

## CHOKER

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- Choking can occur when people think too much about activities that are usually automatic. This is called “paralysis by analysis.” By contrast, people also choke when they are not devoting enough attention to what they are doing and rely on simple or incorrect routines.
- Choking under pressure is poor performance that occurs in response to the perceived stress of a situation. Choking is not simply poor performance, however. Choking is sub-optimal performance. It is when one performs worse than expected given what one is capable of doing, and worse than what one has done in the past. This less than optimal performance does not merely reflect a random fluctuation in skill level, as we all have performance ups and downs. This choke occurs in response to a highly stressful situation.
- The more experience you have as a leader of our company, the worse your ability to manage your team members can become.
- The curse of expertise trips up experts when they try to predict others’ performance.
- Experts store memories as procedures and have difficulty explaining the “how-tos” of complex skills.
- As we get better at performing a skill, our conscious memory for how we do it gets worse.
- When you have to teach someone who knows less than you, you end up learning the material better yourself.
- Several studies have shown that working memory differences across people account for between 50 and 70% of individual differences in abstract reasoning ability or fluid intelligence. Working memory is one of the major building blocks of IQ.
- When what we are doing relies on procedural memory that operates largely outside of conscious awareness, too much time and concentration can be a bad thing because we are tempted to tinker with skills that are best run off without interruption. But when students are taking demanding tests or when people find themselves in situations where they have to reason through a novel problem, giving their cognitive horsepower time to percolate can be beneficial.
- Experts are slower to begin problems. They spend a few moments assessing the underlying structure of the problem and figuring out the best principles to use.
- Walking away from a problem for a few minutes can help folks find the most appropriate solution. This incubation period helps people to let go of their focus on irrelevant problem details and instead think in a new way or from an alternative perspective – producing an aha moment that can ultimately lead to success.
- Practicing under mild levels of stress can prevent you from choking when high levels of stress come around.
- Different types of stressful situations share commonalities, such as the fact that, as people’s motivation to succeed increases, their likelihood of failing does, too.

### Training Success

- What researchers found is that the prefrontal cortex, the part of the brain where working-memory and conscious control are housed, does not perform the lion’s share of the musician’s work as some

had believed. Rather, sensory and motor brain areas, where well-formed procedural memories reside, run the show during the performance of a well-practiced piece.

- Victor Borge to Vladimir Ashkenazy: “Has it ever frightened you to play and watch your fingers moving, and not know who it is that is making them move?”
- Practice can actually change the physical wiring of the brain to support exceptional performance.
- Despite innate differences, our eventual level of success markedly affected by training and practice.
- Relative age effect: The older a child is relative to his peers, the greater the probability this child has of eventually becoming an elite player. Coaches notice the developmental difference and this often leads to that extra bit of playing time, extra confidence playing in important pressure-filled situations, and ultimately extra skill success.
- Birthplace effect: Smaller cities offer more opportunities for unstructured play which leads to longer hours of practice and involvement in sports at a young age.
- Playing different sports also lessens the occurrence of sports-related injuries that may end an athletic career.
- Less sport-specific training and more diverse recreational play seem to be preferable for developing athletic ability and expertise.
- Group pieces of information into bundles to help you remember them.
- Just as lifting weights helps to develop your bicep muscles, practice shapes your brain. However, these practice-related changes often only stick around if, like working the biceps, you continue to work your brain.
- Musical training, and especially early musical practice, can enhance the interaction between the two hemispheres of the brain.
- The later golfers learn, the more vulnerable they are to choking under pressure.

### **Less can be more**

- There are many examples of people getting stuck because they have too much knowledge and brainpower at their disposal.
- Not all adults fall prey to functional fixedness – the inability to see new and usual ways to use an object.
- Focusing your attention on the most important information and ignoring less relevant input is something that people higher in working-memory are very good at.
- A narrow focus of attention can prevent people from detecting alternate solutions to a problem. This narrow focus can even hamper your ability to notice unexpected events around you.
- When the prefrontal cortex takes over, other brain regions such as sensory and motor areas have less room to chime in. These sensory and motor brain areas are quite sensitive to unexpected occurrences in the environment, whereas the prefrontal cortex, on balance, works to uphold people’s expectations. Those who rely too heavily on their prefrontal cortex may miss unexpected events precisely because they are not getting as much benefit from the brain areas best equipped to process the outside world.
- Not being able to focus your attention completely is handy for learning some skills that are important in education and job settings – such as language.
- Cocktail party effect (ability to recognize your name in a conversation you are not really listening to): People lower in working memory show a stronger cocktail party effect than people with higher working-memory because low-powered folks have a hard time focusing in on just one thing and instead are always paying attention to a little bit of everything.

- Because children have lower working-memory capabilities than adults, this actually aids their acquisition of foreign languages.
- When you need to think creatively or outside the box, or engage in flexible problem solving, the higher your cognitive horsepower (or if you are unable to dampen your working-memory on command) the more difficulty you may have. People with lower working-memory will generally do better.
- The key is to have brainpower at your disposal, but to be able to turn it off in situations where it may prove disadvantageous.
- Adults are better at acquiring a new language – that is, adults look more like kids with underdeveloped prefrontal cortexes – when they are distracted and not concentrating too hard on what they are learning.
- Having a golfer count backward by threes or even having a golfer sing a song to himself use up working-memory that might otherwise fuel overthinking and a flubbed performance.
- Recent studies have shown that, after REM sleep, people are better able to see connections between seemingly disparate pieces of information. One reason this may be the case is that working-memory and the prefrontal cortex stop working so hard, allowing for the formation of what were at first glance, nonobvious connections.
- One of the main reasons that people choke under pressure is that they are not using their working-memory in the right way: they are either paying too much attention to what they are doing or not devoting enough brainpower to the task at hand.
- There is some exciting new work that shows that cognitive horsepower or working-memory once thought to be an immutable trait that was completely heritable in origin can be altered with the right type of brain practice.
- Working memory training led to a decrease in the symptoms associated with ADHD.
- Attention training may be one way to jump-start the developmental process.
- Playing action video games can improve your brain power. These benefits occurred after only an hour of play a day.
- College students diagnosed with ADHD are actually better than non-ADHD students at coming up with creative solutions to problems. ADHD students for example are able to generate more unusual uses for common objects than students without ADHD.
- Shah thinks this creativity stems, in part, from ADHD students' lack of ability to inhibit information from creeping into the mind, which leads to more divergent thinking.
- The very act of asserting group difference in cognitive functions such as working-memory based on sex or race can create a stressful situation where the individuals being pigeonholed are likely to perform below their abilities.

### **Differences between the Sexes**

- [www.artofproblemsolving.com/wiki/index.php/2007\\_AMC\\_12A\\_Problems](http://www.artofproblemsolving.com/wiki/index.php/2007_AMC_12A_Problems)
- The boys who score at the top of SAT-M tests come from a variety of backgrounds, but the top-scoring girls are all clustered in a small set of elite schools. As many girls come from the top-twenty-scoring AMC schools as from all other high schools in the US combined. i.e. only a handful of schools are giving girls the support they need to succeed.
- Girls tend to out-perform boys on problems in which following a specific step-by-step solution recipe is the most likely path to success. In contrast, boys out-perform girls on unconventional problems that require unusual solution strategies. Boys tend to be more comfortable taking shortcuts

than girls, and on tests like the SAT, where a large number of items need to be completed in a short amount of time, being able to apply your knowledge in quick and unusual ways has some advantages.

- Just being stereotyped negatively is enough to dive down performance.
- Stereotype threat (poor performance in the face of negative stereotypes) is most dramatic for those girls who are the most skilled and most interested in excelling at what they are being tested on.
- High achieving girls are precisely the ones who, when faced with a negative stereotype about how they should perform worry about confirming it. As a result, their scores suffer.
- When brainpower that could otherwise be devoted to math is instead redirected to controlling worrying, the test taker has fewer resources to support her math problem solving and, as a result, her performance suffers.
- The more emancipated a country was in its views about women's equality with men and its opportunities for women; the less the boys and girls differed in math test performance (on PISA).
- Economist David Figlio has shown that the more feminine a girl's name. The less likely she is to take calculus in high school. (Isabella/Anna vs. Taylor/Madison).
- Bringing up negative stereotypes about how your sex or racial group should perform – girl can't do math, blacks are not smart, even white men can't jump – is enough to send people into a spiral of self-doubt that uses up valuable brain resources that could otherwise work on the task at hand – resources that are already scarce in high-stakes situations. In short, the mere awareness of these stereotypes can lead to choking under pressure.

### **Bombing the Test**

- Elementary education majors have the highest levels of math anxiety of any college major in the U.S.
- When stereotyped (e.g. girls can't do math), people don't perform badly because of some inferior ability, but because they are aware of how they should perform.
- Doing two things at once that rely on similar brain regions is generally harder than doing two things that call on separate pools of brainpower, because in the first case there are just fewer neural resources to go around.
- Math problems presented horizontally seem to be more reliant on verbal brain resources than the exact same problems presented in a vertical format. Performance on the exact same problems presented vertically, so that the students switched to more spatial rather than verbal parts of the brain to solve them, was not eroded under the stress of this stereotype that "women can't do math."
- Individuals with the most cognitive horsepower tend to be bad at downplaying the importance of high-pressure testing situations when they find themselves under the gun, so they also have a hard time easing the tension when the stress is on. High-performing people really feel the pressure, which hurts their ability to succeed.
- Andrew wants to know how some people interpret these states as a cue to thrive, "My heart is racing, it must mean I am motivated," and how these bodily states are interpreted by others as a cue to dive, "Oh, shit, my heart is racing, I am really feeling the pressure now."
- Interpreting this situation and your bodily response in a positive rather than a negative light may be a key to performing well when it counts the most.
- Stereotype threats can affect whether students are able to show what they know. Using a high-stakes exit exam to determine who is eligible to graduate, may inadvertently be putting some students at a real disadvantage – a disadvantage this is not necessarily dictated by their ability, but rather by their race, ethnicity or sex.

## **The Choking Cure**

- The racial achievement gap is not an intractable phenomenon – and it does not take millions of dollars or hundreds of worker hours to begin to change it. You can start by simply setting aside few minutes for students to reflect on their positive qualities.
- Those students who wrote for ten minutes about their worries before the math test performed roughly 15% better than the students who sat and did nothing before the exam.
- When a person repeatedly confronts, describes, and relives thoughts and feelings about his or her negative experiences, the very act of disclosure lessens these thoughts.
- Putting your feelings into words changes how the brain deals with stressful information.
- When a worrisome thought arises, you acknowledge it, name it (as if actually identifying it and writing it down), but then let go of it. You don't attach any more brainpower to it.
- Getting people to think about aspects of themselves that are conducive to success can be enough to propel them to a top performance and prevent choking.
- Tips to Ensure Success Under Stress
  - Reaffirm your self-worth: Write about your many interests and activities.
  - Map out your complexities: Spend five minutes drawing a diagram of everything that makes you a multifaceted individual. This can help to highlight that one event does not define you, which can in turn take some of the pressure off.
  - Write about your worries
  - Meditate away the worries. You can train your brain to recognize and discard negative thoughts.
  - Think differently: Think about yourself in ways that highlight your propensity for success.
  - Reinterpret your reactions. If your heart races, remember that these physiological reactions also occur under pleasant circumstances. Instead of "I am freaking out", think "I am amped up for the test."
  - Pause your choke: Walk away for a few minutes.
  - Educate the worries: Acknowledge stereotypes, but do not use them to diagnose your intellect.
  - The Obama effect: Look for examples of people who defy common stereotypes.
  - Practice under pressure.
  - Outsource your cognitive load: Write down the intermediate steps of a problem rather than trying to hold everything in your head.
  - Organize what you know. "Chunk" information: take the burden off your work-memory.

## **Choking under Pressure**

- People choke under pressure because they worry. They worry about the situation, its consequences, what others will think. They worry about what they will lose if they fail to succeed and whether they have the tools to make it. They may even conjure images in their head of the unwanted outcome – he flubbed performance the missed shot, the fall on the ice.
- Worrying and trying to suppress your worries uses up working memory that could otherwise be used to maintain several pieces of information in mind at once so that you can make a reasoned pitch to a client or argue effectively with your spouse when you are pushing for a new kitchen remodel.
- When athletes think about themselves screwing up, they are more likely to do so.
- When people watch activities for which they are highly skilled, they call upon not only brain areas specialized for seeing, but areas involved in action production as well. Brain networks involved in both doing and seeing have been termed mirror networks, and it is believed that highly skilled athletes rely on these types of mirror in the head to predict the action of others and to anticipate the

outcomes of their own actions. This is why skilled performers always seem as if they are two steps ahead of everyone else.

- Psychologists have known that putting a mirror in front of a person or videotaping him while he performs will make him more self-conscious – more aware of himself and his actions. This also occurs when we find ourselves having to perform in front of a live audience. Most interesting, the more supportive and friendly that audience is, the more self-aware we as performers get.
- Heightened attention to detail can actually mess you up.
- In spite of performing more poorly in front of a supportive person than a neutral one, people felt that having a supportive audience was less stressful. The moral of the story: although we may think the support of others will always manifest itself as a home court advantage, the opposite may actually be true – at least when the pressure is on.
- Paralysis by analysis occurs when you attend too much to activities that normally operate outside conscious awareness.
- Tasks that rely heavily on working-memory suffer from worrying. But sports skills and other activities that run largely outside working-memory are hurt, not because of worrying, but because of the attention and control that worrying produce.
- Bringing skill processes that once operated outside conscious awareness back into working-memory does temporarily degrade performance- a necessity if you want to change in order to improve.
- As learning progresses, there is a reduction in neural activity in the prefrontal cortex and other working-memory intensive brain areas that were once needed to control step-by-step execution.
- Being at the top of your game can also increase your chances of choking.
- In free throws, current superstars scored about 65% of their shots while future superstars were close to 90%. Jordan thinks this is because current superstars feel more pressure to perform at a high level than those who have not yet made it all the way to the top.
- Haste does not always make waste, and sometimes, distraction has its benefits.
- Yips: Involuntary jerks, tremors, and spasms in the extremities that disrupt the execution of fine motor skills.
- Initially the yips was thought to be a purely psychological phenomenon related to feelings of anxiety and stress, but researchers now believe that the yips can have a physical cause, too.

### **Fixing the Cracks in Sport and other Fields**

- Riding in an elevator over and over makes heights less frightening. Similarly, training in stressful situations minimizes the possibility of the choke as you gradually become accustomed to the pressure.
- When musicians were asked to give a performance in front of an audience – some of whom were said to be rating their play - those who had practiced under the watchful gaze of a video camera beforehand performed much better than those who had practiced in isolation.
- Research shows that telling people not to think about something is not effective at suppressing unwanted thoughts or disrupting an inappropriate focus of attention. In fact, when people are told not to think of something, they tend to do it more.
- Focusing on what to do (a strategy focus) rather than how to do it (a technique focus) can help prevent cracking under stress.
- Paradox of control: athletes focus on elements of their technique that they believe will help enhance performance. Paradoxically, this technique focus results in worse performance than if they paid no attention to detail in the first place.

- Focusing on the outcome of your actions – using words like smooth or net – helps the brain organize the processes you need in order to actually produce the end result.
- Rather than paying attention to your body (an internal focus of attention), pay attention to some aspect of the environment – where you want to go rather than where you are right now.
- After spending time describing their past putts, the skilled golfers needed twice as many attempts to sink their putts as the skilled golfers who had not put their performances into words. Beginning golfers' performances were not affected by describing putts.
- How do you skate faster? Being able to communicate this type of information comes from coaching experience, not from playing experience.
- To be honest, even if you use all the psychological techniques at your disposal to deal with pressure's negative effects, inoculation against the choke is never a sure thing. Unfortunately, once athletes start to crack under stress, it can be hard to stop doing so.
- Learned helplessness: a phenomenon in which people do not feel they have control over a particular situation or outcome so they stop working to try to obtain a goal.
- Beta-blockers have been banned in such sports as archery and pistol shooting because of the advantage they may confer in stressful competitions.
- A study conducted in the mid-1980s suggests that beta-blockers do work.
- Practicing under the types of pressure you will face in actual game situations is one of the best antidotes for the negative effects of stress.
- Tips to combat performance flops under pressure in sports and performance
  - Distract yourself: Singing a song or even thinking about your pinky toe can help prevent the prefrontal cortex from regulating too closely movements that should run outside awareness.
  - Don't slow down: Don't give yourself too much time to think and control. Just do it.
  - Practice under stress.
  - Don't dwell: Change how you think about past failures. See them as changes to learn how to perform better in the future.
  - Focus on the outcome, not the mechanics.
  - Find a key word: a one-word mantra such as smooth, can keep you focused on the end result rather than the step-by-step processes of performance.
  - Focus on the positive: Don't be helpless. If you focus on the negative this can make you feel out of control and increase the likelihood that you will not work as hard to obtain future performance goals.
  - Cure the yips by changing up our grip: An alteration in your performance technique reprograms the circuits you need to execute your shot, hopefully clearing your brain and body of the motor hiccup.

### **Choking in the Business World**

- Schemas help us make sense of new situations we encounter based on what we have learned about similar activities in the past.
- Schemas are relevant to interview situations because giving your interviewer a positive schema for interpreting your employment potential early on in the meeting can help shape how s/he remembers the entire encounter.
- Providing a schema for interpreting a meeting at the outset can help guide other's memory of you.
- One way to engender positive feelings about you in others is to act as they act, and this too is related to the mirror system.
- When we feel like we are really in tune with someone else, we like him or her better.

- Chameleon effect: We often unconsciously mimic the postures, mannerisms, facial expressions and other behaviors of our interaction partners, and this engenders liking.
- We judge people and objects to be more pleasant when we are smiling in comparison to when we are frowning, so if you want your interviewer to think positively about you, try smiling.
- Don't take mimicry too far. Once people are aware that they are being copied, the liking can turn into annoyance.
- Mimicking the facial expression of your partner is good for your marriage, because when you imitate others' emotional expressions, your brain is in a better position to understand what emotional state they are in and, as anyone who has been in a long term relationship can tell you, the ability to empathize with your partner is key.
- Trying not to think about something may result in the propensity to have the exact thought you are trying to avoid.
- Wegner suggests that there are really two processes at work when we try not to think about something. There is a conscious process that searches for some new topic to focus on. Then there is an unconscious search for the unwanted thought whose purpose is to check for errors in our ability to strike the unwanted thought from mind. Together, these two processes help people avoid topics they do not want to focus on and, most of the time, people do this pretty well. But the story changes when we find ourselves under the gun. Under stress, we have only the unconscious working for us, the process actually charged with finding the very thing we do not want to focus on. As a result, we are likely to blurt out exactly what we are trying not to say or take the move we tried.
- Soccer players instructed to avoid kicking a penalty shot within reach of the goal keeper are more likely to focus their gaze on the goalkeeper and shoot right at him.
- Researchers have shown that when parents' working memory is at its lowest, their tendency to react negatively to their oppositional children is highest.
- Teenagers have the propensity to bring emotions to the table when they are best left off. Because the prefrontal cortex is still developing in adolescents, they often have a hard time keeping the emotional areas of the brain in check.
- Prevent the choke
  - Give a schema at the outset that will help others encode your positive attributes.
  - Subtle mimicry can help create positive affect.
  - Think about what you want to say, to what you don't want to say.
  - Practice making a fool out of yourself in an acting class.
  - Know what you know. If you have memorized the introduction to your speech, just go with it and try not to think too much about every word. If not, pause before key transitions to allow yourself time to regroup.
  - Research shows that writing about worries and stressful events in your life can help increase working-memory and may prevent other parts of your life from creeping in and distracting you under stress.
  - Think about the journey, not the outcome.
  - Remind yourself that you have the background to succeed and that you are in control of the situation.
  - Prepare well, but don't anticipate too much. Often it is the stress you give yourself worrying about the "what-ifs" that leads to failure when the pressure is on – a self-fulfilling prophecy.