NEURON CULTURE BY DAVID DOBBS

The Tight Collar: The New Science of Choking Under Pressure

By David Dobbs ✉ September 27, 2010 | 7:42 am | Categories: Neuron Culture, Science Blogs

Note from the author: This is a feature I wrote that never ran, because the publication that assigned, accepted and paid for it, The New York Times *sports magazine* Play, *folded six weeks before the story was scheduled to run.*

The Collar

Late in May 2009, perched in superb seats a few rows behind home plate at Chicago's Cellular Field, I took in a White Sox-Indians game with Sian Beilock, a professor of psychology at the University of Chicago who studies what is surely, other than serious injury, the most feared catastrophe in sports: the choke.

This is an opportune time to finally run this feature, for the subject of the story, University of Chicago psychology professor Sian Beilock, has just published a book, *Choke: What the Secrets of the Brain Tell You About Getting It Right When You Have To*. She was working on the book when I researched and wrote this story in summer and fall of 2009. It was a sort of dream assignment for me: baseball and cognitive neuroscience. I went to Chicago and visited Beilock in her lab, where she made me choke in a putting game. (I lost $5 in the deal, too, which I forgot to bill the *Times* for.) That evening we went to a White Sox game to see someone choke, and were not disappointed. And later that summer, I went to see the White Sox play the Red Sox in Fenway — a splendid, tense game, one of the best I've ever seen, in which Chicago lost even as one of its stars redeemed himself while going hitless. Meanwhile, I was introduced to a novel view of what generates or destroys performance under pressure.

Beilock, who not long ago played some high-level lacrosse at University of California, San Diego, traces her own interest in choking back to high school, when she discovered that during the tense, game-beginning face-offs, she more often gained control of the ball if she sang to herself, "to keep me from thinking too much." Later, in grad school, it occurred to her that if you could avoid choking by engaging your brain with singing, it followed that choking must rise from what neuroscientists like to call mechanisms — that is, systematic, causal chains of brain activity.

She has spent much of her time since then exposing and exploring those mechanisms. Her labs include a putting room where she can find a way to make virtually anyone screw up putts that were easy just moments before. Her work has brought her absurdly early tenure, a rain of prizes and grants, and a flashy book contract. She is a kind of queen of choke.

Which is what brought us to Cellular Field. I'd hate to say we were *wishing* for someone to choke; more like waiting. And given that baseball offers a hundred openings for pressure's effects, and that this was a tense game between teams vying for first place — the White Sox led their longtime division rivals, the Indians, by a game and a half — we could wait in confidence, knowing that at some point a player would "suffer," as Beilock politely phrased it, "a decrement under pressure."

The game did not disappoint. Through seven innings the pitchers dominated, and the pressure slowly rose. Then, in the eighth, the White Sox, leading 2-1, got a chance to put the game away when the Indians' pitcher C.C. Sabathia finally tired and was replaced by Jensen Lewis, a rookie, just as the White Sox were sending up their best hitters.

Lewis, perhaps suffering a bit of a decrement himself, walked the first hitter and then surrendered a double that left runners at second and third. When White Sox slugger Jim Thome, who had already homered once, came to bat, Lewis, on orders from the bench, walked him intentionally to get to the next batter.

A certain weight — the weight of great opportunity — falls upon any hitter who steps to the plate with the bases loaded. It falls heavier when the pitcher has just intentionally walked the previous batter.

Feeling this weight now was Paul Konerko, the Sox first baseman. Konerko generally hits well with runners in scoring position, batting a few points higher than his lifetime average, and he could do so in big moments: He had won game 2 of the 2005 World Series, in fact, by homering with the bases loaded.

But Konerko was also a streaky hitter, and lately he had run cold. In fact he was having a terrible season. He was hitting just .212, and he had not homered in weeks. Now, however, he had a chance to break open an important game.

Though I was there to see a choke, I was pulling for the guy. But he had a horrible at-bat.

It was one I could relate to, for I had endured an at-bat remarkably similar to his the week before. (I play in what my wife calls "geezerball," an amateur league for those over 35.) With two runners on and my team trailing by a single run, I had done everything wrong: I took a hittable fastball for strike one, chased an unreachable curve ball outside, and then stood frozen as strike three — another fastball, which you should always be ready for with two strikes — split the plate.

Now I watched with amazement as Konerko did much the same. He had enough sense to swing at *his* first-pitch fastball, only he missed it. But after that it was carbon copy: He chased a curveball outside, then stood frozen as a heater blew by for strike three.

Now, I don't want to say Konerko *choked*, because (a) he was facing major-league pitching, which is incomprehensibly nasty, and (b) I met Konerko later, and he's a tremendously likable guy, and I'd hate to hurt his feelings. Yet it seemed clear that if the tremendous pressure of this crucial at-bat had not exactly destroyed Konerko, it had affected him enough to produce a subpar performance. So I don't want to say he choked. But he gagged.

But what, really, did this mean? What had transpired in his skull to make this feared major-leaguer bat like an amateur?

Useful Distraction

Even the greatest athletes sometimes choke. Take Derek Jeter. Jeter's hitting generally holds steady or even improves under pressure; he bats as well or better as strikes, outs, and base runners accrue, and his .309 batting average in postseason games is impressively close to his lifetime .317. Yet during the epic 2004

American League Championship Series, as his Yankees won the first three games and then *dropped four in a row* to allow the Red Sox to reach the World Series, Jeter hit barely .200.

Or consider Ben Hogan, one of golf's steadiest great players. On the final hole of the 1946 Masters, Hogan needed only to sink a 2-foot putt to win. He completely missed the cup. In another notorious golf gaffe, Arnold Palmer, known for playing well in tight spots and being untouchable once ahead, choked the 1966 U.S. Open twice: He blew a 5-stroke lead in the last four holes of regulation, and in the playoff the next day, he blew 6 strokes in the final eight holes, losing the tournament.

Collapses like these — classic chokes — appear to rise from the process known colloquially as "thinking too much" or "paralysis through analysis," and among cognitive scientists as "explicit monitoring." Explicit monitoring, says Beilock, is "conscious attention to normally automatized physical operations that destroys the athlete's normal fluidity."

This is the micromanaged putt, the aimed pitch, the overdirected free throw. This is the screwup your brother is trying to induce when he asks you, as you tee up, "Do you inhale or exhale on your backswing?" By consciously trying to direct a physical action that you've practiced until it's automatic, you botch it.

Bounteous research has confirmed that for polished athletes, the explicit monitoring of destroys performance. Beilock, for instance, demonstrated this by asking expert college soccer players to keep track of which side of which foot was contacting the ball as they dribbled through a series of pylons. When they did, they moved through the pylons more slowly and made more mistakes than they did normally. She regularly gets similar results when she asks good golfers to monitor, say, how far back they take their backswings.

"You need to monitor these mechanics while you're learning an action," Beilock notes. "But once you've learned it, you've got to leave it alone."

The classic advice for avoiding thinking too much is to "not think about it." But this is not easily done. You're better off, says Beilock, if you find something else to think about — a useful distraction, some simple mental task that occupies the mind enough to keep it from meddling.

Rob Gray, a professor of psychology at Arizona State University, demonstrated this a few years ago with an elegant two-stage experiment he conducted with high-level college baseball players in a batting cage. In the first part of the experiment, he asked the batters (whom he had already watched hit in order to establish a baseline performance) to listen for a tone while hitting so they could report where their bat was in the swing when the tone sounded. Unsurprisingly, this explicit monitoring made them hit worse. They missed more often, and their swings got measurably slower and more choppy.

Yet it was not the listening that messed them up; it was their attention to the swing. For when Gray asked the hitters to listen for a tone while batting and report merely whether the tone was high or low in frequency, the hitters swung as fluidly and hit as well as usual. Their bodies knew the hitting process well enough to do it with a distracted brain. But explicitly monitoring the process gummed it up.

Since then, Gray, Beilock, and others working such "dual-task" or "healthy distraction" experiments have shown that attending a modestly demanding outside mental operation can reduce explicit monitoring and alleviate choking. Beilock has found, for example, that golfers under competitive pressure can prevent decrement by counting backwards to themselves while they putt.

"It's what I was doing when I sang during face-offs," says Beilock. "The simple mental task lets your body do what it already knows how to do."

Judicious Attention

Such findings have made explicit monitoring the blanket explanation of choking in sports. It's as if everyone agreed that while a bit of smarts can serve well at times — mostly for catchers, point guards, and quarterbacks — jocks generally best leave their thinking brains in the locker.

Perhaps because she is both brain and jock, Beilock received this wisdom skeptically. As a grad student looking at choking research, it struck her that the prevailing model of performance under pressure rose from experiments that look almost exclusively at physical actions.

"Yet choking," as she points out, "is so clearly mental.

"If you study golf and study only the strokes, you'll have only one idea about how skills fail. But there are crucial skills in sports that rest on processes less physical. Part of sports is thinking." And there are chokes, she asserts, that rise not from overthinking but from poor thinking.

She offers evidence both anecdotal and experimental. For anecdote, consider golfer Colin Montgomerie in the 2006 U.S. Open. Montgomerie, 42 at the time and burdened with the unofficial title Best Golfer Never to Win a Major, began the tournament's last hole having just taken the lead with a gorgeous 50-foot putt.

To take the trophy he simply had to par the 18th. He put his drive in the middle of the fairway, leaving himself a straightforward 170-yard approach shot to the green. But after pulling a 6-iron from his bag — his usual club for a 170-yard shot — he suddenly worried about hitting too long.

He put back the six and pulled out the shorter 7-iron — and hit short. The ball landed in deep rough. His chip landed 30 feet from the hole, and he three-putted to lose by a stroke.

An even clearer example comes from the 1993 NCAA championship basketball game. University of Michigan star Chris Webber gained possession of the ball with 11 seconds left and called a time-out — only to discover that his team had no more time-outs. The resulting technical foul helped seal Michigan's elimination.

Beilock contends that such failures come not from unwelcome attention, as explicit monitoring does, but from a deficit of needed attention. "Sports aren't cognitively static," says Beilock. "Situations change, and you need to track things and make decisions. You can't just *not* think. There's a whole skill involved in knowing not just what not to think about, but when to attend things that need tending. You've got to be able to control what you're attending to."

At the Sox-Indians game I saw with her, this made perfect sense. A typical at-bat requires coming to the plate with a plan of attack based on the hitter's skills and the pitcher's strengths and proclivities. Most batters focus on a hittable area of strike zone they suspect the pitcher will find at least once with a particular pitch: fastball outside, perhaps, or slider in tight. As the at-bat progresses and the hitter gains or loses advantage by getting ahead or behind in the count, he must shrink or expand his swing zone.

When hitters step out of the box between pitches, it's usually to perform this recalibration: they zoom out from their deep focus to check the count, regauge their swing zone, then step in and zoom in again. If they don't do this or they think poorly or second-guess, they're more likely to get surprised — and to swing at pitches they should take or take pitches they should swing at.

Beilock holds that such faulty thinking amounts to a different sort of choke: a disruption of quick but vital data-checks, calculations, and recalibrations that the athlete must perform to play at optimum level. It's a failure of cognition. Call it a cognichoke.

Is that what was going on with Konerko? And how did it work?

Why White Men Can't Putt

Sports psychology goes back to 1898, when psychologist Norman Triplett found that cyclists ride faster in groups than they do alone. Since then, sports psychologists have had the arena of performance and its decrements largely to themselves. No one outside jock psych seemed terribly interested in what made people screw up.

This began to change, however, in 1995, when a Stanford psychology professor named Claude Steele, working with graduate student Joshua Aronson, published a study titled "Stereotype Threat and the Intellectual Test Performance of African Americans." The paper described how Steele and Aronson knocked down by a whopping 50 percent the scores of black Stanford undergrads taking sections of the Graduate Record Examination (GRE) simply by telling them the test measured intelligence.

The paper created a sensation, inspiring a rain of similar studies. Steele and Aronson subsequently showed you could drive down test scores merely by having black students declare their race on a pre-test form. They and other researchers soon found that stereotype threat works on other groups, too. Mention anything about gender or "innate ability" to women taking a math test, for instance, and they'll make more mistakes.

Though these stereotype-threat effects fairly reek of choking, several years passed before anyone examined them in the light of sports performance. Then, in 1999, Jeff Stone, a social psychologist at the University of Arizona, asked both white and black golfers to play a putting game framed as a test of either "sports intelligence" or "natural athletic ability." The results still astonish: Among the golfers considering the putting game a test of "natural athletic ability," blacks did better than usual and whites did worse. Among those framing it as a sort of sports intelligence test, whites did better and blacks worse.

This result, replicated many times since, eerily echoes the GRE test-score plunge that Steele and Aronson induced in 1995. Yet that white golfers suffered a hit while being tested for "natural athletic ability" raises an intriguing question: If white male golfers in Arizona can be so easily derailed by an unflattering stereotype, who on earth is exempt from stereotype threat?

No one. Since those first studies, Stone, Beilock, and others have produced, with almost laughable ease, absurdly task- and stereotype-specific effects in groups of every sort. For instance, if you ask white men to jump both before and after calling the jumping test a measure of "natural athletic ability," they will jump significantly less high after the threat. White male engineers, meanwhile, will ace a math test if it's presented as a test of gender-based or innate math abilities — but tell them they're being compared with Asian male engineers, and they'll choke badly.

"We haven't found anyone," says Beilock, "that we can't screw up by suggesting that some group they're a member of is bad at something."

Stereotype threat, it turns out, is a surprisingly democratic dynamic. Obviously stereotypes such as bigotry and sexism are not applied equitably. But no one is immune to the mechanism that stereotype threat applies. For this reason, some psychologists are starting to call it "identity threat." As Jeff Stone put it, "We all have multiple identities, and they can all be discriminated against. It's the identities we carry that make us vulnerable here."

Emphasize the identity aspect, and the sports implications rapidly expand. The many late-season and post-season failures by the Chicago Cubs, for instance, start to make more sense: In a pressure situation, any simple reminder that you're a Cub (like, say, your uniform) may cause enough decrement to make you drop fly balls, boot grounders, or monitor your way out of an at-bat.

Meanwhile, stereotype "lift" — a performance boost that some studies have found in people doing tasks their stereotyped groups supposedly do well — may lend extra advantage to the Yankees or (now that their two World Series wins in 2004 and 2007 seem to have lifted the Curse) the Boston Red Sox.

But how does stereotype threat work? The initial hypothesis about the Steele and Aronson African-American test-taking results was that stereotype threat created a self-fulfilling image of failure, a sort of role-playing in which the test-taker surrenders to the stereotyped identity by disengaging emotionally and intellectually. In the last five years or so, however, researchers such as Beilock and the University of Arizona's Toni Schmader have done experiments suggesting that stereotype threat fouls performance primarily by occupying working memory.

Working memory is the crucial mental faculty that briefly retains multiple pieces of unrelated data so you can use or manipulate them. You depend on working memory every time you read a paragraph, learn a new definition, perform a multipart math problem in your head, or try to retain a phone number while you finish a conversation. Working-memory capacity is closely tied to general powers of intellect and decision-making. When it's not working well, you're not as sharp.

In late 2007, Beilock found that when women under stereotype threat choked on a math test she designed for them, they choked almost exclusively on problems that relied on working memory; they fell short not because they were thinking too much, but because they couldn't keep in mind the things necessary to the task.

This working memory failure is a much different mechanism than external monitoring (which stereotype threat can also cause); instead of overmonitoring a physical operation, the athlete or test-taker is poorly attending a mental operation. Beilock believes such misattention is at work when athletes commit mental stumbles like Colin Montgomerie's club switch. Montgomerie wasn't stupid to double-check his choice of club; calibrating club selection is essential to high-level golf. His mistake was in not working through the problem fully and leaving out the essential information: that conditions dictated that he should indeed use his regular club length. But with his cognitive machinery slowed by preoccupied working memory, he failed to think straight and miffed it. He cognichoked.

How do you fend off such effects of stereotype threat? As Jeff Stone notes, identity is partly a matter of context and even choice. "Usually, something in the context has to activate a stereotype threat. It has to be turned on. But you can also turn it off. To some extent, you can reframe things yourself." Asian women, for instance, do better on math tests if they focus more on their Asianness than on their gender.

"You can't dictate your genes," says Stone. "But among the many identities you have, you can choose which to operate from." Tiger Woods, for instance, has clearly forged an identity that transcends the potential vulnerabilities of his multiracial makeup. You can wallow in your most negative identity — the slow one, the overthinker, the one who doesn't care — or you can foreground another identity, the one who is ready, the one who knows what's coming, the one who calmly attacks the problem.

Not that this comes easy. As Beilock notes, this second, cognition-based failure under pressure means "there are at least two things going on, running parallel, almost all the time": a physical track and a mental track. "And what might disrupt you — what might crunch under pressure — depends on what you're doing at a particular moment."

You can jump off the physical track by overmonitoring and fall off the cognitive track through inattention. And distraction greases the physical track and kinks the cognitive. To travel both smoothly requires knowing what to attend to and what not to attend to — or to put it another way, understanding what to distract yourself from (your physical mechanics) and what not to get distracted from (the score, the count, how many time-outs you have left).

This is a vision of athletic performance both alluring and daunting. Sports start to look a lot more like real life — and much more demanding.

"It's a lot more complicated than just 'Don't think about it,'" says Beilock.

Showtime

How did hitters handle this dual track? I wanted to ask Paul Konerko. So late that season of 2009, on August 29th, I went to another White Sox game, the opener of a vital three-game series against the Red Sox in Boston. For pressure, this one easily beat the May game I'd watched with Beilock. Both teams were in drum-tight pennant races; the Red Sox were 4.5 games out of first in the American League East and the White Sox up a game and a half in the AL Central. Both teams needed wins. Both knew they might meet a month later, in the postseason.

Despite the stakes, however, the White Sox clubhouse seemed a remarkably calm place three hours before game time. Several players sat watching a Cubs-Phillies game that ran quietly on a television. Another cluster studied laptops showing films of Boston pitcher Daisuke "Dice-K" Matsuzaka, whom they would face that evening. I found Konerko in a chair in front of his locker doing a crossword puzzle.

Konerko in person projects a warmth and quickness of expression that doesn't come across in photos or even video. He is a smart but modest man, and articulate and open in a way that had long made him a favorite interview target among Chicago sportswriters. He sat alone today, however.

His season had not gone well since I'd seen him strike out in May. After hitting .222 in April and .191 in May, he'd gone .250 in June and .209 in July, and so entered August hitting .214 with just 9 homers, half his normal pace. The White Sox, desperate to produce more runs, dropped him two spots in the order, from the hallowed cleanup spot, fourth, to sixth; the Chicago press, meanwhile, was calling for his head.

On July 31 the team acquired slugger Ken Griffey Jr., and Konerko started seeing his name replaced on the lineup every few days by Nick Swisher, a 27-year-old outfielder-first baseman who until then had played the center field spot now occupied by Griffey.

Whether it was the Griffey trade, the days off, or improving health, however, Konerko had started to heat up the first week of August. He got a hit almost every game that week, including three in one game in Detroit. The following week he went 6-for-20. He entered this crucial Boston series hitting .339 for the month.

In four weeks he'd become a different hitter. Surely, I figured, he would be able to describe some difference in how he felt now versus a month before, some mental or mechanical adjustment that explained his cleaner engagement with the baseball.

"It's kind of strange, actually," he told me. "Fact is, I don't feel any different. I mean, I feel happier when it's going well and I'm helping the team. But I don't really understand what goes on when I'm doing well versus when I'm doing badly. I've had whole years where I had 'good years' — good numbers, helped the team — but felt like I was struggling the whole time. I've had other stretches where I feel completely locked in — and things don't work out."

I asked him how he tried to adjust when things weren't going well or when a situation carried more pressure.

"You try to stay steady. Not change too much. You prepare. You do your work every day, so you're swinging well and you know your pitcher and the situation. Then you go in and try to focus and execute. In the box, keep it simple. I try to concentrate on tracking a pitch into a zone I've chosen to focus on, swing hard at those. Sometimes you get fooled. But you stick to your routine, stay focused. Don't overthink."

This message — sticking to a routine, not overexamining — was echoed by every hitter I talked to that day, on both teams: Boston's free-and-easy slugger David Ortiz ("Don't be changing things!"); his tautly focused teammate catcher Jason Varitek ("Stay with your game."); and Konerko's clubhouse mates Jim Thome ("Be true to your program.") and Ken Griffey, Jr., who simply said, smiling slyly and repeating himself precisely in tone and emphasis, "Every at-bat the same. Every at-bat the same."

These were variations on "Don't think too much." But almost every conversation also addressed, in ways more veiled, the tension between when to think and when not to. The most revealing was a comment Konerko made as I closed my notebook, ready to let him return to his crossword.

"I wish you luck with this," he said. "It's a hard kind of story to get people to talk about this time of year — a team like this, anyway, in the middle of a pennant race. This is really kind of a spring-training story."

Only later did I realize what he meant. During the season, hitters in particular must guard against constant tinkering, or they'll tinker away a season. You save the heavy refashioning — reworking your stance or your swing, changing your focal tactics — for spring training. Once play begins, you stick to your program.

Approaching every at-bat the same does more than prevent external monitoring. It ritualizes the mental processes — the zoom out to check the situation, the zoom back in to focus, the oscillations between thinking and not thinking — that are as vital as the physical execution. It creates a management of attention as proceduralized, if not quite as automatic, as your swing mechanics.

I considered all this later, as I watched Konerko confront the mystery that was Daisuke Matsuzaka. Dice-K, 16-2 entering the game, had all seven of his pitches going that night in Boston. He was always on or near the edges of the plate and never over the center; he threw an untrackable variety of trajectories and speeds; he dipped, zipped darted, and curved; he made the ball do everything but climb. The White Sox managed just two hits, and they never came close to scoring. It was hard not to feel sorry for them.

Yet Konerko, though he went 0-for-3, looked good. Before each at-bat, when he was on deck, he smoothly executed the same stretching and swinging rituals, a sort of meditative entry. At the plate, he stepped out of the box after each pitch with the same deliberation and rhythm every time, took the same easy-ripping practice swing, raised his bat, stepped back in.His body language did not convey the dismay and confusion that it had 14 weeks before. He was more evenly engaged. And he had good at-bats.

He didn't get much to hit, but he took the pitches he should take and swung at the ones he had to, and in the second he drove the one touchable pitch he saw, a nasty low fastball, deep to right-center, where it was gathered in by a sprinting Jacob Ellsbury. He didn't get a hit. But he had righted himself.

Was he in the "zone," that hallowed place of effortless full focus? Perhaps; he certainly seemed to be there in the week that followed, as he went 10-for-28 with 3 homers, and for the rest of the pennant race, as he hit .260 with 9 homers in September, despite a knee injury mid-month. He was the team's hottest bat as they won the American League Central Division by a single game in a race decided the last day of the season. (They then lost the American League Championship to the Marlins in four games.)

The zone is a happy place. Yet if the zone lies at one end of a spectrum and the choke at the other, athletes spend most of their time laboring in the spectrum's inner bands, in a gray area between groove and gag. Playing on the happier end of this band requires almost numbingly proceduralized mechanics both physical and mental — a physical groove of automated motion and a mental groove requiring a disciplined oscillation of attention and thought.

"It'd be nice," as Konerko told me, "if it were as simple as not thinking. But you're always thinking. It's a matter of what you're thinking about."

———

Images: 1) Australia's Greg Norman reacts to a bad tee shot on No. 4 during final-round play of the 1996 Masters at the Augusta National Golf Club in Augusta, Georgia, April 14, 1996. Norman bogied the hole. (Curtis Compton/AP).
2) Cal State Fullerton senior catcher Billy Marcoe wipes his brow following a 3-run Minnesota first inning that helped lift the fourth-seeded Golden Gophers to a 3-1 upset of top-seeded Cal State Fullerton on June 4, 2010, at Goodwin Field during the NCAA Baseball Regionals. Matt Brown/Flickr/Cal State Fullerton.
3) Flickr/eagle102.
4) Fickr/Barb and Dean.
5) Vera Zvonareva at the 2008 Sony Erickson Open. Flickr/LinksmanJD.

David Dobbs writes articles and books, shares Google Reader items/a>, occasionally visits Facebook, and spends too much time on Twitter. He's currently in London working on a book about the epigenetic underpinnings of temperament.

Pages: 1 2 3 4 5 View All

Tags: baseball, Behavior, choking, Neuroscience, Paul Konerko, performance, Sian Beilock, Sports, sports performance
Post Comment | Permalink

Also on Wired.com

- Traffic-Swallowing Straddling Bus Coming To America
- *Lego Universe* Hits Shelves Today!
- Review: Fight Poké-Poaching in *Pokémon Ranger: Guardian Signs*
- Chemical Weapons, Iranian Agents and Massive Death Tolls Exposed in WikiLeaks' Iraq Docs
- Amazon Will Let Readers Lend Kindle Books This Year