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How science can save you from choking

Can you prevent sports stars from "doing a Van de Velde"?

Psychologists think they have the answer. By Jonah Lehrer

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Kenny Perry could taste history. He had a two-shot lead with two holes to go at the 2009 Masters - all he had to do was not make any big mistakes and he would become, at 48, the oldest Masters champion in history. For three days at Augusta, he had played the best golf of his life: on the first 70 holes, he made only four bogeys. But then, at the 71st hole, everything started to fall apart.

It began with his approach shot, which sailed left over the green. On the next shot, Perry watched as his chip and run went horribly awry and the ball raced downhill, past the hole and off the green. The crowd gasped. Perry was lucky to double-putt for a bogey, his first in 22 holes.

On the final hole, the tee shot that looked straight ended up twisting left and landing in a bunker. He then short-sided himself on the green, so that the ball came to rest on a treacherous downhill slope. His next shot got him within 15ft of the hole, and putting for the championship. Perry's face was etched with anxiety. He took out his plumb-bob - a tool that helps golfers determine the break of the green - and tried to measure the subtle curve of the grass. Then he measured again. And again. It's as if Perry no longer trusted his eyes or his instincts. He missed the putt.

The play-off didn't go much better. At the first hole, after a solid drive, Perry's next shot went far right and landed in thick grass. He needed a masterful stroke just to eke out par. And then, on the second extra hole, he unravelled. From the fairway he hit an ugly hook and the ball landed with a thud in the pine trees. Perry looked to be on the verge of tears: he knew he had just lost the Masters. It was not quite a Van de Velde moment - named after the Frenchman who squandered the 1999 Open - but it was not far off.

The next day Perry was stoic. "Great players make it happen," he said. "Your average players don't. And that's the way it is." In other words, the dividing line between winning and disappointment isn't about technique or athleticism or talent. It's about performing under pressure, hitting the shots when they matter most.

We call such failures "choking", if only because a person frayed by pressure might as well not have oxygen. What makes choking so morbidly fascinating is that the performers are incapacitated by their own thoughts. Perry, for example, was so worried about not making a mistake on the 17th that he played a disastrous chip. His mind sabotaged itself.

Scientists have begun to uncover the causes of choking, diagnosing the particular mental differences that allow some people to succeed while others wither in the spotlight. Although it might seem like an amorphous category of failure, their work has revealed that choking is triggered by a specific mental mistake: thinking too much.

The sequence of events typically goes like this: when people get nervous about performing, they become self-conscious. They start to fixate on themselves, trying to make sure that they don't make any mistakes. This can be lethal for a performer. The bowler concentrates too much on his action and loses control of the ball. The footballer misses the penalty by a mile. In each instance, the natural fluidity of performance is lost; the grace of talent disappears.

Sian Beilock, a professor of psychology at the University of Chicago, has helped illuminate the anatomy of choking. She uses golf as her experimental paradigm. When people are learning how to putt, it can seem daunting. There are just so many things to think about. Golfers need to assess the lay of the green, calculate the line of the ball, and get a feel for the grain of the turf. Then they have to monitor their putting motion and make sure that they hit the ball with a smooth, straight stroke. For an inexperienced player, a golf putt can seem unbearably hard, like a life-sized trigonometry problem.

But the mental exertion pays off, at least at first. Beilock has shown that novices hit better putts when they consciously reflect on their actions. The more time they spend thinking about the putt, the more likely they are to hole the ball. By concentrating on their game, by paying attention to the mechanics of their stroke, they can avoid beginner's mistakes.

A little experience, however, changes everything. After golfers have learned how to putt - once they have memorised the necessary movements - analysing the stroke is a waste of time. The brain already knows what to do. It automatically computes the slope of the green, settles on the best putting angle, and decides how hard to hit the ball. Bradley Hatfield, a professor of kinesiology and psychology at the University of Maryland, has monitored the brain wave activity of expert athletes during performance. (Because the subjects have to wear a bulky plastic cap full of electrodes, Hatfield can only study golfers, archers and Olympic rifle shooters.) While the brain waves of beginners show lots of erratic spikes and haphazard rhythms - this is the neural signature of a mind that is humming with conscious thoughts - the minds of expert athletes look strangely serene. When they are performing, they exhibit a rare mental tranquility, as their brain deliberately ignores interruptions from the outside world. This is neurological evidence, Hatfield says, of "the zone", that trance-like mindset which allows experts to perform at peak levels. (As the corporate motto says, the best athletes don't think: they just do it.)

Beilock's data further demonstrate the benefits of relying on the automatic brain when playing a familiar sport. She found that when experienced golfers are forced to think about their putts, they hit significantly worse shots. All those conscious thoughts erase their years of practice. "We bring expert golfers into our lab, we tell them to pay attention to a particular part of their swing, and they just screw up," Beilock says. "When you are at a high level, your skills become somewhat automated. You don't need to pay attention to every step in what you're doing."

This is what happens when people "choke". The part of their brain that monitors their

behaviour starts to interfere with actions that are normally made without thinking. Performers begin second guessing skills that they have honed through years of practice. The worst part about choking is that it tends to spiral. The failures build upon each other, so a stressful situation is made more stressful.

Chuck Knoblauch, for instance, was one of baseball's finest infielders. But in 1999, playing for the New York Yankees as second baseman, he developed the "yips" and started making inaccurate throws to first base. (This involves throwing the ball less than 20 feet - it's the shortest throw in the game.) Although Knoblauch had been playing in the position for more than two decades, his throws were now sailing into the stands - even, on occasion, injuring fans. Paradoxically, it was the easy throws that had become the most difficult, simple tosses that allowed him time to think. This strange psychological lapse would end his career.

Thinking too much isn't just a problem for athletes. Claude Steele, a professor of psychology at Stanford University, studies the effects of performance anxiety on standardised tests. When Steele gave a large group of second-year Stanford students a set of questions, which he said would measure their innate intellectual ability, he found that the white students performed significantly better than their black counterparts. This discrepancy - commonly known as the achievement gap - conformed to a large body of data showing that minority students tend to score lower on a variety of standardised tests, from Sats to the IQ test.

When Steele gave a separate group of students the same test but stressed that it was not a measure of intelligence - he told them it was merely a preparatory drill - the scores of the white and black students were much more similar. The achievement gap had dramatically narrowed.

According to Steele, the disparity in test scores was caused by an effect that he calls "stereotype threat". When black students are told that they are taking a test to measure their intelligence, it brings to mind, rather forcefully, the ugly and untrue stereotype that blacks are less intelligent than whites. The Stanford sophomores were so worried about being viewed through the lens of a negative stereotype that they performed far below their abilities, just like a self-conscious golfer.

However, choking doesn't have to happen - it's not an inevitable flaw of performance. Last year, Daniel Gucciardi and James Dimmock, psychologists at the University of Western Australia, performed a study of 20 experienced golfers with handicaps ranging from zero to 12. The scientists had the golfers play under three separate conditions. In the first, they were told to fixate on specific components of their swing, such as "hips" or "straight wrist". The second condition consisted of the golfers focusing on irrelevant words, such as "blue" or "white". In the third, the golfers were told to focus on general aspects of their intended movement, or what the psychologists refer to as a "holistic cue word". For instance, rather than contemplating the precise position of their wrist, they contemplated descriptive adjectives such as "smooth" or "balanced". To make the

experiment a bit more realistic, and to induce some anxiety, the scientists awarded a modest cash prize to the best golfer.

Gucciardi and Dimmock got two interesting results: the first was that anxiety only interfered with performance when it was coupled with self-consciousness. Nervous golfers who thought about the details of their swing, such as how to position their hips, hit consistently worse shots.

The second interesting result was that there was a way to ward off choking. When the expert golfers contemplated a holistic cue word, their performance was no longer affected by anxiety. Because the positive adjectives were vague and generic, they didn't cause the athletes to lose the flow of expert performance or overrule their automatic brain.

The best athletes do this automatically - they have found a way to resist the pitfalls of pressure. Hank Haney, Tiger Woods's swing coach, says his client's ability to clear his mind at combustible points in a tournament is unparalleled.

"Tiger, he's at his calmest when he's in the last round and things are coming down to the end. It's absolutely amazing." How does Tiger do this? By fixating on banalities and cliches. "Mental toughness, I think you could put it into words," Tiger says. "It's stuff like you never give up. You never give in to anything. You never accept anything but the best from yourself." These vapid phrases have saved Tiger countless times from coming undone on the 18th hole.

The benefit of the "holistic cue word" approach is that it doesn't require performers to stop thinking entirely, as this can be excruciatingly difficult, especially under pressure. Instead, the experiment suggests that golfers and footballers can still contemplate their behaviour - they just need to do so without thinking about specifics. In this sense, focusing on a vague aspiration can be an elegant distraction, a simple thought that can keep us from thinking too much.

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