of whatever you would call false pain that makes you then feel better because it's not actual pain that might be specific to music.

>> Well, I've linked it to the hormone prolactin which has this consoling effect, so when people cry prolactin is released, in fact, you can measure it in their tears the prolactin is released throughout the body including in the tears, so you can see it there and it has this marvelous consoling effect, it's this warm sort of fuzzy feeling, it's almost as though what the body is doing is that when you are suffering some great tragedy or some pain, or maybe not such a great tragedy but a minor tragedy, part of the ordinary slings and arrows of life, that the body is, it's taking care of itself in a certain way, it's preventing your own physiological response from going overboard and being too extreme. In biology this is referred to as homeostasis, so you may be alarmed by something and it may be holy appropriate for your heart to start bumping and to be a much higher blood pressure and much higher heart rate, but you don't want the heart rate going completely overboard and you don't want the blood pressure going way over the top, so there's a kind, in many respects the body behaves as though there's one foot on the gas and one foot on the brake and it appears that in the case of grief or sadness, prolactin is part of the breaking mechanism that the body is trying to put a cap on the psychic pain that you might be feeling, and that it has this consoling effect.

>> That is fascinating, but again, let me dig one more time into the question of how we would differentiate that the effects that music would have in making you feel these emotions versus, say, another form of art.

>> That's the great thing about music, it's the mystery. It's that these wonderful abstract sounds, it's not the sound of a kitten purring, it's not the sound of a cooing of a baby, these are not representative sounds or sounds that are recognizable in our ordinary lives they're just things like do-re and mi, they're tones that are produced by plucking strings and hitting stretched drum pads and things like that, and the marvelous thing is that these abstract sounds can still manage to tug so strongly

on our heartstrings and get us to feel these extraordinary feelings of joy or these moments of desperate sadness and lots of things in between. When I step back from it, I always think that isn't this just astounding that this is even possible, and of course, the whole art of music is based on this odd notion that abstract sequences of sounds can have this effect, but I think when you start investigating it, you realize that really despite the abstraction of the sounds it's taking advantage of these deep biological properties of the auditory system to draw important effective states out of the environment. It comes from millions of years of listening to each other and trying to infer effective states of recognizing: Oh, you're angry or oh you're hungry or you're passionate or you're sad or you're depressed or whatever and empathizing as one of the key ways of understanding what's actually being conveyed. So, I think it's the very fact that humans are such social animals and that we're so attuned to the emotions of each other that we have this kind of radar system of trying to understand, pullout all of this emotional information from just listening to these sounds that these then carryover into this abstract realm that we call music.

>> That's fabulous. Now let me ask you one final question as we wrap up, which is, when people look at your research and take your research and want to apply it say in areas that are not specifically about music, do you work with folks who want to take your findings and say let's look at language or let's look at improving cognition of people with brain issues or people who are aging like we all are, but do you work with them to use your research in any of those ways?

>> Ah yes, I suppose it's one of the surprises of my work that you start to find this; although, it shouldn't be surprising, of course, going into this business despite my interest in music you end up reading on things like memory and cognition and all these other in general areas of how the brain works, because they have repercussions for what may be going on in the case of music. I suppose it shouldn't be so surprising that when we make a breakthrough in music that people in other areas of brain science would then take an interest in what we've done there. To give an example here, I remember shortly after "Sweet Anticipation" was published, being contacted by some researchers at the medical school at San Francisco University who were working in eating disorders, in particular obesity, and one of the things that they had come to the conclusion was that a large part of the motivation to eat something had to do with anticipation and expectation of the pleasure, so that when you walk by, you know, a French pastry shop on the, along the sidewalk, that there's some mental process goes on that anticipates the joy or the pleasure that what happened from going into the shop and actually buying something. So, it was interesting to me that something, you know, like obesity research which seems so far away from music, would actually end up bootstrapping on the work that we'd done on musical expectation.

>> Well, that's exactly the kind of thing I wanted to hear and that does sound fascinating. I'm sorry, but I guess we have to conclude our discussion and I want to thank you David Huron Professor of Music, head of the Cognitive and Systematically Musicology Laboratory, and the School of Music at Ohio State University and also involved with OSU's Center for

Cognitive Science, author of "Sweet Anticipation: Music and the Psychology of Expectation". Thanks for joining us.

>> Thanks so much for having me.

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