Reflections on Math and Magic

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When I was a high school student, I performed magic at many birthday parties for children. It was through this experience that I learned most of what I know about teaching today, even at the college level.

Ask any children's entertainer for the most important ingredient to a successful show and they will tell you that it is audience participation. In my shows, this would sometimes involve having people "on stage" with me, and frequently asking the audience for assistance, by yelling out magic words or helping me find the missing ghost. In the classroom, I constantly ask questions of my students—sometimes to the class at large, and sometimes to specific students. This technique helps keep the class more engaged in the same way that it is usually more interesting to hear a conversation than a monologue.

When I performed magic for children, my goal was to entertain them. Because they already believed in magic, I did not try to fool them. I was simply putting my magic powers to entertaining use. In the classroom, my goal is not to show students how smart *I* am, but rather how smart *they* can be. Whether you are performing or teaching, a little bit of humor goes a long way, as does spontaneity. When performing, some of the most memorable moments are those that seem unplanned, where you come up with a great ad-lib to a surprising event. Of course, if you've performed many times, then you can start to expect some unexpected things to happen and it's a good idea to be prepared for them. Likewise, in the classroom, it's great if you can present material in such a way that a student naturally asks a question that leads to the next topic.

Of course, to be successful as a performer or teacher, you need to have complete mastery of the material, and the more practice and guidance you can find, the better you will be. But don't expect a standing ovation the first time. Putting together the perfect classroom experience or performance piece is an evolving process that may take many iterations before it all comes together.

4	9	2
3	5	7
8	1	6

Incidentally, as a professor of mathematics, my intended reaction from the audience is very similar to my goal as a magician. I want my students to say "That's really cool! Why does that work?" If you can get people to actively wonder "how did you do that" then you are half-way home.

Although my research has primarily focused on combinatorics, some of my favorite papers were inspired by magic tricks, games, and paradoxes. Many of these papers were coauthored with students and appeared in MAA publications. For example, take your favorite 3×3 magic square, say consisting of rows 492, 357, and 816. Believe it or not, $492^2 + 357^2 + 816^2 = 294^2 + 753^2 + 618^2$. The same pattern holds for the columns and the wrapped diagonals. Can a knight's tour of an 8×8 chessboard always be performed given any starting and ending squares of opposite color? In a game of Bingo with a large number of players, why is a horizontal winner more likely than a vertical winner?

By the way, for as much as I've learned from magic, I seldom perform tricks in the classroom, unless it somehow motivates the course material. Although, I still recall my first day of teaching, when I taught with a deck of cards in my pocket. I brought the cards with me, so that if the lecture bombed, I could still show my class something fun at the end. As it happened, the lecture went well, but I ended with the card trick for them anyway (which also went well). ●

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