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Break a Leg! The Ironic Effect, Choking, and Other Mind Games

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AS ALL SINGERS KNOW, SINGING IS BOTH a mental and a physical effort—a total body sport. Many pages in this journal and elsewhere have been devoted to describing the precise physical alignment of the four physical systems of the voice that is necessary for artistic singing. We call this *technique*, bequeathed to us by teachers, coaches, and mentors, honed by years of practice and performing experience, and periodically retooled. But what of the mental controls necessary to learn well what others have to teach, practice effectively, and stay both physically and mentally flexible throughout the dynamic pursuit of artistic singing? These are all worthwhile questions to ponder, since over the course of a lifetime, training and practice time far outweigh time actually spent on stage performing.

Nevertheless, in this installment of “Mindful Voice,” I will focus on some of the mental controls necessary for public performance, which is the obvious culmination of training and self-evaluation. But perhaps even more intriguing is what psychologists suspect goes awry in the brain when these controls falter.

MENTAL CONTROLS

Let us begin by taking a brief inventory of the tasks the singer must control. Following the four physical systems of the voice as a simple plan, much like a pilot does a “cross check” before taking off, performers check (consciously or not) the outward, “macro” structures like skeletal alignment, freedom of movement, and released abdominal muscles, and the interior, “micro” structures, like lifted soft palate, laryngeal freedom, and resonant tone. Many singers like to manipulate their articulators by silent chewing, lip and tongue trills, or by producing any number of consonant combinations. Singers who have experienced success with body awareness systems like Alexander, Dalcroze, and Feldenkrais techniques may engage in more mindful cross-checking, while others will simply pace, roll their shoulders, or flex their knees. (An accompanist with whom I once worked commented that watching singers warm up before a performance was like watching stallions in the stall at a racetrack—snorts and all.)

How singers mentally prepare for performance is much less obvious, due to the simple fact that such preparation is interior. However, neuroscientists

have recently begun to peer inside the brains of musicians, using functional magnetic resonance imaging (fMRI). This neuroimaging technique is based upon observed changes in blood flow in the brains of test subjects who perform appointed cognitive tasks. At present, the conclusions that scientists reach are not hard data, but inferred neural activity based upon blood flow patterns. Thus, because fMRI test results are interpreted rather than measured, fMRI as a technique is somewhat controversial, although that hasn't impeded its explosive popularity as the tool of choice for examining the brain while on everything from politics to pornography.¹

The visual appeal of fMRI scans, which depict the human brain lit up like an oversaturated rainbow, makes for effective marketing of the brave new neural frontier. The fMRI image is already an icon of the new brain age, and has, in the words of science writer Jonah Lehrer, "become a staple of popular culture, a symbol of how scientific advances are changing the way we think about ourselves."²

THIS IS YOUR BRAIN ON JAZZ

In a recent experiment on jazz musicians, researchers Charles Limb of the National Institute of Health and Alan Braun of Johns Hopkins University sought to "investigate the neural substrates that underlie spontaneous musical performance."³ In other words, they were interested in what two accomplished jazz musicians' brains looked like when engaged in musical improvisation. First, though, they had to get these cooperative musicians settled on their backs inside an fMRI machine.

In order to be scanned in an fMRI machine, subjects must lie as still as possible, for as long as an hour, in a chamber the size of a large coffin. The noise of the machine is usually masked by headphones. Claustrophobia is common during imaging procedures, so most come equipped with a panic button should the subject suddenly feel the need for freedom.

The piano keyboard was placed on the subjects' lap in supine position, while the knees were elevated with a bolster. A mirror placed above the subjects' eyes allowed visualization of the keys during performance. Subjects were instructed to move only their right-hand during the scanning and were monitored visually to

ensure that they did not move their head, trunk, or other extremities during performance.⁴

One wonders how these subjects were able to lie as still as possible while demonstrating the degree of freedom that was the subject of the entire enterprise. As if in answer, the authors helpfully offered that their subjects "lay supine in the scanner without mechanical restraint."⁵ In any case, the researchers' conclusions will not be surprising to anyone who understands or has experienced creative inspiration:

In short, musical creativity vis-à-vis improvisation may be a result of the combination of intentional, internally generated self-expression . . . with the suspension of self-monitoring and related processes . . . that typically regulate conscious control of goal-directed, predictable, or planned actions.⁶

In other words, the brain regions typically associated with self-monitoring and self-evaluation calmed down, while brain areas associated with self-expression lit up. The researchers concluded that "creative intuition" springs forth when brain regions typically associated with self-monitoring quiet down, "allowing unfiltered, unconscious, or random thoughts and sensations to emerge."⁷

This conclusion also will come as no surprise to people who regularly engage in artistic acts of creation. Such people understand that creativity is accessed through a fund of emotion and experience not sifted by worries and what-ifs. In short, art doesn't need science to verify what has already been discovered by experience, or, as Lehrer notes, in many instances throughout the recent past "art foretold the facts of the future."⁸ Therefore, it seems to me that what is most noteworthy from this study is not what the researchers concluded regarding what is necessary for shepherding creative expression. Rather, it is the question raised by this study: of what cost to the creative process is inhibition? And, on a related note, is inhibition a possible cause of technical gaffes in performance?

HUMAN INFORMATION PROCESSING

In order to understand how hard-won technique can go awry, it is helpful to understand how human beings process information (Table 1).

TABLE 1. Human information processing, controlled versus automatic.

Learned	Inherent
• Propositional	• Tacit
• Slow	• Fast
• Demands attention	• Can “multi-task”
• Avoidable	• Unavoidable
• Volitional	• Not volitional
• Declarative learning	• Procedural learning
• “Top-down”	• “Bottom-up”

An easy way to remember the difference between “automatic” and “controlled” processing is that “control” is what one does when inputting new knowledge (following a recipe for sautéed spinach), and automatic processing is what one does when accidentally brushing one’s finger across the hot stove burner on the way to the salt shaker—ouch! Fortunately, our brains don’t need to compute the precise temperature at which flesh will burn in order to save us from the deed; in the time that it would take to control-process that information, we would incur a second-degree burn. Instead, normally developed humans come equipped with an autocontrol button that sounds the alarm when danger is near.

CHOKING AND PANIC

In a mental process known in the expertise literature as “choking,” expert or simply very well trained performers will occasionally and inexplicably bungle their performance in public. What makes choking “inexplicable” is that it happens for no apparent reason to a motivated, expert performer who has performed seemingly perfectly in preperformance trials or rehearsals. The current thinking on the phenomenon of choking is that it is the province of experts, not beginners, because it is the result of thinking too much in performance, rather than thinking too little.

Panic, on the other hand, is not the result of conscious self-direction, but is an instinctive reaction to a challenging or life threatening situation. As evolutionary biologists remind us, we humans were originally structured for living among the dangers in the wild. Our “fight or flight” reaction is a deeply hardwired instinct responsible for the critical choice between standing our ground

to fight an oncoming predator, or fleeing the situation entirely. Panic is generally demonstrated by beginners who, for lack of training, simply flounder, flee, or even “blank out” and completely disassociate from the present. Fainting is an extreme version of panic, and fits into the “fleeing” paradigm as taking the path of least resistance.

Therefore, the special hell of choking—messing up in front on an audience—is reserved for accomplished performers who have pursued (and paid for) hours and hours of training. This exposes a conundrum: Aren’t we supposed to improve with more training? And isn’t the payoff for an investment in training the freedom to relax in performance? Or at the very least, not consciously think about what we are doing? The answers to these questions lie not in the number or dearth of thoughts we entertain while actively engaged in performance; rather, it seems it is the composition of those thoughts that matters most.

The Limitations of Language

It has long been theorized that language can be an impediment to “insight.”

... words are a blessing which can turn into a curse. They crystallize thought; they give articulation and precision to vague images and hazy intuitions. But a crystal is no longer fluid.⁹

Koestler’s point was that the price paid for language’s ability to freeze-frame thought is inhibition of the unconscious, which is central to the creative process. Cognitive neuroscience has since supported the theory that language stultifies creativity by providing several possible reasons for this.

The most dominant explanation is that verbal commands are slow; they simply take time to make their way through our information processing system (recall the hot stove analogy). When verbal commands (managed by the controlled processing system) are juxtaposed with high-level physical performance (otherwise known as *technique*, which is managed by the automatic processing system), one could say a kind of cognitive battle ensues. Within the power vacuum created while the two metaphoric sides of the brain argue for primacy, the dreaded choke occurs: the missed putt, the muffed pitch, the flubbed high note.

This “argument” illustrates a second theory regarding the “inflexibility” of language, namely, that verbal commands differ from sensory commands because they

use noncomplementary brain regions, and are thus destined for the no-mans-land of the choke.

Finally, a third hypothesis, the *Theory of Ironic Processes of Mental Control*, illuminates why we may perversely “Think, Say, or Do Precisely the Worst Thing for Any Occasion.”¹⁰

THEORY OF IRONIC PROCESSES OF MENTAL CONTROL

The Theory of Ironic Processes of Mental Control put forward by Harvard psychologist Daniel M. Wegner,¹¹

holds that any intentional control of the mind introduces an operating process that directs conscious attention—focusing our minds on positive thoughts, for example, if we are hoping to improve our mood. This process is accompanied, however, by an ironic monitoring process that looks for the failure of our intention.¹²

By the tenets of this theory, the attempt to control one’s actions in performance is not necessarily beleaguered by the sensory system’s mutinous reaction to verbal commands, but by the imp of failure that accompanies the pursuit of success.

... ironic processes seem to underlie a variety of unwanted mental states, from obsession and depression to anxiety and insomnia, and can produce unwanted actions in sports and performance settings as well.¹³

Wegner adds that “Such monitoring can, when we are stressed or under mental load, actually promote the unwanted mental state.”¹⁴ Considering that performing artists regularly and doggedly pursue success in public arenas, and most such public performances are accompanied by both stress and mental load, it is no small wonder that performing artists are able to succeed at all.

But succeed singers do, in spite of the notorious bogies of performance jitters. After all, what else is the traditional admonition to “break a leg” (or in the opera world, to venture into “into the mouth of the wolf”—*in bocca al lupo*) but a kind of reverse charm to ward off the well known specter of flubbing in public? I suspect that the phenomenon of choking as a result of the Ironic Effect has been around as long as performing artists have been plying their trade before a critical audience, and I further

propose that these talismans are simply another case in which art got there first.

In any case, because science acknowledges this phenomenon (i.e., choking is not just “all in one’s mind”), it is now a subject worthy of scientific study. The research itself is purely fascinating, but on another level, such research may offer performers insight and even some antidotes into age old phenomena that have bedeviled performers for centuries.

HOPE

At this point it seems a very good idea to offer hope by way of three suggested solutions to counter choking, panic, and the Ironic Effect.

Practice “Deliberate Calm.” Recall that panic is the province of inexperience, so the simple answer to curbing panic is training. Airline pilots train to such an extent that they practice what they call “deliberate calm.” Captain C. B. “Sully” Sullenberger is a recent addition to the list of iconic heroes whose training saved the lives of those entrusted to their care. On January 15, 2009, US Airways flight 1549 took off from LaGuardia airport. Just two minutes into the flight, the plane was hit by a flock of Canadian geese. Many of the birds were sucked up into the engines, which immediately blew out both of them. After alerting the control tower, Sullenberger and copilot Skiles first attempted to return to LaGuardia, then decided to try a nearby airport in New Jersey. However, Sullenberger quickly determined that was not to be, and announced his intention to ditch the plane in the Hudson river. The flight ended there just six minutes after take-off, saving the lives of all 155 people on board. In the many interviews following the incident, Captain Sullenberger repeatedly named education and training as the reason he did not succumb to panic.

... for 42 years, I’ve been making small, regular deposits in this bank of experience: **education and training**. And on January 15th, the balance was sufficient so that I could make a very large withdrawal.¹⁵

Holistic Word Cues. Some research shows that one word, or “holistic” word cues that act as vague reminders may help prevent choking in trained practitioners.¹⁶ It is important to note that a one word cue (as distinguished from an entire sentence of technical instructions) seems

to be regarded by the brain as a picture, and therefore does not get tracked into the left prefrontal cortex, the brain region responsible for processing verbal information. Imagine, as a foil to choking, a cue word such as “loose,” scrawled on a card in a nonthreatening ink tone of inspirational blue, posted on the dressing room door. But beware of posting directions: “Keep your jaw loose, your palate raised and your throat open”; these admonitions could well end up choking off the best-laid plans.

“*Avoid Avoiding.*” Finally, these admonitions from Daniel Wegner: “Avoid Avoiding” and “orchestrate your circumstances for success.”¹⁷ In other words, respect the medium (performance) and give it the time necessary for mental preparation. This may sound simple enough for experienced singers, but I wager that this is something that must be taught to young students—and their parents.

NOTE TO SELF—AND FAMILY

In my early years of teaching, I noticed that my inexperienced recitalists would do exactly the opposite of “avoiding avoiding” in just about any way one could imagine, from last-minute shopping to late-afternoon hair appointments on the day of their recital. And it was not just my students who did not orchestrate their own circumstances well, but their relatives who had arrived on the day of the big event, expecting to spend time with their son or daughter, or worse, foisting the younger siblings on my student singer for some quality one-on-one time.

In an effort to help everyone “orchestrate the circumstances for success,” I wrote a generic “Letter to Friends and Family” and posted it on my studio’s website. My first time recitalists are required to write a letter to their family in their own words, but use this letter as a template (see Appendix).

BREAK A LEG!

Short of garlic, reversed good luck wishes, or other such talismans intended to ward off performance gaffes, research in cognitive science may illuminate this particular darkness. Science, which is slow and methodic, can both corroborate phenomena accepted as real by artists for centuries and also offer new insights into the mysteries for which most artists have neither time, inclination, nor expertise to pursue.

APPENDIX

Letter to Friends and Family

Dear Loved One,

Thank you for your support on this very important day! My teacher cares as much about my success as you probably do, and so he/she has asked me to inform you about a few things.

Please remember that this recital is a requirement for my degree, and I must pass it in order to earn a grade, credit, and graduate. A solo recital is both a mental and physical effort. It requires my complete concentration. Therefore, I must do everything possible to clear my mind of unnecessary distractions and activities, and must spend much of the time on the day before my recital in quiet, by myself. I will be happy to greet you briefly when you arrive, but I cannot do any of the following: [*please edit as necessary; however, do not take for granted what your people know/don’t know.*]

- Talk/chat/visit/catch up
- Go on an extensive shopping trip with you
- Make restaurant reservations for my family
- Get my hair done* (hairspray is death on the vocal cords!)
- Get my nails done* (nail polish has toxic fumes)
- Take my younger siblings off your hands for some one-on-one time.

I know you will be proud of me on this day, and will want to record it for history. However, you may not:

1. Videotape me; knowing you would want me to, I arranged to have that done.
2. Take any photos during my recital, whether flash or non-flash. If you wish to photograph me, you may do so at the very end, while I take my final bow. I will also happily pose for you after my recital is over. Please understand that if you photograph me as I am singing, it may destroy my concentration, and the project for which I have worked all year may suffer.

NOTES

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2. Jonah Lehrer, “Picturing Our Thoughts,” *The Boston Globe* (August 17, 2008), http://www.boston.com/bostonglobe/ideas/articles/2008/08/17/picturing_our_thoughts/page=3.

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4. *Ibid.*, 8
5. *Ibid.*
6. *Ibid.*, 4–5
7. *Ibid.*, 4
8. Jonah Lehrer, *Proust was a Neuroscientist* (New York: Houghton Mifflin, 2008), vii.
9. Arthur Koestler, *The Act of Creation*, "The Snares of Language" (New York: The Macmillan Co., 1964), 173.
10. Daniel M. Wegner, "How To Think, Say, or Do Precisely the Worst Thing for Any Occasion," *Science Magazine* 325, no. 5936 (July 2009): 48–50.
11. Daniel Wegner, "Ironic Processes of Mental Control," *Psychological Review* 101, no. 1 (1994): 34–52.
12. Daniel Wegner's website: <http://www.wjh.harvard.edu/~wegner/ip.htm>.
13. *Ibid.*
14. *Ibid.*
15. Chester "Sully" Sullenberger, Interview with Katie Couric, February 10 2009, CBS Evening News; <http://www.cbsnews.com/stories/2009/02/10/eveningnews/main4791429.shtml> (accessed July 1, 2010).
16. Jonah Lehrer, "Don't Choke," *The Frontal Cortex*, Posted on: April 13, 2010 6:56 http://scienceblogs.com/cortex/2010/04/dont_choke.php (accessed June 23, 2010).
17. Wegner website.



Lynn Holding has sung throughout the United States, Europe, Australia, and Iceland, where her performances were broadcast on Icelandic National Radio. Her lecture series *Connecting Voice Science to Vocal Art* illuminates ongoing research in cognitive science, a field she claims "ushers in a paradigm shift in emphasis from how well teachers teach, to how well students learn."

Holding studied voice at the University of Montana with Esther England, in Vienna with Kammersänger Otto Edelmann, and at Indiana University with Dale Moore, where she was the first singer accepted to pursue the Artist Diploma. She earned the Master's Degree in Vocal Pedagogy from Westminster Choir College of Rider University, and studied vocology with Dr. Ingo Titze, Dr. Katherine Verdolini and others at the Summer Vocology Institute of the National Center for Voice and Speech. In 2005, she was awarded the Van Lawrence Fellowship, given jointly by the Voice and NATS Foundations.

She served four years as a member of the voice faculty at Vanderbilt University, and is currently Associate Professor of Voice and Director of Performance Studies at Dickinson College in Carlisle, Pennsylvania. She welcomes visitors to her website: <http://users.dickinson.edu/~holding> and communication at: holding@dickinson.edu.

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