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Lynn Holding
Dickinson College

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Creativity in Crisis?

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HARDLY HAD THE CLOSING STRAINS of “Auld lang syne” echoed off the Wasatch range at the 51st national NATS conference in Salt Lake City last July, than this urgent cover story appeared in *Newsweek* magazine:

The Creativity Crisis: For the first time, research shows that American creativity is declining. What went wrong—and how we can fix it.¹

The cover itself was comprised of an American flag made of broken red, white, and blue crayons. These iconic symbols of childhood signaled the real focus population of the article, while the title, “Creativity in America,” promised to reveal “the science of innovation” and “how to re-ignite our imaginations.”² Alas, the article was less about creativity itself and more about testing for creativity (via the Torrance Tests of Creative Thinking), and a perceived lack of it among children. As a rule, I read all screeds decrying kids these days with a skeptical eye, but this caught my attention:

With intelligence, there is a phenomenon called the Flynn effect—each generation, scores go up about 10 points. Enriched environments are making kids smarter. With creativity, a reverse trend has just been identified and is being reported for the first time here: American creativity scores are falling.³

According to the authors, a Flynn effect could also be seen regarding creativity until 1990, when a precipitous drop in the creativity quotient (CQ) was noted. According to a leading researcher in the field, “It is the scores of younger children in America—from kindergarten through sixth grade—for whom the decline is most serious.”⁴

Why the decline? The usual guilty culprits were trotted out: too much TV, too many videogames, and the current assessment culture in American education (“teaching to the test”). Predictable, too, was that Bronson and Merryman’s deliberately provocative article should spark critics, who simultaneously touted the creative benefits of digital technology, while ridiculing the very idea that an attribute as ethereal as creativity could actually be tested; after all, the article was about the decline in creativity scores, not creativity itself. The authors’ suggestion that the “crisis” can be averted by teaching creativity in the classroom drew this outright guffaw:

What’s the [authors’] recommendation for boosting America’s impending underperformance? Why, put creativity classes in school curricula! . . . The same public schools pro-

ducing students who underperform on standardized tests in math, science, writing and reading comprehension should be performing CPR—Creative Process Recovery—on America’s schoolchildren? That doesn’t even rise to the level of nonsense. . . . Please. America will truly have a “creativity crisis” when “creativity” becomes a required high school course.⁵

Considering how much attention this article has garnered, both for the authors and for the subject itself, “creativity” seems a subject worth considering for those of us who teach anything, but most especially for those of us engaged in the performing arts, an endeavor historically yoked to “creativity.”

CREATIVITY: AN EXPLOSIVE FIELD

It is important to begin by considering creativity as a *bona fide* field of scientific research. I myself have often dismissed “creativity” as a topic, simply because it seems all too familiar. Whether as a performing artist or village dweller, through direct engagement or exposure to the ubiquitous craft fairs and street festivals that attend the manufactured quaintness of the historic town in which I live, I feel fairly steeped in creativity. My earlier stint as the parent of two small children was a creative enterprise in itself, and that’s not even counting the invention of car games, sewing of Halloween costumes, and hot-gluing of science fair projects on the dining room table. For many, the word “creativity” conjures up something homey and familiar, like doing crafts on a rainy afternoon. So it may be enlightening to learn that the serious study of creativity as a subject was itself a creative act, a linking of creativity with research “after centuries of being apart.”⁶

The necessary first step in doing research was to have the concept of research in mind, which more or less required the invention of research. The next step was nearly as difficult but no less important. This was to believe that doing research on human nature—rather than merely speculating about it—was as important and as feasible as doing research on physical nature.⁷

Over its sixty-year growth as a field to the present time in which “the field can only be described as explosive,”⁸ the worth of studying both the creative process and the consequences of that process to the advancement of knowledge has been undisputed. The growth in creativity studies has lately engendered a distinction

between what researchers call “Big-C” creativity (big ideas that change the world, like Einstein’s theory of relativity) and “little-c” creativity (the kind of projects that do-it-yourselfers shop for at Home Depot). The relatively recent introduction of “Positive Psychology”⁹ into the mainstream has allowed for the serious study of such heretofore academically unworthy topics as emotion and happiness, and the respectful and humane consideration of “little c” creativity as not only attainable for all, but essential to a well lived life, to liberty and, even, it turns out, to the pursuit of happiness.

THE BUILDING BLOCKS OF CREATIVITY

There is nearly unanimous agreement among creativity researchers that a working definition of creativity must contain two facets, namely, originality and usefulness. “The ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints).”¹⁰ A review of the creativity literature further reveals the common agreement that creativity cannot be experienced or assessed—indeed, cannot truly exist, until and unless it is turned to some product, whether enduring or ephemeral. In other words, “originality per se is not sufficient—there would be no way to distinguish eccentric or schizophrenic thought from creative,”¹¹ or, as neatly explained by renowned psychologist Mihaly Csikszentmihalyi in the monumental book, *Creativity: Flow and the Psychology of Discovery and Invention*, the critical difference is that “[n]ormal people are rarely original, but they are sometimes bizarre. Creative people, it seems, are original without being bizarre.”¹²

The “Creative Cognition Approach,” so named by psychologist Thomas Ward, holds that extraordinary creativity is not solely the province of geniuses, or what he calls “minds that operate according to principles that are fundamentally different than those associated with normative cognition.”¹³ Translation? You, too, can be creative!

It is this spirit of inclusiveness that sparked the assignment “little c” to everyday creation and problem solving, and is expressed by Csikszentmihalyi in his best selling books on “optimal experience,” which he termed “flow.”¹⁴ All of Csikszentmihalyi’s writing on the subject of “flow” includes meditations and tips on how to imbue the everyday, and even the mundane activities of life

with creativity. To do so makes necessary tasks not only bearable in the moment, but repeatable to the extent that such tasks as washing dishes and taking out the trash demand repetition many times over. Still, Csikszentmihalyi's masterwork on the subject of creativity, the result of over thirty years of research, considers only the "Big-C" variety of creativity. The book is both fascinating and inspiring, especially the first-hand accounts of the lives of the ninety-one highly creative people who were gracious enough to participate in the study on which the book is based.

Indeed, a whole new field of research into "optimal experience" has produced a sea of research on what motivates us, and it is not, it turns out, the rewards and punishments of carrot-or-stick systems, but the opportunity to be deeply engaged in endeavor—in other words, creative. Since motivation and downright dogged determination are fundamental requirements for attaining even minimal success in the performing arts, motivation deserves special consideration, so it is a topic to which I will return in a future column.

"THE BOX"

Returning to cognition, creativity's two distinct cognitive pathways are, in order, *divergent thinking* and *convergent thinking*, or what psychologist Mark Runco termed "problem-finding" and "problem-solving."¹⁵ In order to create something, a question or problem must first be sought, then identified. For some people, the problem to be grasped is apparent to the point of obviousness; for others, its absence incites a quest. Either way, "problem identification (just noticing that there is a problem at hand) and problem definition and redefinition (making a problem operational and workable)"¹⁶ are the first steps in the creative process.

Creators in the divergent thinking phase are searching, flexible and able to "generate a great quantity of ideas."¹⁷ This is the much balley-hooed "thinking outside the box," a concept that has been coopted by advertising firms to highlight products positioned on the vanguard of style, the implication being that those still stuck inside "the box" are pathetically out of fashion. This hackneyed term for the parameters of culture raises a compelling question: can creativity exist without the box? In other words, is creativity dependent upon resisting

the parameters of culture, upon breaking free of the box to define a new set of parameters? Is creativity born only from struggle?

For the catch is, the seeker has to return to the box in order for his discovery to become relevant and valued. Once the questions or causes have been found, they are stowed like precious raw material and returned to a workshop, whether actual or of the mind, for fashioning into a useful product. This can be anything from an idea to an object, but in order to adhere to the working definition of creativity, it must retain its novelty while proving its worth within a cultural context. This is the moment of convergence, wherein the problem or idea is forged, through a messy combination of elimination (tossing out bad ideas) and plain hard work.

Tell anybody you're a sculptor and they'll say, "Oh, how exciting, how wonderful." And I tend to say, "What's so wonderful?" I mean, it's like being a mason, or being a carpenter, half the time. But they don't wish to hear that because they really only imagine the first part, the exciting part. But, as Khrushchev once said, that doesn't fry pancakes, you see. That germ of an idea does not make a sculpture which stands up. It just sits there. So the next stage, of course, is the hard work. Can you really translate it into a piece of sculpture? Or will it be a wild thing which only seemed exciting while you were sitting in the studio alone? Will it look like something? Can you actually do it physically? Can you, personally, do it physically? What do you have by way of materials? So the second part is a lot of hard work. And sculpture is that, you see. It is the combination of wonderful, wild ideas and then a lot of hard work.¹⁸

Even though the preceding description of the creative process was given by a sculptor, as a singer, I found much in common with her description of her process, her concerns, and the reactions she provokes in nonartists. Upon seeing my office for the first time, an academic colleague of mine remarked, "How lucky you are to have a piano in your office!" (This same colleague also surmised that my job as music director of our college's biannual music theater production must be "fun.")

However it is completed, in mirth or in sweat, the product of hard work must adhere to another hallmark of creativity that evinces itself at the final stage of the process, namely, its recognition as something of value by a wider community of experts, or what Csikszentmihalyi calls "social confirmation,"¹⁹ and he, along with others, argues that this assessment of creative worth should be the province of experts in the field: scientists,

artists, and intellectuals. Others argue that assessment by a select group of experts is an elitist usurpment of power, especially because the decision to deem an invention “creative” often has social and monetary implications. Extreme views on this subject erupt most noticeably over federal or state funded art. Recently, William Donohue, the spokesman for the Roman Catholic advocacy group Catholic League, objected so strenuously to the exhibit at the National Portrait Gallery called “Hide/Seek” that he called on Congress to eliminate all federal funding for the Smithsonian Institution.

“Why should the working class pay for the leisure of the elite when in fact one of the things the working class likes to do for leisure is to go to professional wrestling? And if I suggested that we should have federal funds for professional wrestling to lower the cost of the ticket, people would think I’m insane. I don’t go to museums any more than most Americans do,” Donohue said.²⁰

(Before opening his mouth the speak, Donahue apparently neglected to check the facts on museum attendance; according to the American Association of Museums, “American museums average approximately 865 million visits per year, which translates to 2.3 million visits per day.”)²¹ As Csikszentmihalyi noted, noncreative people are rarely original, but they can be, sometimes, bizarre.

Some in the business community argue that the only voice that matters in judging the worth of a product is that of the consumers, who vote with their pocketbook by literally putting their money on a good idea.

In markets, creativity—and its value—is determined by consumers. The most creative industries such as fashion, music, video-games, software, and animated movies tend to have audiences and customers that think of themselves as creative. Customer openness to creativity—however defined—powerfully influences creative supply . . . My view is that creativity—like any meaningful exchange of value—is not declared but negotiated.²³

But all agree that in creativity, context means everything; that, unlike the crashing tree in the classic physics conundrum, if no one besides the creator is there to experience it, let alone judge it, it is as if the creative act never occurred at all. On this point, Nobel prize winner George Stigler had this to say when interviewed for Csikszentmihalyi’s creativity research:

I think you have to accept the judgment of others. Because if one were allowed to judge his own case, every one of us should have

been President of the United States and received all the medals and so forth.²³

And what happens to “the box”? If the product of creative endeavor is crowned with a capital C by social confirmation, then it is likely that the box itself is redesigned, setting a new cultural norm. This is an apt description of the significant inventions throughout human history that have transformed culture: the plow, the clock, the microscope, and the birth control pill, to name a few. But according to author Nicholas Carr, it is the group of inventions he dubbed the “intellectual technologies” that has “the greatest and most lasting power over what and how we think.”²⁴

STUPID AND STUPIDER: GOOGLE AND THE INTERNET

Carr’s 2008 article, “Is Google Making Us Stupid?” received widespread attention, due in part to its provocative headline, but mostly to the search engine’s ubiquitous reach in lives around the globe.²⁵ According to a study by its own engineers, Google processes over one billion user-generated search requests per day—and that was in 2008.²⁶ There is every reason to believe that number is even higher three years later.

Carr reviewed the neuroscience literature in order to judge the impact of computers on our brains, and his conclusions are implicit in the title of his new book, *The Shallows: What the Internet is Doing to our Brains*.²⁷ He names society’s wholesale embrace of new intellectual technology an “intellectual ethic,” that is, something previously limited to an elite band of inventors which then becomes available to the general population. Such propagation and wholesale acceptance ushers in “a set of assumptions about how the human mind works or should work.”²⁸ Interestingly, he notes that the dissemination of an intellectual ethic is neither aimed for nor much noticed by its creators. (This rings especially true in light of Google’s tone deafness to repeated and legitimate charges of privacy violations, as in this disdainful retort by Google CEO Eric Schmidt: “If you have something that you don’t want anyone to know, maybe you shouldn’t be doing it in the first place.”)²⁹

Heavily quoting from such masterworks in the neuroscience literature as Joseph LeDoux’s *Synaptic Self*,³⁰ Carr notes that all intellectual technologies literally change

our brain tissue, and not always for the better. In a rejoinder to Stephen Johnson's now classic apologia of the new technology, *Everything Bad is Good for You*, in which Johnson suggested that the constant stimulation provided by 24/7 connection to the Internet is more valuable to learning than the "chronic under stimulation" and isolation engendered by reading an old-fashioned book,³¹ Carr writes: "When it comes to the firing of our neurons, it's a mistake to assume that more is better."³²

Indeed, in my review of the creativity literature, the component that revealed itself as the most important precondition for creativity was space: space in one's life, space in one's daily schedule to be sure, but most critically, space in the mind.

A SPACE OF ONE'S OWN

The wonders of the digital age (and there are many) allow us to satisfy a fundament of our hardwiring, what scientists call *operant conditioning* and what researcher Jaak Panksepp dubbed the "seeking system."³³ Seeking is the original survival mechanism that stimulated our species' search instinct on the African savannah where humans first thrived. The seeking instinct was incentivized with a flood of feel-good dopamine, the hormone of reward, when food or mates were found. According to evolutionary biologists, not much has changed since we roamed that oft invoked plain from evolutionary literature. It is this seeking urge that compels us to surf the web and obsessively check our e-mail (even if we are at work and shouldn't), and more darkly, compels modern day scourges like gambling addiction and texting while driving. Besides the obvious disasters that such compulsive behavior engenders, obsessive seeking packs our minds to the point of destroyed concentration, all on account of our famously feeble attention spans.

[W]e lurch from site to site, if only because we constantly crave the fleeting pleasure of new information. But this isn't really the fault of the Internet. The online world has merely exposed the feebleness of human attention, which is so weak that even the most minor temptations are all but impossible to resist.³⁴

Lest we believe that we are among the chosen (I can turn it off if I want to), Carr notes that "instrumentalism" (in this context, the belief that technological tools are "entirely subservient to the conscious wishes of their users") is

the most widely held belief about technology, not due to its veracity but "because it's the view we would prefer to be true."³⁵

While it is true that many tasks require focus and concentration, it has also been noted that too much concentration on a task—"trying too hard"—results in so-called "choking" and failure.³⁶ Indeed, research on "brainstorming," that is, the conscious effort to generate creative thought, demonstrates a similar effect.³⁷ Recent research into that most creative of musical enterprises, jazz improvisation, reveals that creativity flourishes when portions of the right hemisphere of the brain associated with creativity are allowed to ramble freely, unfettered by the self-monitoring and self-evaluation of the left hemisphere.³⁸ There is no reason to doubt that similar processes may be unleashed during creative voice practice.

Thus creativity does not require concentration in its generative, divergent phase, and indeed is probably choked by it. But it does need mental space. And space implies time. The experts are still debating whether or not digital technology destroys concentration, but no one who uses it can dispute the fact that it gobbles up big chunks of our time.

If Steven Johnson is right, what we receive in return for our connection to the net is intense mental stimulation, which he posits can only be as his book's title implied: "good for you." But all that mental stimulation doesn't just lodge benignly in the mind; it craves repetition and restimulation (recall the dopamine reward system), and in some, becomes a truly addictive cycle. With the real crisis being one of mental space, just imagine what a mind habituated to the constant overstimulation provided by a Smartphone does when confronted with the empty void of the practice room.

TEXTING: CANTUS INTERRUPTUS

Text messaging from cell phones, or "texting," is the current technology that provides the continuous stimulation and sense of being connected that have always been hallmarks of adolescence. It is a fair guess that within the NATS membership, the majority of voice students are adolescents and young adults, so we have more than just a passing interest in the texting habits of this population, which a recent Nielsen survey examined.

If it seems like American teens are texting all the time, it's probably because on average they're sending or receiving 3,339 texts a month. That's more than six per every hour they're awake—an 8 percent jump from last year . . . No one texts more than teens (age 13–17), especially teen females, who send and receive an average of 4,050 texts per month. Teen males also outpace other male age groups, sending and receiving an average of 2,539 texts. Young adults (age 18–24) come in a distant second, exchanging 1,630 texts per month (a comparatively meager three texts per hour).³⁹

Another recent study of the texting habits of college students, conducted by two psychology professors at Wilkes University, showed that among the 95% of students who responded to the survey, all said they bring their cell phones to class every day. This is neither surprising nor disturbing. However, 91% of these respondents reported that they actually use their phones to text during class; almost half said their instructors don't notice, and 62% said that they should be allowed to text in class as long they don't disturb others.⁴⁰ This attitude carries over to darkened movie theaters and concert halls, where the glare of cell phones is indeed disturbing to others; but perhaps not for long.

Recently, in separate but unabashed bids to engage young adults, both the Indianapolis Symphony and the New York Philharmonic invited audience members to choose the encore they most wanted to hear by text messaging their votes during the concert.⁴¹ Even an opera company was so enthralled by cell phone “interactivity” that its director invited audience members to text their preferred pairing in the final scene of Mozart's *Così fan tutte*.

The opera ain't over until the audience texts. In a move purists will pray never comes to the Met, producers of the updated version of Mozart's fiancée-swapping classic “*Così fan Tutte*” . . . will ask patrons to use their cell phones to vote on who marries whom in the climactic wedding scene. “The cast will implement the favored ending,” said a show rep, adding, “It's a rare opera when you are actually asked to turn your cell phones on.”⁴²

And the texting path is not just one-way. At a concert in the summer of 2009, the National Symphony Orchestra streamed program notes to the audience through the popular social networking and “micro-blogging” site “Twitter.” Text message “tweets,” created by conductor Emil de Cou, were sent in real time during a performance of Beethoven's “Pastoral” Symphony. De Cou called

the Twitter commentary, “an adult musical pop-up book written for first timers and concert veterans alike.”⁴³

Thus it is not a stretch at all to imagine voice students accessing, streaming, texting, and tweeting—almost anything but paying deep and sole attention during master classes, concerts, and practice sessions. Neuroscience research highlights the fact that the building of neural pathways in the brain—synaptic strengthening—is powerfully effective. We become what we practice, even if what we are practicing is inattention.

So I suggest one simple yet powerful way to counteract the “creativity crisis” in our sphere of influence: ban the use of cell phones during both lessons and practice. And it should be noted that “screen addiction” cuts across all categories of age, gender, and profession; teachers habitually hooked up to their iphones contribute to the problem of scattered attention. (One wonders what would happen if students asked for discount based on the number of interrupted lesson minutes that teachers spend fiddling with their cells to reschedule clients or texting their kids to do their homework.) Even if lesson interruptions seem as defensible to teachers as the right to text in class does to the Wilkes University survey students, the result is still quantities of lost time.

If you are like one University of Syracuse professor who finds texting during class “brazenly disrespectful,” I would not suggest his solution (he walks out).⁴⁴ Better is a clear studio policy regarding cell phone use and then consistent enforcement of it. To be sure, it is easier to post a policy than to actually enforce it. But enforcement is a form of *feedback*, named as the second most critical component of motor learning (bested only by actual practice).⁴⁵

The two main categories of *feedback* in the time domain are *delayed* and *immediate*, and if students have the audacity to text while others are performing, a delayed response is not only useless to the offenders as learners, it is potentially damaging to the student performer. In my performance classes, “immediate feedback” translates to the immediate loss of the privilege of being there. The class is stopped and the offending texter is asked to leave. Why? In my book, texting in class is like sending notes in sixth grade; besides, their actions clearly signal a wish to be elsewhere. Student singers who won't summon the self-control to listen attentively must ask themselves who they think will listen to them when it is their turn to

perform. The prospect of singing for an audience of bowed heads is deeply uninspiring.

Creating a “no text zone” in classes and lessons is relatively straightforward, but it is simply not possible to enforce in the practice room—but neither is it possible, in reality, to enforce in an automobile. Granted, the consequences of running one’s vocal progress into the ditch are not as dire as if one’s car lands there; the magnitude is different. But the effects are the same (ruined car/ruined concentration/ruined practice). And then there is what happens to creativity.

As the saying goes, “Nature abhors a vacuum;” space is filled, one way or another, but we can control the quality of what rushes in to fill that space. Lesson minutes protected from interruption are transformed into that dynamic arc of information exchange we know as teaching. Emptied chairs in performance classes soon fill with singers who want to participate completely. Cell phones switched to “off” (not “vibrate”—that doesn’t count) allow neurons to form new synaptic connections—what Le Doux calls “synaptic plasticity”⁴⁶—and what we call “learning.”

If there really is a “creativity crisis” in America, I suggest that its primary source is a dearth of mental space, which is the fundamental necessity to creative thinking. As Carr discovered, in regard to neurons firing, more is not better. An empty head is a mind at once filled with one of the best resources imaginable in this harried age of information overload: the potential for creative thinking.

NOTES

1. Po Bronson and Ashley Merryman, “Creativity in America,” *Newsweek Magazine*, online version (July 10, 2010); <http://www.newsweek.com/2010/07/10/the-creativity-crisis> (accessed December 10, 2010).
2. Ibid.
3. Ibid., 2.
4. Ibid.
5. Michael Schrage, “The Creativity Crisis? What Creativity Crisis?” *Harvard Business Review*, online version (August 25, 2010); <http://blogs.hbr.org/schrage/2010/08/the-most-important-thing-to.html> (accessed December 10, 2010).
6. Mark A. Runco and Robert S. Albert, “Creativity Research,” in James C. Kaufman and Robert J. Sternberg, eds., *The Cambridge Handbook of Creativity* (Cambridge: Cambridge University Press, 2010), 4.
7. Ibid.
8. Ibid., 5.
9. Martin Seligman and Mihaly Csikszentmihalyi, “Positive Psychology: An Introduction,” *American Psychologist* 55, no. 1 (January 2000): 5–14.
10. Robert J. Sternberg and T. I. Lubart, “The Concept of Creativity: Prospects and Paradigms,” in R. J. Sternberg, ed., *Handbook of Creativity* (Cambridge: Cambridge University Press, 1999), 3.
11. Gregory J. Feist, “The Function of Personality in Creativity,” in Kaufman and Sternberg, 114.
12. Mihaly Csikszentmihalyi, *Creativity: Flow and the Psychology of Discovery and Invention* (New York: Harper & Row, 1996), 63.
13. Thomas Ward, “Cognition and Creativity,” in Kaufman and Sternberg, 114.
14. Mihaly Csikszentmihalyi, *Flow: The Psychology of Optimal Experience* (New York: Harper & Row, 1990).
15. Mark Runco, “Creativity,” *Annual Review of Psychology* 55, no. 1 (February 2004): 657–687.
16. Ibid., 675.
17. Csikszentmihalyi, *Creativity*, 60.
18. Ibid., 62.
19. Ibid., 25.
20. William Donahue interview on NPR: <http://www.npr.org/2010/12/02/131748447/gay-portraiture-exhibit-sparks-funding-debate> (accessed December 13, 2010).
21. American Association of Museums, <http://www.aam.us.org/aboutmuseums/abc.cfm> (accessed December 13, 2010).
22. Schrage, 3.
23. Csikszentmihalyi, *Creativity*, 42.
24. Nicholas Carr, *The Shallows: What the Internet is Doing to our Brains* (New York: W.W. Norton, 2010), 45.
25. Carr, “Is Google Making Us Stupid?” *The Atlantic Monthly*, online version (July/August, 2008); <http://www.theatlantic.com/magazine/archive/2008/07/is-google-making-us-stupid/6868/> (accessed December 13, 2010).
26. Jeffrey Dean and Sanjay Ghemawat, “MapReduce: Simplified Data-Processing on Large Clusters,” *Communications of the Association for Computing Machinery* 51, no. 1 (January 2008): 107–113.
27. Carr, *The Shallows*.
28. Ibid., 45.
29. Cade Metz, “Google Chief: Only Miscreants Worry About Net Privacy,” posted in *Music and Media*, December 7, 2009; http://www.theregister.co.uk/2009/12/07/schmidt_on_privacy/ (accessed December 10, 2010).

30. Joseph LeDoux, *Synaptic Self: How Our Brains Become Who We Are* (New York: Penguin Books, 2002).
31. Steven Johnson, *Everything Bad is Good For You* (New York: Penguin Group, 2005), 18–19.
32. Carr, *The Shallows*, 123.
33. See Jaak Panksepp, *Affective Neuroscience: The Foundations of Human and Animal Emotions* (New York: Oxford University Press, 2004).
34. Jonah Lehrer, “Our Cluttered Minds,” *The New York Times* (June 3, 2010); <http://www.nytimes.com/2010/06/06/books/review/Lehrer-t.html> (accessed December 10, 2010).
35. Carr, *The Shallows*, 46.
36. See Lynn Holding, “Break a Leg! The Ironic Effect, Choking, and Other Mind Games,” *Journal of Singing* 67, no. 2 (November/December 2010): 207–212.
37. Po Bronson and Ashley Merryman, “Forget Brainstorming,” *Newsweek Magazine*, online version (July 12, 2010); <http://www.newsweek.com/2010/07/12/forget-brainstorming> (accessed December 10, 2010).
38. Charles Limb and Allen R. Braun, “Neural Substrates of Spontaneous Musical Performance: An fMRI Study of Jazz Improvisation,” *PLoS ONE* (Public Library of Science) 3, no. 2, (February 2008), <http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0001679>.
39. U.S. Teen Mobile Report: “Calling Yesterday, Texting Today, Using Apps Tomorrow,” *Nielsen Wire*, http://blog.nielsen.com/nielsenwire/online_mobile/u-s-teen-mobile-report-calling-yesterday-texting-today-using-apps-tomorrow, October 14, 2010 (accessed December 5, 2010).
40. “Wilkes University Professors Examine Use of Text Messaging in the College Classroom,” <http://www.wilkes.edu/pages/194.asp?item=61477> (accessed on December 5, 2010).
41. Stephanie Clifford, “Texting at a Symphony? Yes, but Only to Select an Encore,” *The New York Times* (May 15, 2009); <http://www.nytimes.com/2009/05/16/arts/music/16text.html> (accessed December 5, 2010).
42. *The New York Post*, “The Opera Isn’t Over Until the Audience Texts,” March 27, 2009; http://www.nypost.com/seven/03272009/gossip/pagesix/the_end_of_opera_161471.htm (accessed December 5, 2010).
43. Dave Itzkoff, “A Different Tweet in Beethoven’s Pastoral Symphony,” *The New York Times* (July 23, 2009); <http://artsbeat.blogs.nytimes.com/2009/07/23/a-different-tweet-in-beethovens-pastoral-symphony> (accessed December 5, 2010).
44. “If You Text in Class, This Prof Will Leave,” *Inside High Ed News* (April 2, 2008); <http://www.insidehighered.com/news/2008/04/02/texting> (accessed December 5, 2010).
45. Richard Schmidt and Timothy Lee, *Motor Control and Learning: A Behavioral Emphasis*, 4th ed. (Champaign, IL: Human Kinetics, 2005), 399.
46. LeDoux, 9.

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.

To be creative means to be in love with life. You can be creative only if you love life enough that you want to enhance its beauty, you want to bring a little more music to it, a little more poetry to it, a little more dance to it.

Osho
(Bhagwan Shree Ranjeesh, 1931–1990)

There is no doubt that creativity is the most important human resource of all. Without creativity, there would be no progress, and we would be forever repeating the same patterns.

Edward de Bono

Creativity requires the courage to let go of certainties.

Eric Fromm

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