



Indy's **alternative** voice

# Quantum theory and classical music

by Scott Shoger @scottshoger – April 23, 2014

## Quantum: Music at the Frontier of Science

Edwin Outwater, conductor with Indianapolis Symphony Orchestra  
Featuring works by Mozart, Webern, Ives, Brant, Cage, Xenakis  
April 25 and 26, 7:30 p.m. at Schrott Center for the Arts  
Tickets: \$29-52 adult, \$10-52 senior/student



*Edwin Outwater is music director of Ontario's Kitchener-Waterloo Symphony.*

*Butler's ArtsFest* closes this weekend with what may well prove its most provocative, illuminating, adventurous show. [Quantum: Music at the Frontier of Science](#) tells the parallel stories of quantum physics and modern music, which, if you ask Ontario-based conductor [Edwin Outwater](#), share quite a bit in common. He's partnering with the [Indianapolis Symphony Orchestra](#) on the show, premiered in 2012 and developed by Outwater with the University of Waterloo's [Institute for Quantum Computing](#). This will be its U.S. debut. Outwater tells us more.

### **NUVO: How did you start to draw parallels between quantum theory and music?**

Edwin Outwater: The process was freeform at first. We sat down with a group of people from the Institute for Quantum Computing and talked about what physics and music have in common.

We learned two things: First, the timelines of how both classical music and physics developed, through the 18th and 19th centuries, are remarkably similar. Mozart and Isaac Newton had a lot in common in the way they perceived things, and maybe that's just because of the way things were perceived at that time. And then, in both physics and music, there's sort of a language breakdown at the turn of the 20th century. Classical ideas in physics started to fall apart when Einstein discovered what he called "spooky action at a distance," basically the first quantum phenomena. At the same time, Schoenberg, in particular, threw musical thinking on its head by saying that musical language as we knew it had kind of exhausted itself, and a good amount of the intellectual crowd went along with that.

The second thing was that the strange experimental music of the 20th century reflected, coincidentally or not, what was going on in science. Music experimented with how it takes place in a given space, how random phenomena are involved, and other things along those lines that reflected the physics research, and especially the quantum research, that was going on.

### **NUVO: The program starts by pointing out similarities between Mozart and Newton, their interest in symmetry, in an equal reaction to an action.**

Outwater: Generally, the role of an artist or composer is to give an expression to how people perceive reality, and at that time, during the Enlightenment, reality was certainly perceived in that way. Quantum perception, if we even know what it is, is totally different. Even today we still perceive music in terms of Mozart and physics in terms of Isaac Newton, but we're now aware that some very different things are actually happening outside of our frame of reference and reality. These artists of the 20th century are doing music that some might find bizarre but are in some ways reflecting a reality being perceived or possibilities being perceived.

### **NUVO: And while Mozart may not have been aware of role math played in his music, you eventually play composers who actually used math and science to create their work.**

Outwater: [Xenakis](#), who's featured heavily in this program at the end, used game theory, set theory, even early computer science to model things in music. He was an engineer and architect who worked with Le Corbusier.

### **NUVO: And you play a piece by Henry Brant, who was interested in another dimension of music (space) in the same way string theory and quantum theory talks about multiple dimensions.**

Outwater: To be fair, a lot of composers from the beginning of music explored music in a space, but that seemed to be the main driving force of Brant's music. We're not trying to say that everything's clearly connected, but there are these resonances in how music was happening at that time versus how science was happening at that time, and they illuminate each other.

### **NUVO: How did you present the science in such a way that people wouldn't fall asleep?**

Outwater: Instead of trying to give an explanation, we're trying to create a feeling because that's what music does so well. It creates a visceral or emotional reaction to whatever the artist is trying to express. You get a sense of mystery and adventure, and even humor, in

the concert. What I was trying to do in putting the show together is create something like *Cosmos* or a great PBS documentary that has constant interest and entertainment, as well as provides a lot of information.

**NUVO: Do you talk about the [Music of the Spheres](#), a concept which said that the universe was structured in a musical way?**

Outwater: We allude to that, but that goes way back, even to the Greeks. We don't even know what that music sounded like! We have some idea, but we don't have the music. The idea of music as a sort of unifying force is certainly as old as the idea of science being one. I think another interesting thing in putting music in the context of science is you realize how much a part of everything it is. That's why I get kind of upset when people try to keep science and cut music programs in education. Music has been a part of education as long as we've been a culture. Certainly at the very beginning with the Music of the Spheres, it was an essential part of understanding the world, not only in terms of perception, but even of politics.

The piece by Henry Brant is called [On the nature of things: \(after Lucretius\)](#). Even these ancient guys perceived what we might think of as quantum phenomena. Whether people understood the science of it, they understood the possibility of it. There was even a recent book about Lucretius by Stephen Greenblatt, a scholar of Shakespeare, called [The Swerve that modernized Lucretius](#). Brant's piece is based on a quote of Lucretius that has a strange, scientific idea. Basically, the second half of the concert, we have a Cage piece based on astronomy and star charts, Brant's piece based on Lucretius and a Xenakis piece written on a computer - and they're all musical tributes to science, ancient or modern.

**NUVO: Did you have to read up on quantum theory or were you already familiar with the concepts in the show?**

Outwater: It's not something that I'm unfamiliar with. The job of the co-writer of this piece, Colin Hunter, was to translate some terms into lay language. I've read and been up on quantum phenomena, but I certainly wasn't obsessed with it. But after sitting around with these physicists, I've certainly done a lot of reading and research, which was incredibly mind-bending and fun. It was at least a one and a half year process just putting the show together, which is far too little time to know the details of quantum physics! But you can learn the outline and go for visceral ideas and feeling. Of course, the great quote about quantum understanding is that the moment you feel you understand quantum physics you obviously don't. So when you get that feeling you need push yourselves harder and farther.

And to be fair, the physicists were in the same boat about music. They didn't know much about oboes and clarinets either. That was the fun of it: Asking questions and guiding each other to where things sat well together. But before this I had done a concert with a neuroscientist, Daniel Levitin, who wrote the book *This Is Your Brain on Music*. It was a kind of [brain analysis through the lens of Beethoven's Fifth Symphony](#). So this is my second science-based project.

**NUVO: You also have a full-time job as a conductor of concert music. Why do you take the time to do these kinds of shows?**

Outwater: This is, in a way, what I'm most interested in. I love the music - I'm a trained concert musician, and I do concerts every week of these great composers. But I've always thought that symphony orchestras, for some reason, exist in their own universe. That's just the way they've developed, and I think they really belong in the world of ideas and thoughts. There are a lot of people who are very curious about science and literature and politics who would be more curious about music if we kind of invited them in. I think creating these experiences is an open door for people to understand not only the music that we're playing - in this case, some of it kind of avant-garde - but to bring people into the symphony experience in way that seems familiar with them. To be honest, most of our audience is just discovering this music, and we want to help them discover it.

**NUVO: How have people reacted to the program? Did you meet your goals as you just described them?**

Outwater: Absolutely, their minds were really blown by the show. There was that feeling of adventure and discovery. I think the musicians in the orchestra themselves learned about this strange music that they're sometimes asked to play and realized its place in the musical world much better than they had before. It's a real ear-, eye- and mind-opener, and it's fun and entertaining. The idea of having the door opened to this wonderful hidden world all around us is pretty exhilarating, for me as well as everyone else.

**NUVO: And you've become something of an ambassador and go-to conductor for new music, including in Indianapolis.**

Outwater: Everything needs context, and I think orchestras provide far too little context for the music that they play - and that includes Beethoven. You don't need to be in a classroom, but you do want to have an idea of the why and what that goes into this music. For those of us who go to a gallery to look at art, usually there's material around that. I think once music has context, it becomes much clearer to people why it's there.

**NUVO: I suppose the counter-argument is that by contextualizing things in a certain way, you deprive newcomers of the chance to experience things for themselves, to come to their own conclusions.**

Outwater: I think that's the total danger of doing this, except that explaining everything and telling them what they're supposed to think is not the same as providing context. Of course, the entire purpose of this music is to have multiple interpretations and meanings, especially when there are no words. In no way is my goal to narrow people's understandings of music to the way that I think about it. It's just to give them a cue or a point of interest where they can connect with their own intellect and experience and imagination to go further.

**NUVO: Can you tell me the gist of your TEDx Talk?**

Outwater: The idea of subculture is very interesting, and it's occurred to me, and it's certainly occurred to other people, too, that classical music is a sub-culture. At one time, playing the guitar and being a rock and roller was considered out of the norm; now it's exactly the opposite, and I think the bassoonists or the classical composers are the true rebels. A lot of classical music was, and still is, music of rebellion and change. The talk was just flipping the concept on its head. In classical music we sometimes come up with reverse snobbery; oh, that's too smart for me. But I think you've got to give the music its due.