

BASICS

As a teenager I got into the habit of listening to the string quartets of Béla Bartók—which I found slightly cacophonous but still enjoyed—while doing my homework. Somehow tuning out those discordant tones helped me focus on, say, the chemical equation for ammonium hydroxide.

Years later, when I found myself writing articles on deadline for the *New York Times*, I remembered that early drill in ignoring Bartók. At the *Times* I labored away in the midst of the science desk, which in those years occupied a classroom-sized cavern into which were crammed desks for the dozen or so science journalists and a half dozen editors.

There was always a Bartók-ish hum of cacophony. Nearby there might be three or four people chatting; you'd overhear the near end of a phone conversation—or several—as reporters interviewed sources; editors shouted across the room to ask when an article would be ready for them. There were rarely, if ever, the sounds of silence.

And yet we science writers, myself among them, would reliably deliver our ready-to-edit copy right on time, day after day. No one ever pleaded, *Everyone please be quiet*, so we could concentrate. We all just redoubled our focus, tuning out the roar.

That focus in the midst of a din indicates selective attention,



the neural capacity to beam in on just one target while ignoring a staggering sea of incoming stimuli, each one a potential focus in itself. This is what William James, a founder of modern psychology, meant when he defined attention as “the sudden taking possession by the mind, in clear and vivid form, of one of what seems several simultaneously possible objects or trains of thought.”¹

There are two main varieties of distractions: sensory and emotional. The sensory distractors are easy: as you read these words you’re tuning out of the blank margins surrounding this text. Or notice for a moment the feeling of your tongue against your upper palate—just one of an endless wave of incoming stimuli your brain weeds out from the continuous wash of background sounds, shapes and colors, tastes, smells, sensations, and on and on.

More daunting is the second variety of lures: emotionally loaded signals. While you might find it easy to concentrate on answering your email in the hubbub of your local coffee shop, if you should overhear someone mention your name (potent emotional bait, that) it’s almost impossible to tune out the voice that carries it—your attention reflexively alerts to hear what’s being said about you. Forget that email.

The biggest challenge for even the most focused, though, comes from the emotional turmoil of our lives, like a recent blowup in a close relationship that keeps intruding into your thoughts. Such thoughts barge in for a good reason: to get us to think through what to do about what’s upsetting us. The dividing line between fruitless rumination and productive reflection lies in whether or not we come up with some tentative solution or insight and then can let those distressing thoughts go—or if, on the other hand, we just keep obsessing over the same loop of worry.

The more our focus gets disrupted, the worse we do. For instance, a test of how much college athletes are prone to having their concentration disrupted by anxiety correlates significantly with how well or poorly they will perform in the upcoming season.²

The ability to stay steady on one target and ignore everything else operates in the brain’s prefrontal regions. Specialized circuitry in this area boosts the strength of incoming signals we want to concentrate on (*that email*) and dampens down those we choose to ignore (*those people chattering away at the next table*).

Since focus demands we tune out our emotional distractions, our neural wiring for selective attention includes that for inhibiting emotion. That means those who focus best are relatively immune to emotional turbulence, more able to stay unflappable in a crisis and to keep on an even keel despite life’s emotional waves.³

Failure to drop one focus and move on to others can, for example, leave the mind lost in repeating loops of chronic anxiety. At clinical extremes it means being lost in helplessness, hopelessness, and self-pity in depression; or panic and catastrophizing in anxiety disorders; or countless repetitions of ritualistic thoughts or acts (*touch the door fifty times before leaving*) in obsessive-compulsive disorder. The power to disengage our attention from one thing and move it to another is essential for well-being.

The stronger our selective attention, the more powerfully we can stay absorbed in what we’ve chosen to do: get swept away by a moving scene in a film or find a powerful poetry passage exhilarating. Strong focus lets people lose themselves in YouTube or their homework to the point of being oblivious to whatever tumult might be nearby—or their parents calling them to come eat dinner.

You can spot the focused folks at a party: they are able to immerse themselves in a conversation, their eyes locked on the other person as they stay fully absorbed in their words—despite that speaker next to them blaring the Beastie Boys. The unfocused, in contrast, are in continual play, their eyes gravitating to whatever might grab them, their attention adrift.

Richard Davidson, a neuroscientist at the University of Wis-

consin, names focus as one of a handful of essential life abilities, each based in a separate neural system, that guide us through the turbulence of our inner lives, our relationships, and whatever challenges life brings.⁴

During sharp focus, Davidson finds, key circuitry in the prefrontal cortex gets into a synchronized state with the object of that beam of awareness, a state he calls “phase-locking.”⁵ If people are focused on pressing a button each time they hear a certain tone, the electrical signals in their prefrontal area fire precisely in synch with the target sound.

The better your focus, the stronger your neural lock-in. But if instead of concentration there’s a jumble of thoughts, synchrony vanishes.⁶ Just such a drop in synchrony marks people with attention deficit disorder.⁷

We learn best with focused attention. As we focus on what we are learning, the brain maps that information on what we already know, making new neural connections. If you and a small toddler share attention toward something as you name it, the toddler learns that name; if her focus wanders as you say it, she won’t.

When our mind wanders off, our brain activates a host of brain circuits that chatter about things that have nothing to do with what we’re trying to learn. Lacking focus, we store no crisp memory of what we’re learning.

ZONING OUT

Time for a quick quiz:

1. What’s that technical term for brain wave synchrony with a sound you hear?
2. What are the two main varieties of distraction?

3. What aspect of attention predicts how well college athletes perform?

If you can answer these off the top of your head, you’ve been sustaining focused attention while you read—the answers were in the last few pages of this book (and can be found at the bottom of this page).*

If you can’t recall the answers, you may have been zoning out from time to time while you read. And you’re not alone.

A reader’s mind typically wanders anywhere from 20 to 40 percent of the time while perusing a text. The cost for students, not surprisingly, is that the more wandering, the worse their comprehension.⁸

Even when our minds are not wandering, if the text turns to gibberish—like *We must make some circus for the money*, instead of *We must make some money for the circus*—about 30 percent of the time readers continue reading along for a significant stretch (an average of seventeen words) before catching it.

As we read a book, a blog, or any narrative, our mind constructs a mental model that lets us make sense of what we are reading and connects it to the universe of such models we already hold that bear on the same topic. This expanding web of understanding lies at the heart of learning. The more we zone out while building that web, and the sooner the lapse after we begin reading, the more holes.

When we read a book, our brain constructs a network of pathways that embodies that set of ideas and experiences. Contrast that deep comprehension with the interruptions and distractions that typify the ever-seductive Internet. The bombardment of texts, videos, images, and miscellaneous of messages we get online seems the enemy of the more full understanding that comes from what Nicholas Carr calls “deep reading,” which requires sustained con-

*Answers: 1. phase-locking; 2. sensory and emotional; 3. how well the athletes can concentrate and ignore distractions.

centration and immersion in a topic rather than hopscotching from one to another, nabbing disconnected factoids.⁹

As education migrates onto Web-based formats, the danger looms that the multimedia mass of distractions we call the Internet will hamper learning. Way back in the 1950s the philosopher Martin Heidegger warned against a looming “tide of technological revolution” that might “so captivate, bewitch, dazzle, and beguile man that calculative thinking may someday come to be . . . the only way of thinking.”¹⁰ That would come at the loss of “meditative thinking,” a mode of reflection he saw as the essence of our humanity.

I hear Heidegger’s warning in terms of the erosion of an ability at the core of reflection, the capacity to sustain attention to an ongoing narrative. Deep thinking demands sustaining a focused mind. The more distracted we are, the more shallow our reflections; likewise, the shorter our reflections, the more trivial they are likely to be. Heidegger, were he alive today, would be horrified if asked to tweet.

HAS ATTENTION SHRUNK?

There’s a swing band from Shanghai playing lounge music in a crowded Swiss convention hall, with hundreds of people milling about. In the midst of the manic throng, standing stock-still at a small circular bar table, Clay Shirky has zoned in to his laptop and is typing furiously.

I met Clay, a New York University-based social media maven, some years back, but rarely have the chance to see him in the flesh. For several minutes I’m standing about three feet away from Clay, off to his right, watching him—positioned in his peripheral vision, if he had any attention bandwidth to spare. But Clay takes no notice until I speak his name. Then, startled, he looks up and we start chatting.

Attention is a limited capacity: Clay’s rapt concentration fills that full bore until he shifts to me.

“Seven plus or minus two” chunks of information has been taken as the upper limit of the beam of attention since the 1950s, when George Miller proposed what he called this “magical number” in one of psychology’s most influential papers.¹¹

More recently, though, some cognitive scientists have argued that four chunks is the upper limit.¹² That caught the public’s limited attention (for a brief moment, anyway), as the new meme spread that this mental capacity had shrunk from seven to four bits of information. “Mind’s Limit Found: 4 Bits of Information,” one science news site proclaimed.¹³

Some took the presumed downsizing of what we can hold in mind as an indictment of the distractedness of everyday life in the twenty-first century, decrying the shrinking of this crucial mental ability. But they misinterpret the data.

“Working memory hasn’t shrunk,” said Justin Halberda, a cognitive scientist at Johns Hopkins University. “It’s not the case that TV has made our working memory smaller”—that in the 1950s we all had an upper limit of seven plus or minus two bits of information, and now we have only four.

“The mind tries to make the most of its limited resources,” Halberda explained. “So we use memory strategies that help”—say, combining different elements, like 4, 1, and 5, into a single chunk, such as the area code 415. “When we perform a memory task, the result might be seven plus or minus two bits. But that breaks down into a fixed limit of four, plus three or four more that memory strategies add. So both four and seven are right, depending on how you measure it.”

Then there’s what many people think of as “splitting” attention in multitasking, which cognitive science tells us is a fiction, too. Rather than having a stretchable balloon of attention to deploy in

tandem, we have a narrow, fixed pipeline to allot. Instead of splitting it, we actually switch rapidly. Continual switching saps attention from full, concentrated engagement.

"The most precious resource in a computer system is no longer its processor, memory, disk or network, but rather human attention," a research group at Carnegie Mellon University notes.¹⁴ The solution they propose to this human bottleneck hinges on minimizing distractions: Project Aura proposes to do away with bothersome systems glitches so we don't waste time in hassles.

The goal of a hassle-free computing system is laudable. This solution, however, may not get us that far: it's not a technological fix we need but a cognitive one. The source of distractions is not so much in the technology we use as in the frontal assault on our focusing ability from the mounting tide of distractions.

Which gets me back to Clay Shirky, particularly his research on social media.¹⁵ While none of us can focus on everything at once, all of us together create a collective bandwidth for attention that we each can access as needed. Witness Wikipedia.

As Shirky proclaims in his book *Here Comes Everybody*, attention can be seen as a capacity distributed among many people, as can memory or any cognitive expertise. "What's trending now" indexes how we are allotting our collective attention. While some argue that our tech-facilitated learning and memory dumb us down, there's also a case to be made that they create a mental prosthesis that expands the power of individual attention.

Our social capital—and range of attention—increases as we up the number of social ties through which we gain crucial information, like tacit knowledge of "how things work here," whether in an organization or a new neighborhood. Casual acquaintances can be extra sets of eyes and ears on the world, key sources of the guidance we need to operate in complex social and information ecosystems. Most of us have a handful of strong ties—close, trusted friends—

but we can have hundreds of so-called weak ties (for example, our Facebook "friends"). Weak ties have high value as multipliers of our attention capacity, and as a source of tips for good shopping deals, job possibilities, and dating partners.¹⁶

When we coordinate what we see and what we know, our efforts in tandem multiply our cognitive wealth. While at any given moment our quota for working memory remains small, the total of data we can pull through that narrow width becomes huge. This collective intelligence, the sum total of what everyone in a distributed group can contribute, promises maximal focus, the summation of what multiple eyes can notice.

A research center at the Massachusetts Institute of Technology on collective intelligence sees this emerging capacity as abetted by the sharing of attention on the Internet. The classic example: millions of websites cast their spotlight within narrow niches—and a Web search selects and directs our focus so we can harvest all that cognitive work efficiently.¹⁷

The MIT group's basic question: "How can we connect people and computers so that collectively we act with more intelligence than any one person or group?"

Or, as the Japanese say, "All of us are smarter than any one of us."

DO YOU LOVE WHAT YOU DO?

The big question: When you get up in the morning, are you happy about getting to work, school, or whatever it is that occupies your day?

Research by Harvard's Howard Gardner, Stanford's William Damon, and Claremont's Mihaly Csikszentmihalyi zeroed in on what they call "good work," a potent mix of what people are excel-

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lent at, what engages them, and their ethics—what they believe matters.¹⁸ Those are more likely to be high-absorption callings: people love what they are doing. Full absorption in what we do feels good, and pleasure is the emotional marker for flow.

People are in flow relatively rarely in daily life.¹⁹ Sampling people's moods at random reveals that most of the time people are either stressed or bored, with only occasional periods of flow; only about 20 percent of people have flow moments at least once a day. Around 15 percent of people never enter a flow state during a typical day.

One key to more flow in life comes when we align what we do with what we enjoy, as is the case with those fortunate folks whose jobs give them great pleasure. High achievers in any field—the lucky ones, anyway—have hit on this combination.

Apart from a career change, there are several doorways to flow. One may open when we tackle a task that challenges our abilities to the maximum—a “just-manageable” demand on our skills. Another entryway can come via doing what we are passionate about; motivation sometimes drives us into flow. But either way the final common pathway is full focus: these are each ways to ratchet up attention. No matter how you get there, a keen focus jump-starts flow.

This optimal brain state for getting work done well is marked by greater neural harmony—a rich, well-timed interconnection among diverse brain areas.²⁰ In this state, ideally, the circuits needed for the task at hand are highly active while those irrelevant are quiescent, with the brain precisely attuned to the demands of the moment. When our brains are in this zone we are more likely to perform at our personal best whatever our pursuit.

Workplace surveys, though, find large numbers of people are in a very different brain state: they daydream, waste hours cruising the Web or YouTube, and do the bare minimum required. Their

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attention scatters. Such disengagement and indifference are rampant, especially among repetitive, undemanding jobs. To get the disengaged workers any nearer the focused range demands upping their motivation and enthusiasm, evoking a sense of purpose, and adding a dollop of pressure.

On the other hand, another large group are stuck in the state neurobiologists call “frazzle,” where constant stress overloads their nervous system with floods of cortisol and adrenaline. Their attention fixates on their worries, not their job. This emotional exhaustion can lead to burnout.

Full focus gives us a potential doorway into flow. But when we choose to focus on one thing and ignore the rest, we surface a constant tension—usually invisible—between a great neural divide, where the top of the brain tussles with the bottom.