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# < Teller Talks: The Science Behind Magic Tricks

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JOHN DONVAN, HOST:

This is TALK OF THE NATION. I'm John Donvan.

Science and magic are supposed to be opposites. Science is real, and it's hard, and it's facts-driven. Magic is illusion, and it's make-believe. Two separate worlds. But not for Teller, half of the famous magic duo Penn & Teller. He recently wrote an article for Smithsonian magazine, outlining the secrets that magicians use to manipulate the human mind and how those tricks may be put to use by scientists. At the core of every trick, he wrote, is a cold, cognitive experiment in perception. Does the trick fool the audience?

Well, in this portion of the program, we would like to hear from the magicians out there. What is the trick that proved most difficult for you to master? And if you want to share its secret, what was its secret? Our number is 800-989-8255. Our email address is [talk@npr.org](mailto:talk@npr.org). And you can join the conversation on our website. Go to [npr.org](http://npr.org), and click on TALK OF THE NATION. Teller joins us from NPR member station KNPR in Las Vegas. Teller, thanks very much for joining us.

TELLER: Happy to be here.

DONVAN: So psychologists talk about the artistic intuition that magicians have, this innate ability honed over time, a lot, a lot of time to grab a person's attention and control it and manipulate it. Are they right about that? Are psychologists on to

something in this assessment of what you magicians are really up to?

TELLER: Psychologists are - they're right, in part. Magic is not just controlling somebody's attention. You know, I - there's a term in magic, misdirection, which laypeople tend to hear and say, oh, I know. All magic is just - he's waving his hand on - over on the right-hand side so that I'll look over there while he does something sneaky on the left-hand side. And that's an oversimplified view. There are rare occasions in which mere distraction enable you to perform a piece of magic. But most of the time, it's not that at all because if you, as an audience member say, wait, I was looking over there, and it happened over here, it's pretty apparent how the trick was done.

So psychologists are doing some really cool stuff nowadays. Richard Wiseman in England, for example, has put up a number of wonderful YouTube videos in which you watch very carefully what you think is happening, and your attention is focused on the plot that you perceive. But in the end, you find yourself completely surprised because attention is not just where your eyes are looking. Attention is what you're thinking about.

DONVAN: You've actually published an article as a co-author in a scientific journal, Neuroscience Nature Reviews. And you're in company with psychologists and - so it lists psychologists and some other performers and yourself. And I'm quite interested in this intersection between science and magic right now. What is it that the - why are the psychiatrists - psychologists focused on you? What are they trying to learn from you?

TELLER: Magicians - in real life the most important decision you ever make is, where does reality leave off and make-believe begin. If you make a mistake about that, you're dead. You know, you're out on the street corner. You think there's no bus coming. You step out, you're dead. Magic gives a human being an opportunity to experience that kind of mistake and experience no harm from it. And so, in a certain way, there's a parallel between that and psychology, in that psychologists are doing - they're studying the way people perceive and the way people experience things but in a way that's not going to end up doing them any harm.

So I think - I also think, quite frankly, that psychologists are tired of being, you know, in labs with rats, and, you know, in the halls of academe, and they want something a little more romantic. And they think, oh, magic, you know? And they see sort of Disney dust sparkling out of magic wands, and they say, oh, this will make, you know, this will make magic - this will make psychology more interesting. And recently there's been a, sort of a flurry of activity among neuroscientists who are those people who, you know, they study the brain scans and all that very tiny, tiny detailed stuff trying to hook themselves into the flash of the show business of magic. And one of the, you know, one of the jokes that I make in this article is that those people are really taking soil samples from the, you know, the outside of the mine that magicians have been pulling gold out of for centuries. So they're focused on very, very small things.

DONVAN: So how does - as you say, they're outside of a lab but, I guess, all the world is a lab for them. How do they set these studies up? Are they hooking up audience members to electrodes and dials and meters or are they doing questionnaires afterwards? How does the experimentation work?

TELLER: With good - people like Richard Wiseman or even, you know, the - that wonderful fairly new book by Daniel Kahneman called "Thinking Fast and Slow." Penn calls that the best magic book that's been out in a long time because Kahneman's premise there is that there are two essential kinds of thinking. That kind that you do with your gut and the time - the kind that you sit back afterwards and reflect on and you think about things. And, you know, magic is this great situation where those two things are in conflict. They're smashing against one another. So... you have to take me back to your question again. What was your question?

DONVAN: I want to picture the experiments. I mean, how do scientists gather their data on what's actually happening when you perform a trick and the audience is either fooled or entertained or discovers?

TELLER: The closest, I think, that the really strict mechanical scientists have come to that is eye tracking. And in eye tracking, they're really dealing with the most rudimentary kind of illusion perception. You know, they're saying, well, because we

have now equipment that allows you to see exactly the focal point of the eye at any given moment, they have people watch videos of magicians, and they track the position of the people's eyes.

And they discovered - there are a couple of worthwhile things they have discovered. They have discovered, for example, that when a magician makes a straight movement from one point to another, the human eye looks at the first point and then dashes to the second point but doesn't really pay attention to the journey between those two, whereas, if the magician moves in a curved pattern, the eye follows the movement all the way. So that seems to me - that is the most profound revelation that I've heard from the people who are doing this sort of really lab-y, techie kind of stuff.

DONVAN: And is it something you can use or you're already out there using and you just never had a name for it?

TELLER: I suppose if I ever thought about the small journeys of things, I probably would use it. I rarely do.

DONVAN: I want to bring in Joe(ph) from Paw Paw, Michigan. Hi, Joe. You're on TALK OF THE NATION with Teller.

JOE #1: Hello.

DONVAN: Hi. You're on the air.

JOE #1: Yes. Thank you for taking my call, first of all.

DONVAN: Pleasure.

JOE #1: And the hardest trick that I've had to learn as a magician - are you familiar with the Asher twist?

DONVAN: I'm personally not. I'm going to ask Teller if he is.

TELLER: I'm honest - I'm not a card guy. And that's a card move, right?

JOE #1: That's a card - yes, it's a card flight. And it's an illusion where you have four cards that are facedown. And when you spread the cards, one of the cards just turns face up, and it look as if from the spectator's point of view that the card just magically turns face up. It doesn't look like you're doing any sleight whatsoever. But the reason that's so hard, or that was so hard for me to pick up, was that - just the timing of the sleight with what we needed to do to take the spectator's eyes away at that particular moment. There's a timing issue.

DONVAN: Joe, give us civilians an idea of how long you would work on that.

JOE #1: I'm still - I still am working on it. I've been working on that particular sleight for about a year and a half.

DONVAN: Wow. And you have not presented it to a public audience yet?

JOE #1: Not to a public audience. I've been presenting to my family and my friends to get feedback to other magicians but not in a public performance as of yet.

DONVAN: Wow. Is that, Teller, an unusual amount of preparation to work on one trick?

TELLER: Not at all.

DONVAN: Not at all.

TELLER: Not at all. I mean, remember, in magic, you're trying to convincingly create the impression that something impossible is happening, and this means that it has to be perfect. You know that - I believe that if a singer is slightly off pitch for two notes of a song, you readily forgive that singer. If a magician is slightly off pitch, it completely destroys the whole effect because the moment there's a little bit of a flaw in what you're seeing, it no longer looks impossible. It looks like something sneaky is going on.

So it is - I - not so long ago, I put a new piece into the "Penn and Teller" show in Vegas that I rehearsed every night after the show, worked on, developed for 18 months before the first performance. There's something we're putting in tomorrow night in the

"Penn and Teller" show that - at least I hope we'll put it in tomorrow night. We're rehearsing it in the afternoon. That we've been on for two years, and it's just a very finicky kind - it's a difficult art form.

DONVAN: I want to go another caller. Joe(ph) is in Oklahoma City. Joe, hi. You're on TALK OF THE NATION.

TELLER: All magicians are named Joe, by the way.

(SOUNDBITE OF LAUGHTER)

JOE #2: Yeah, yeah. All the magicians are Joes. But the - my background is primarily in sleight of hand magic. I think it's the easier form of magic. It's, you know, if you practice enough, you get the, you know, the mechanics of it. And like Teller was saying, I was actually a magician in, while I was living in England, who participated in the eye tracking that one of the universities was doing. They took videos of myself and some other magicians. And through that, I could see almost like a - a robot could do some sleight of hand in the rudimentary way, you know, get it, but where I've found, you know, the most difficulty and the most rewarding when it comes - when it gets right is in the, you know, like mind reading, or it's the same magic without any props because there's only your, you know, your words and the perception that, you know, you're altering their perception just with the words and, you know, through, you know, body language and stuff like that.

It's been, you know, the most difficult and the most rewarding. And as I've performed in America and in England, I've seen some of the slight language differences have actually come up between, you know, performances and altering things.

DONVAN: Joe, do you think that you've learned something about human nature, in other words, the things that the psychologists are trying to put - to quantify and put numbers on. Do you think that you've instinctively figured out some things about human nature, about how the mind works, and how perception works?

JOE #2: Absolutely. Absolutely. And it's the most rewarding part about being a

magician, I think. And I think that anybody who would want to go to your public library and get, you know, the first book on card tricks or coin tricks or whatever interests you, you'll find that you'll learn way more than just how to do a trick at a party because it's in performing that trick at a party or for your friends or your family that you'll find that you get a little inside glimpse at the backstage of the human mind.

DONVAN: Interesting. Joe, thanks very much for your call. You're listening to TALK OF THE NATION on NPR News. Teller, we have an email that's just come in. Guess what the guy's name is.

TELLER: Joe(ph).

DONVAN: Yeah, it is.

TELLER: You see, I'm psychic. I'm psychic today.

(SOUNDBITE OF LAUGHTER)

DONVAN: It's Joe.

TELLER: I sense that it's Joe.

DONVAN: "Hey, man, I love Penn and Teller for years. You guys are awesome. I love sleight-of-hand magic and was interested in starting to learn some. Would you have any recommendations where to start?" I bet you get asked that question a lot.

TELLER: I do. When I started out, the - I went to the Philadelphia Public Library, and I took out books continually until I found books that suited me. I think my favorite card trick book at the time was "The Royal Road to Card Magic." It's a very, very good, almost a programmed course. That's a nice place to start. For coin magic, there's J.B. Bobo and his book called "Modern Coin Magic," which is now about 50 years old, which is wonderful.

(SOUNDBITE OF LAUGHTER)

TELLER: And let me see, general magic, there's a lovely book by Henry Hay called "The Amateur Magician's Handbook," and it's a very - really introduces you to the scope of things.

I didn't have initially - when I was a kid, I didn't have a mentor until I got to high school, and then I lucked in to this wonderful high school English teacher named David G. Rosenbaum, whom we called Rosey, who was also the high school drama coach. And he and I sat around and spent a great deal of time thinking about what magic's place in the arts is, because magic is always - because magic is such an incredibly strong form. I mean, if an absolute moron comes out and waves a handkerchief and suddenly pulls a dove out of it, people will applaud. That's the form. That's not the art. The art is taking some idea and making that into something, you know, amazing and real. So I say go to the library. That's a good place to start.

DONVAN: Interesting thing that you talk about as a performance and part of theater in general because I take note of the fact that a large number of successful and, for all I know, unsuccessful comedians talk about doing magic earlier in their careers. And I note also that in your piece in the Smithsonian, you write about the importance of laughter in the illusion. So talk to me about where laughter fits in, the audience's laughter.

TELLER: Well, in - a little discovery that I think maybe Penn and I made on our own, but I'm sure magicians have discovered over the centuries is that laughter disables your ability to think critically for at least a moment. So if I do some move that might be slightly suspect to the audience and immediately afterwards there's a laugh, I can be pretty sure that they're going to forget any attention that they were going to give to that move.

DONVAN: Even if it comes afterwards?

TELLER: Even - and especially if it comes afterwards, but it's that - it's - once you charge somebody up with emotion, you're putting them into a state where their critical thinking or what, you know, what Kahneman would call system-two thinking, that reflective thinking becomes harder. And you have to keep in mind, this also - I'm



making this sound like this sinister thing, you know, that, oh, we're trying to get away with - well, maybe when the car salesman is telling you a joke just at the point where you were about to, you know, open the hood and look at the engine, and you go, oh, this is a nice guy. I'll buy this car from him. Maybe there, it's sinister, you know? In magic, you come in expecting and hoping that the person is going to amaze you and/or make you laugh.

DONVAN: And if he doesn't, you're disappointed. I want to thank you so much for joining us, Teller. Teller's piece called "Teller Reveals His Secrets" ran in the March issue of Smithsonian magazine. There's a link to it at [npr.org](http://npr.org), click on TALK OF THE NATION. He joined us from NPR member station KNPR in Las Vegas, Nevada. Thank you very much for joining us, Teller.

TELLER: Hey, thanks.

DONVAN: Tomorrow, we will talk about the science of pet therapy and how the happiness can go both ways. This is TALK OF THE NATION from NPR News. I'm John Donvan in Washington.

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