

Hit the Reset Button in Your Brain

By DANIEL J. LEVITIN

AUG. 9, 2014

THIS month, many Americans will take time off from work to go on vacation, catch up on household projects and simply be with family and friends. And many of us will feel guilty for doing so. We will worry about all of the emails piling up at work, and in many cases continue to compulsively check email during our precious time off.

But beware the false break. Make sure you have a real one. The summer vacation is more than a quaint tradition. Along with family time, mealtime and weekends, it is an important way that we can make the most of our beautiful brains.

Every day we're assaulted with facts, pseudofacts, news feeds and jibber-jabber, coming from all directions. According to a 2011 study, on a typical day, we take in the equivalent of about 174 newspapers' worth of information, five times as much as we did in 1986. As the world's 21,274 television stations produce some 85,000 hours of original programming every day (by 2003 figures), we watch an average of five hours of television per day. For every hour of YouTube video you watch, there are 5,999 hours of new video just posted!

If you're feeling overwhelmed, there's a reason: The processing capacity of the conscious mind is limited. This is a result of how the brain's attentional system evolved. Our brains have two dominant modes of attention: the task-positive network and the task-negative network (they're called networks because they comprise distributed networks of neurons, like electrical circuits within the brain). The task-positive network is active when you're actively engaged in a task, focused on it, and undistracted; neuroscientists have taken to calling it the central executive. The task-negative network is active when your mind is wandering; this is the daydreaming mode. These two attentional networks operate like a seesaw in the brain: when one is active the other is not.

This two-part attentional system is one of the crowning achievements of the human brain, and the focus it enables allowed us to harness fire, build the pyramids, discover penicillin and decode the entire human genome. Those projects required some plain old-fashioned stick-to-itiveness.

But the insight that led to them probably came from the daydreaming mode. This brain state, marked by the flow of connections among disparate ideas and thoughts, is responsible for our moments of greatest creativity and insight, when we're able to solve problems that previously seemed unsolvable. You might be

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going for a walk or grocery shopping or doing something that doesn't require sustained attention and suddenly — boom — the answer to a problem that had been vexing you suddenly appears. This is the mind-wandering mode, making connections among things that we didn't previously see as connected.

A third component of the attentional system, the attentional filter, helps to orient our attention, to tell us what to pay attention to and what we can safely ignore. This undoubtedly evolved to alert us to predators and other dangerous situations. The constant flow of information from Twitter, Facebook, Vine, Instagram, text messages and the like engages that system, and we find ourselves not sustaining attention on any one thing for very long — the curse of the information age.

My collaborator Vinod Menon, a professor of neuroscience at Stanford, and I showed that the switch between daydreaming and attention is controlled in a part of the brain called the insula, an important structure about an inch or so beneath the surface of the top of your skull. Switching between two external objects involves the temporal-parietal junction. If the relationship between the central executive system and the mind-wandering system is like a seesaw, then the insula — the attentional switch — is like an adult holding one side down so that the other stays up in the air. The efficacy of this switch varies from person to person, in some functioning smoothly, in others rather rusty. But switch it does, and if it is called upon to switch too often, we feel tired and a bit dizzy, as though we were seesawing too rapidly.

Every status update you read on Facebook, every tweet or text message you get from a friend, is competing for resources in your brain with important things like whether to put your savings in stocks or bonds, where you left your passport or how best to reconcile with a close friend you just had an argument with.

If you want to be more productive and creative, and to have more energy, the science dictates that you should partition your day into project periods. Your social networking should be done during a designated time, not as constant interruptions to your day.

Email, too, should be done at designated times. An email that you know is sitting there, unread, may sap attentional resources as your brain keeps thinking about it, distracting you from what you're doing. What might be in it? Who's it from? Is it good news or bad news? It's better to leave your email program off than to hear that constant ping and know that you're ignoring messages.

Increasing creativity will happen naturally as we tame the multitasking and immerse ourselves in a single task for sustained periods of, say, 30 to 50 minutes. Several studies have shown that a walk in nature or listening to music can trigger the mind-wandering mode. This acts as a neural reset button, and provides much needed perspective on what you're doing.

Daydreaming leads to creativity, and creative activities teach us agency, the ability to change the world, to mold it to our liking, to have a positive effect on our environment. Music, for example, turns out to be an effective method for improving attention, building up self-confidence, social skills and a sense of engagement.

This radical idea — that problem solving might take some time and doesn't always have to be accomplished immediately — could have profound effects on decision making and even on our economy. Consider this: By some estimates, preventable medical error is the third leading cause of death in the United States, accounting for hundreds of thousands of deaths each year. You want your diagnostician to give the right answer, not always the quickest one. Zoning out is not always bad. You don't want your airline pilot or air traffic controller to do it while they're on the job, but you do want them to have opportunities to reset — this is why air traffic control and other high-attention jobs typically require frequent breaks. Several studies have shown that people who work overtime reach a point of diminishing returns.

Taking breaks is biologically restorative. Naps are even better. In several studies, a nap of even 10 minutes improved cognitive function and vigor, and decreased sleepiness and fatigue. If we can train ourselves to take regular vacations — true vacations without work — and to set aside time for naps and contemplation, we will be in a more powerful position to start solving some of the world's big problems. And to be happier and well rested while we're doing it.

Daniel J. Levitin is the director of the Laboratory for Music, Cognition and Expertise at McGill University and the author of "The Organized Mind: Thinking Straight in the Age of Information Overload."