

Quantum Mechanical Con Game

For the first time, physicists have come up with a scheme that would allow a quantum mechanical expert to win every time in a con game with a victim who only knows about classical physics. Prior quantum cons have typically been vulnerable to simple countermeasures.

A pair of physicists at Tel-Aviv University in Israel came up with the quantum cheat by imagining two people betting on the location of a particle hidden among a set of boxes. In the game, a quantum mechanical con artist named Alice turns away as her classical victim, Bob, is allowed to look inside one of two boxes sitting on a table to see if there is a particle inside. He then closes the box and Alice guesses whether or not Bob found anything in the box he chose. If she guesses correctly, she wins Bob's money, if not, she pays him.

Classically, there is a 50% chance of Alice getting it right. If instead she's adept at quantum mechanics, and has a third box hidden away, she can ensure that she always knows what Bob found in his box. All she has to do is prepare the particle in a state that essentially places it in all three boxes simultaneously, through a phenomenon known as quantum superposition. In effect, there is an equal chance of the particle turning up in any one of the boxes.

After Bob looks in one of the two boxes on the table, Alice measures the state of the particle in her hidden box. If she finds it empty, she knows Bob saw the particle in the box he opened. If she finds that the particle is in a superposition between two boxes, she knows that Bob opened the third box but didn't see anything inside. In either case, she always knows what Bob found, even though she has no way of knowing in advance where the particle will turn up or which box Bob chose to look in.

The authors of the paper admit that the current state of technology isn't good enough for a con artist to make money with quantum mechanics. But they believe that this is the first time anyone has shown that it's theoretically possible for someone like Alice to use quantum mechanics to win every time in a game that classical physics would only give her a fifty-fifty chance of winning. With advances in quantum technology, it may someday turn out that gambling is only risky for those of us who don't understand quantum mechanics.

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