

# THE NEUROSCIENCE OF CHANGE

## HOW TO RESET YOUR BRAIN

While it might sound counterintuitive, taking breaks is an essential component of optimal thinking.

by **Matthew E. May**

**IN THE LATE SPRING OF 1905**, an utterly frustrated 26-year old **Albert Einstein** decided to pour his heart out to his friend and fellow Swiss Patent Office worker, **Michele Besso**. Einstein revealed the puzzle he had been wrestling with for the last decade: either **James Maxwell** or **Isaac Newton** had to be wrong – but he couldn't figure out which was the case. Both were pillars of modern Physics, but in his mind they were completely incompatible.

Einstein laid out the issue to Besso: the intricacies of Maxwell's

theory about light travelling at a constant speed contradicted Newton's concept of absolute space and time. He talked for hours, until he once again surrendered to the problem – completely exhausted, both mentally and physically – whereupon he announced his defeat and intent to abandon the quest for a solution entirely.

Melancholy from his failure, Einstein pushed his thoughts to the back of his mind and headed home. Riding in a streetcar, he gazed out at the famous clock tower that dominated the city



of Bern. *Suppose*, he pondered, *this streetcar raced away from the clock tower at the speed of light. What would happen?* He was suddenly struck with the realization that since light could not catch up to the streetcar, the clock would appear stopped, but his own clock – say, his pocketwatch – in the streetcar would beat normally. “A storm broke loose in my mind,” he later recalled. “Suddenly, I understood where the key to the problem lay.”

Einstein’s sudden creative insight was not an exception. Consider the following examples:

- **Friedrich von Stradonitz** discovered the round shape of the benzene ring after dreaming of a snake biting its tail;
- **Philo Farnsworth** was plowing a field as a teenager when the idea for projecting moving images line by line came to him as he gazed out over the even rows, prompting him to use his knowledge of electrons and vacuum tubes and invent the first electronic television;
- **Richard Phillips Feynman** was watching someone throw a plate in the air in Cornell University’s cafeteria when the wobbling plate with its red school medallion spinning around sparked the Nobel Prize-winning idea for quantum Electrodynamics;
- **Kary Mullis**, another Nobel winner, was driving along a California highway when the chemistry behind the Polymerase Chain Reaction (PCR) came to him;
- Author **J.K. Rowling** was traveling on a train between Manchester and London in 1990, thinking about the plot of an adult storyline when the character of Harry Potter flashed in her mind and she was able to work out all the details of a children’s story without so much as a pen and paper;
- **Shell Oil** engineer **Jaap Van Ballegooijen**’s idea for a snake oil drill came in 2005 as he was watching his son Max turn his bendy straw upside to better sip around the sides and bottom of his malt glass.

Varied as they are, these sudden insights have one thing in common: they all came at strange times and places, and they happened after an intense, prolonged struggle with a particular problem, followed by a break. Broken patterns, it seems, make our brains sit up, take notice, and pay attention. In short, we think differently – and more resourcefully – when a break occurs.

There are two kinds of breaks: those you *make*, and those you *take*. Let’s look at each in turn.

## Making a Break

The mysteries of the mind are many and complex. Neuroscience, through the magic of technology, is just beginning to unravel some of them, including neuroplasticity. Simply put, neuroplasticity is the mind’s ability to change the brain. Yes, you read that correctly: neuroplasticity radically reverses ages of scientific dogma which held that mental experiences result only from physical goings-on in the brain, and we can’t do much about it. But extensive studies confirm that our mental machinations *do* alter the physical structure of our brain matter. So when you change your mind, you also change your brain.

This is great news for most of us, because one issue all of us grapple with is change. Whether it’s kicking a bad habit, coming up with new and original ideas, shifting a business focus, changing company culture, or trying to change the world, at the heart of the issue is changing minds and mindsets – in other words, unlocking, refreshing and resetting the brain. I recently made a number of visits to Dr. **Jeffrey Schwartz**, a practicing neuropsychiatrist affiliated with UCLA, and author of several books, to learn more. Dr. Schwartz is an internationally-recognized authority on one of the most prevalent and debilitating patterns in the brain – Obsessive-Compulsive Disorder (OCD). He has developed a successful behaviour therapy at the UCLA School of Medicine for patients suffering from OCD, called the UCLA Four Steps. Here’s the thing: he doesn’t use drugs to treat patients. Instead, he teaches them to rewire their brain by changing how they think.

I’m interested in Dr. Schwartz’s methods not because I’m curious about OCD, but because if he can help people with extreme mental rigidity, think what can be done with the mind that isn’t all locked up. As he described his four-step method to me, it seemed quite obvious that it could apply to anything we want to change.

**Step 1: Relabel.** The first step is to relabel a given thought, feeling or behaviour as something else. An unwanted thought could be relabeled ‘false message’ or ‘brain glitch’. This amounts to training yourself to clearly recognize and identify what is real and what isn’t, refusing to be tricked by your own thoughts. You step back and say, “This is just my brain sending me a false message.” For someone with OCD, instead of saying, “I have to check the stove,” she would start saying, “I am having a compulsive urge to check the stove.”

This sounds easy, almost a trite affirmation, like what they give you at one of those weekend long shut-ins where you transform yourself into the person you always thought you could be. But it isn’t; it’s hard. Focusing on something completely different when your brain is sending long-embedded directions with overwhelming force is incredibly difficult.



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**Step 2: Reattribute.** The second step answers the question, “Why do these thoughts keep coming back?” The answer is that the brain is misfiring, stuck in gear, creating mental noise, and sending false messages. In other words, if you understand why you’re getting those old thoughts, eventually you’ll be able to say, “Oh, that’s just a brain glitch.” That raises the natural next question: What can you do about it?

**Step 3: Refocus.** The third step is where the toughest work is, because it involves the actual changing of behaviour. Having recognized the problem for what it is and why it’s occurring, you now have to replace the old behaviour with something new. This is where the change in brain chemistry occurs, because you are creating new patterns, new mindsets. By refusing to be misled by the old messages, by understanding they aren’t what they tell you they are, your mind is now in charge of your brain.

This is basically like shifting the gears of your car manually. “The automatic transmission isn’t working, so you manually override it with positive, desirable alternatives,” says Schwartz. “They can be anything you enjoy and can do consistently each and every time. Like most other things, the more you practice, the easier and more natural it becomes, because your brain is beginning to function more efficiently, calling up the new pattern without thinking about it.”

**Step 4: Revalue.** It all comes together in the fourth step, which is the natural outcome of the first three. With a consistent way to replace the old behaviour with the new, you begin to see old patterns as simple distractions. You devalue them as being completely worthless. Eventually the old thoughts begin to fade in intensity, the brain works better, and the automatic transmission in the brain begins to start working properly.

“Two very positive things happen,” says Dr. Schwartz. “The first is that you’re happier, because you have control over your behavioural response to your thoughts and feelings. The second is that by doing that, you change the faulty brain chemistry.” Dr. Schwartz confirmed that his methods could be used to create change in any area of business, work or life.

What all of this meant to me was that we can indeed learn to override our default mindsets and reset our brain simply (albeit not easily) by making a clear break from regular thinking and invoking the **Apple** tagline: Think different.

#### Taking a Break

In his recent best-selling book *Imagine: How Creativity Works*, **Jonah Lehrer** refers to the need to take breaks when grappling with difficult problems, writing that, “While it is commonly assumed that the best way to solve a difficult problem is to relentlessly focus, this clenched state of mind comes with a hidden cost: it inhibits the sort of creative connections that lead to breakthroughs. We suppress the very type of brain activity that should be encouraged.”

The challenge is that we are reticent to take breaks, especially when it comes to our careers. But new research is shedding light on the idea that to be more productive and creative, we need to make break-taking a regular business practice.

At the University of Luebeck in Germany, neuroendocrinologist **Ullrich Wagner** has demonstrated that the ultimate break – *sleep* – actually promotes the likelihood of sudden creative insights. In one experiment, he gave volunteers some Mensa-style number sequences to solve, along with two logical rules to use in manipulating them to find the pattern. But there was a single, simpler, ‘hidden’ rule that they might discover as they worked through the sequences. The subjects were allowed to practice

several times with the given rules, and were then told to take a break. Some took naps, some didn't.

Upon returning to the experiment to continue doing more problems, those who had taken a nap found the hidden rule much more often than those who hadn't. Wagner believes that information is consolidated by a process taking place in the hippocampus – the part of the brain that bundles and repackages memories and fragments of information from other areas and sends them to the frontal cortex to be synthesized into higher-level thought – during sleep, enabling the brain to clear itself and, in effect, reset, all the while forming new connections and associations. It is this process that is the foundation for creativity. The result is new insight and the *aha!* feeling of the so-called Eureka moment.

While no one yet knows what exactly that process is, it is important to know that putting pressure on ourselves to speed up or artificially influence our brains to work harder only *slows down* our ability to arrive at new insights. Ironically, when we take a break and let go, we actually speed up the transformational processes.

According to a 2009 survey by the **Society for Human Resource Management**, 70 per cent of employees work beyond scheduled time – staying late, taking work home, working weekends – and over half cite “self-imposed pressure” as the reason. The numbers are even more dramatic in certain industries: Harvard researchers **Leslie Perlow** and **Jessica Porter** surveyed 1,000 people in professional service firms and found that nearly half worked more than 65 hours per week, not including nearly 25 hours spent connecting with their work while outside the office. “They believe an ‘always on’ ethic is essential if they and their firms are to succeed in the global marketplace,” wrote Perlow and Porter in their four-year study.

Their research seems to confirm just the opposite, that not working can yield better work. In the experiment, members of a dozen consulting teams at **Boston Consulting Group** (BCG) were required to take ‘predictable time off’ every week, defined as one uninterrupted evening free each week after 6 pm – no work contact whatsoever, and no Blackberries. The downtime was awkward for many, nerve-racking for some, and a few fought the idea, fearful of poor performance ratings or more weekend work.

The goal was to teach people that you can tune out completely for a time and still produce great work; and it worked: internal surveys showed that within six months, consultants were more satisfied with their jobs and work-life balance, and more likely to stay with the firm, compared to those who weren't part of the study. BCG clients told Perlow and Porter that the teams turned out better work, in part due to “more open dialogue among team members” and that “the improved communication also sparked new processes that enhanced the teams’ ability to work most efficiently and effectively.” In fact, it worked so well that BCG has made it a policy.

There are at least two reasons why we don't take time out more often. The first is fear. Stepping away from our work is counterintuitive, as the BCG study demonstrated; it somehow feels wrong, like preemptive surrender. It's scary to ease up, because we think may lose our momentum, and that if we take our eye off the problem even for a second, we may lose the energy we've invested. But the result is that we get anxious when the solution to whatever we're struggling with remains elusive, and it's easy to start doubting our creativity, abilities and even our intelligence (“I must be stupid because I can't figure this out.”)

This is a cue to take a break. But too often, we still don't, for a second reason: *we don't know how*. We haven't practiced enough to develop a reliable and comfortable way to refresh our mental resources. There are a variety of ways to do this, but three are especially effective.

**1. Meditation** Executives at **GE**, **3M**, **Bloomberg Media**, **Green Mountain Coffee Roasters**, and **Salesforce.com** do it. **Google** teaches a course in it at Google University. **Ford** chairman **William Ford** does it, as do former corporate chiefs **Bill George of Medtronic** and **Bob Shapiro of Monsanto**. **Phil Jackson** and **Tiger Woods** do it. **Oracle** chief **Larry Ellison** does it and asks his executives to do it several times a day. **Chip Conley**, founder of **Joie de Vivre Hotels** and an author of *Emotional Equations* does it. Even **Thomas Edison** did it. The ‘it’ is mindful meditation.

New research from the UCLA Laboratory of Neuro Imaging suggests that people who meditate show more gray matter in certain regions of the brain, stronger connections between brain regions, and less age-related brain atrophy. In other words, meditation might make your brain bigger, faster and younger. The researchers used a type of brain imaging known as diffusion tensor imaging, or DTI, a relatively new imaging mode that provides insights into the structural connectivity of the brain. According to lead researcher **Eileen Luders**, herself a meditator, “Meditation appears to be a powerful mental exercise with the potential to change the physical structure of the brain at large. Meditation might not only cause changes in brain anatomy by inducing growth, but also by preventing reduction.”

According to former Medtronic CEO **Bill George**, now a professor of Management Practice at Harvard and best-selling author [see Thought Leader Interview, page 10], meditation has been an integral part of his career. He meditates twice a day, and during his tenure at Medtronic, he designated one of the company's conference rooms for mental breaks, encouraging employees to give it a try.

**2. Pulsing** Pulsing entails working in 90-minute cycles, separated by short breaks. Psychologist **K. Anders Ericsson**, renowned for his research and theories on expertise, has pointed out that

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top performers in fields ranging from music to science to sports tend to work in approximately 90-minute cycles and then take a break. After each period, go for a walk, change the scene, exercise, doodle, listen to music that relaxes you, shower (if that's an option) – anything that has a renewal effect and gives you the feeling of a 'second wind' – even if you think you don't need it.

The late physiologist **Nathaniel Kleitman**, who discovered rapid eye movement (REM) sleep and correlated it with dreaming and brain activity, showed that we move through five stages of light-to-deep sleep in recurring 90-minute periods. These 'ultradian cycles' have a parallel in our waking life: when we're awake, we move from higher to lower alertness every 90 minutes. After working at high intensity for more than 90 minutes, our brains begin to shut down; we become more reactive and less capable of thinking clearly and reflectively, or seeing the big picture. Our bodies clearly signal that rhythm, in the form of restlessness, hunger, drowsiness and loss of focus. But generally, we either ignore or override those signals because we have a lot to do and many ways to artificially pump up our energy with various supplements.

The fact is, we are designed to pulse – to move between *spending* and *renewing energy*. Taking time to renew every 90 minutes keeps your body in alignment with its natural rhythms.

**3. Daydreaming walks.** In my chats with Jonah Lehrer, he revealed to me that this self-descriptive tool is his go-to method for rebooting his brain. The walls he runs into in his work tend to be structural, he says – how to construct a certain piece, where to put the different threads – and answers come to him while he's just walking around, not thinking about them. "I know when I'm stuck that I'm not going to solve the problem by just playing with words on my computer screen – I need to get away," he says.

Research confirms the power of this tool. **Jonathan Schooler**, who has pioneered the study of daydreaming and mind wandering, has shown that people who daydream score higher on creativity tests. Every day, he takes a dedicated daydreaming walk on a beautiful bluff along the Pacific, just north of Santa Barbara.

#### In closing

Neuroscience has now confirmed something that most artists and creatives have long known intuitively: when a well-worn pattern is broken, creativity often emerges. When we need to find far-reaching connections between seemingly-unrelated ideas, and when we hit a wall, this is precisely when we need to relax and stop thinking about work.

Countless examples indicate that the answer only arrives when we stop looking for it. As a result, Jonah Lehrer says he never feels guilty for taking long walks in the middle of the day. Nor should you. **R**



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