



# RESEARCH2REALITY

Shining a light on research & innovation.

## How is Mathematics Like Making Music?

An interview with **Jeffrey Rosenthal**, Statistician  
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So a lot of the math that people do, you know, in elementary school or high school, well you have to solve this problem and you have to use these equations exactly the same way as it was done in the textbook. And there's not a lot of creativity there, it's just trying to follow what you're supposed to do. But when you're doing mathematical research that's original, you're not following what anyone's done before, you're doing something brand new. So there are no set equations that you have to use, you have to try to put together everything you know in a way that's as best as you can.

Mathematics involves a certain sort of logical structure, so you certainly have to have a logical mind to see how things fit together. You can't just go making things up. But on the other hand, what not everyone realizes is that to do research in mathematics also involves a form of creativity. It's what I call creativity within structure. In fact, I also play some music, and a lot of math people play music, and it's been pointed out that music also kind of has a structure: you can't just play whatever you want, but it also has some creativity involved. So there's creativity within the logical structure.

### Is your daily work individual or collaborative?

A lot of it is thinking, because it's all these mathematical, logical relationships, and they kind of have to fit together up here. If they fit together up here I can get them onto the computer, so sometimes I'll just be lying in bed and thinking, and I'll try to make connections, too. So it can happen really anywhere, but quite a lot of it involves working with other people, too.

TODAY'S RESEARCH. TOMORROW'S REALITY.



I've done collaborative work with people from the Faculty of Medicine, and the Faculty of Law, and people from psychology, and people from all different sorts of fields, because they all have things that involve data, or involve randomness, or involve ways to model things. And there's a real freedom to, in addition to doing my technical core work, to do work which has applications to other areas. When I was doing the really pure math, I didn't always feel that, because you're working on something so specialized that it only interested a few people. But you get a little more broadly into randomness and statistics and data, it has so many different connections and applications, so that's been great, too.