**EXPLAINING THE UNEXPLAINABLE**

**Jim Davies | Nautilus | 5/10/18**

*Behavioral Psychology: When Logic Fails, Stories and Superstition Prevail.*

During the Enlightenment, the French philosopher Voltaire called superstition a “mad daughter” and likened it to astrology. The leading thinkers of the time espoused reason and sought to explain the world through the scientific method.

Today, we take a certain pride in approaching the world analytically. When faced with a confusing event, we search for its cause and effect. If we can determine why one action follows another, we can explain why it happened and when it might recur in the future. This makes the outcome reliable.

The fact is that any of us can become superstitious given the right circumstances. You included.

Take batters in baseball. Many sports fans believe that batting in professional baseball is the most difficult task in sports. Even the best batters only manage to get a hit about a third of the time. Fans of baseball will know that many batters have good luck rituals.  Before they step up to the plate, spectators might see players touching their hat, making the sign of the cross, or tapping their foot on home plate.

As cultural anthropologist George Gmelch describes in a baseball review magazine, players’ rituals extend to actions before and after the game. For reasons that remain unknown, tuna sandwiches are the preferred “last supper” before one player’s game, while another wears special underwear. After a successful game, one player has been known to put pennies in his jock strap. By the end of a good season, he jingles as he runs.

It seems that batters are a superstitious bunch, but this is not because there is something different about the brains of baseball players.  Batting turns out to be so challenging that it is impossible to predict the outcome. Sometimes a batter hits the ball out of the park. More often, he strikes out. The ritual behavior is a particular response to the circumstance.

But lest you think that superstition is innate to batters, keep in mind that they are the same individuals who play other positions during the course of a game. While batters may run with pennies clinking in their jockstrap, outfielders are a fairly sedate bunch by comparison. They are the same individuals, the same baseball players wearing different hats. It can’t be that batters are inherently more superstitious than fielders. There’s something about batting that makes them prone to practice rituals. It’s the situation that makes them superstitious.

Superstition in baseball is limited to a particularly challenging part of the game. Similarly, superstition can be associated with a particular behavior in a society.

In 1948 the Polish born British anthropologist Bronislaw Malinowski published a book on a study he conducted of the fishermen of the Trobriand Islands. Sometimes they fished in an inner lagoon, where fishing was pretty predictable. Every time they fished there, they got pretty much the same kind of catch. But they also fished in the open ocean, where the fish were bigger and harder to catch. Sometimes people would get great catches, and other times, terrible ones.  The lure of the very rare great catch proved too tempting for the Trobrianders, so they ventured into the open ocean despite the odds—and developed a set of superstitions. These included rituals performed during fishing and the casting of magic spells.

The circumstance dictated the explosion of rituals. We might think this is a completely human adaptation.  But it turns out that the tendency to resort to ritual in an effort to manage a challenging situation isn’t exclusive to humans. In the same year that Malinowski published his experiment, American psychologist B. F. Skinner found that he could generate superstitious behavior in pigeons. He taught pigeons to press down on a bar in exchange for food. All animals can learn to do this, and this learning process is called reinforcement. But an interesting thing happens if the food is given at random intervals—that is, pressing the bar sometimes does, and sometimes does not, produce a treat, with no discernable pattern. Under these conditions, but not under reliable conditions, the pigeon will start repeating arbitrary, idiosyncratic behaviors before pressing the bar. It might bob its head, or turn around twice. The pigeon becomes superstitious.

It’s as though the pigeon believes, at some level, that there is a reliable way to get a food pellet. It is the pigeon’s experience that pressing on the bar isn’t enough, because that doesn’t always work. So when the food actually comes, the pigeon looks at what it was doing before and wonders if those arbitrary actions—turning the head, making a noise—had something to do with the food delivery. The pigeon tries those things, and sometimes the food does indeed come. But sometimes the pigeon performs the ritual and the food still doesn’t come.

One would think that this would convince the pigeon that getting or not getting the treat has nothing to do with behavior. Similarly, in baseball, the batter can’t point to a direct correlation between tapping their foot on home plate and batting a double. The brave Trobriand fisherman who ventures out into the open sea after practicing a particular ritual can’t rely on the spirits’ goodwill. Voltaire and the philosophers from the Age of Reason would want us to apply rational tools and to understand that there is no connection between cause and effect.

Yet—whether for humans or pigeons—the opposite turns out to be true. There seems to be something in the brain that, when confronted with no easily discernable pattern between one’s action and the outcome, seeks to forge a bridge and create a story that unites the two events—one an action that you can take, and therefore a reliable bet, and two, an event with a low probability of occurrence.

People, just like pigeons, are desperate to understand how the world works and map out its patterns. We know a bit about the biological process underlying this drive. It appears that a neurotransmitter—a chemical that neurons use to communicate with each other—called dopamine is strongly implicated in pattern detection in the brain. Very broadly speaking, the more dopamine you have at work in your brain, the more patterns you see.

Dopamine tags perceptions as meaningful. If there is too little dopamine, we don’t notice any patterns, and if there is too much, we perceive patterns that are not there. We might jump at every shadow, thinking it’s a murderer. Our view of the world would be full of misconceptions—and we would become paranoid. Our dopamine levels have to be set correctly.

In fact, we are all born with default dopamine levels: This often determines how we see the world. The Swiss neuroscientist Peter Brugger ran a famous experiment testing the extent to which one’s dopamine output determined one’s worldview.  He showed images of faces to participants, some of whom had admitted to believing in the paranormal and in religion, and others who had said they were skeptics. Some of the images were easily recognizable as faces and some were degraded to the point where it was hard to discern facial features. The skeptics saw few facial patterns while the believers saw many.

Half of the skeptics were then unwittingly given a dose of levodopa, a drug that temporarily increased their dopamine levels. With levodopa, these skeptics behaved more like the believers—they saw more faces in the images. Because it could manipulate a person’s pattern sensitivity by changing their dopamine levels, this experiment showed that higher dopamine levels can cause more pattern detection. The process also works in reverse: Mexican neuroscientists Victor de Lafuente and Ranulfo Romo found that when thrust into unpredictable environments, monkeys had an increased amount of dopamine in their brains.

It turns out that when we are confronted with a situation that presents no obvious pattern our brains amp up the dopamine levels, making us superstitious. The situation creates cognitive confusion and we respond accordingly. Even Voltaire, the arch rational philosopher, might have responded this way.

In some cultures, superstition has become so entrenched that it has become part of the belief system. Superstition then becomes less a way of dealing with particularly unlikely events and more a way to explain all external, difficult to explain events. In the late 1920s, British anthropologist Edward Evan “E. E.” Evans-Pritchard studied the Zande people of the Sudan. In his memoirs, he records an anecdote that involved a level of interaction with one’s study subjects that would be frowned upon today. A Zande boy stubbed his toe on a tree stump. The cut festered and the boy blamed it on witchcraft. Evans-Pritchard explained that the stump had grown naturally, and that the boy had failed to see it in the grasses, and that dirt can cause infections. To scientifically-minded people, this explanation might be enough. However, it turned out that the boy already knew these things, but was *not* satisfied that they explained everything.

The Azande (plural for Zande) believed in witchcraft, a belief that extended to every level of their lives—from fishing to family relations.  “There is no niche or corner of Zande culture into which it does not twist itself,” Evans wrote. To the boy, witchcraft explained why, in spite of being vigilant, he failed to see the stump *at that time*, and why *this* cut festered when others did not. Evans-Pritchard had no better answer to these questions. Indeed, nearly 100 years later science would still basically attribute these events, vaguely, to chance. To this Zande boy, “chance” wasn’t much of an explanation at all. The cut felt meaningful. And it happened to him.

There is another important lesson from the Zande story: Superstition flourishes precisely because we believe that we are able to influence the outcome of events. We have an outsized sense of control. Recent scientific studies support this claim, showing that when we experience something personally, we exaggerate its significance.

For example, Israel-based psychologist Ruma Falk ran an experiment in which people read stories about coincidences that supposedly happened to them and stories that happened to other people. People rated coincidences that happened to them as more surprising than those that happened to other people. If *someone else’s* old friend calls him while he’s thinking about her, well, that kind of thing happens all the time. But if *my* old friend calls me while I’m thinking about him, well, that’s got to mean something, doesn’t it? It is more surprising because coincidences seem more unlikely when they happen to us. The feeling that something is meaningful is stronger when that something happens to us as opposed to someone else.

These are both examples of how we try to create patterns and a narrative around an event when little information is available. Even if success or failure is written in the stars for the pigeon, the batter, and the Trobriander fisherman, their subjective experience persuades them that there is some way to sway the odds in their favor. Perhaps through a ritual dance? Together with the need to make sense of the environment, subjectivity may be crucial to understanding why the mind is so affected by low probability events.

Voltaire would protest that even when an explanation of an event is personally meaningful, we still must consider the laws of science when trying to make sense of it. Yet two and a half centuries later, even with tremendous advances in scientific understanding, there are many situations in which we are still prone to become superstitious. In fact, by tracking neurotransmitters in the brain, science has showed us that individuals in professions requiring the construction of narrative connection (like philosophy and novel writing) have high dopamine levels, making them prone to superstition. That would apply equally well to the famous author of the novel *Candide*: Voltaire.

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