

The Paradigm Discourses

“Spooky-Coins and Magic-Envelopes”

Don't ask how it can be like that, no one knows. It is a black pit from which no one returns.

- Feynman

Experiment was flirting with Curiosity, or at least showing off. Either way, he had her rapt attention. He fired off another pair of envelopes, one to Proof the other to Reason who had both agreed to assist in his demonstration.

They carefully aligned their envelopes, opened them at exactly the same time, and recorded the contents. This time Proof had a gold coin and Reason had a silver coin. That made 100 runs. Curiosity, “They’re opposites again.” “Yep,” Experiment responded, “that’s the power of spooky-coins.”

She snatched the lists from both Proof & Reason and laid them side-by-side. Sure enough, they always received opposite coins; if Proof got a gold coin, Reason got a silver one, and vice versa. They never got the same coin; 100 examples without exception. Curiosity, “But each list looks random.” She looked at Mathematics for confirmation. Glancing at the lists, he scanned each, made a few mental calculations, and then professorially, “Each list individually is as perfectly random as any list of 100 items can be, but the correlation is odd; I would have expected that 50% of the time the coins matched. Instead it’s zero. Interesting.”

Next, she looked at Theory, “So does getting a gold coin in one envelope cause a silver coin to occur in the other? Or is it that a silver coin causes a gold coin?” Thinking furiously, “Or perhaps it is Proof’s envelope that causes the other coin to be opposite, or perhaps the other way around, that Reason’s envelope causes the other coin to be opposite.” Still thinking it through, trying to make sure she had covered all the possibilities, “Or perhaps it is just whoever opens their envelope first?”

Logic, “We can dispense with the last explanation as they open their envelopes simultaneously. It’s like, there’s not enough time.” He continued, “As for the other four explanations, they are all based on the idea that opening an envelope acts as a cause.”

Dogma, “You’ve all missed one other explanation,” he glared at them, “you should assume that Experiment is being a little devious here, really devious.” He looked at each of the three protagonists, Experiment, Proof, and Reason, “Experiment is simply putting a classical gold coin in one envelope and a classical silver coin in the other, and then randomly sending one envelope of each pair to Proof and the other to Reason. There is no *cause*,” hands above his head, he did the finger quote thing, “between Proof and Reason; the cause is Experiment who populates the envelopes before sending them out. That puts him in the past of both Proof and Reason.” Mimicking Theory’s professorial tone, “It’s called common cause. No mystery here. No spooky action.”

Curiosity, a bit perturbed, “*Ahh*, I feel stupid, of course that’s the explanation.”

Understanding came over, glanced at Dogma, then looked directly at Experiment, “Are you trying to pull a fast one?” Experiment, laughing, “Not at all, I’m just trying out this neat kit I picked up from the National Letter Service. The procedure is simple, I pick two spooky-coins, rub them together, place each one,” he paused while glancing at the kit’s brochure for the proper jargon, “in a magic-envelope, and then send them in opposite directions.”

Dogma was initially gratified that Understanding had come to his defense, but he was also a bit wary; a portent as it turned out.

Understanding picked up the kit’s brochure and did a quick but comprehensive once over of it. “In that case,” he continued, “what if you have Proof and Reason open their envelopes vertically instead of horizontally?” Curiosity, “What difference will that make?” Before Understanding could respond, Experiment jumped in, “Oh, let’s just try it.”

Under Experiment’s direction another 100 pairs of magic-envelopes each containing one member of a pair of spooky-coins were sent to Proof and Reason, who meticulously oriented their envelopes vertically, opened them simultaneously, and then dutifully recorded the results. To everyone’s surprise except Understanding’s, there wasn’t a gold or a silver coin in the entire run. Instead the coins were either platinum or osmium. But there were two similarities to the previous run; each list was completely random, and the lists were 100% anti-correlated. If Proof got a platinum coin, Reason got an osmium coin, and vice versa.

Theory chimed in, “I have a prediction to make. Let’s do one more run, but now let Proof and Reason randomly choose how they open their envelopes. They will still open them at the same time, but they won’t let the other know how they oriented their envelope. And just to be doubly careful, they won’t decide which way to orient their envelope until after Experiment has stuffed them and sent them on. They are to delay their choices until after the envelopes separate.”

Understanding nodded while Dogma got that sinking feeling in the pit of his stomach. That feeling got worse when Paradigm wandered over, “I think this last run is going to be the most interesting of all.”

One more time the EPR team stuffed, sent out and opened 100 pairs of envelopes. Mathematics reviewed the two lists and gave his report. “As Theory predicted, the anti-correlations exist only when the envelopes are opened with the same orientation; gold/silver for the horizontal orientation, and platinum/osmium for the vertical orientation. When the orientations differed, there were no correlations; a gold coin on one side offered no predictive value to whether a platinum or an osmium coin showed up on the other. Same unpredictability for silver, platinum, or osmium.”

Paradigm, with a very annoying glint in his eye, queried Dogma point blank, “A rather *uncommon* pattern, wouldn’t you say? So, how did Experiment know which coins to place in the envelopes?” Dogma was stunned, for while it wasn’t immediately obvious, a little computation revealed that no matter what combination of classical coins were stuffed into the envelope pairs, it wasn’t possible to produce the observed patterns. The difference was small, only 12.5% but it was irreducible. Somehow, the combination of spooky-coins and magic-envelopes was able to

produce correlated outcomes that could not be achieved with classical coins, even when using the magic-envelopes. Timelike causality couldn't explain it as the envelopes were opened at the same time, and common cause could not explain it as the statistics revealed.

What was worse, these were the only two types of causes in Dogma's current place-scheme. He looked at Paradigm; he looked at him for a long time. He realized what was coming. Sooner or later Paradigm was going to propose some new kind of causality, a third kind; and upset his world once again.