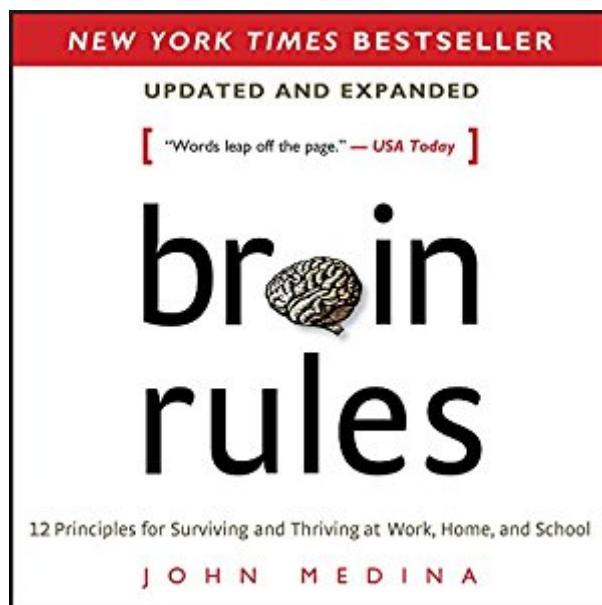


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# Brain Rules (Updated And Expanded): 12 Principles For Surviving And Thriving At Work, Home, And School



## Synopsis

Most of us have no idea what's really going on inside our heads. Yet brain scientists have uncovered details every business leader, parent, and teacher should know - like the need for physical activity to get your brain working its best. How do we learn? What exactly do sleep and stress do to our brains? Why is multi-tasking a myth? Why is it so easy to forget - and so important to repeat new knowledge? Is it true that men and women have different brains? In the New York Times bestseller *Brain Rules*, Dr. John Medina, a molecular biologist, shares his lifelong interest in how the brain sciences might influence the way we teach our children and the way we work. In each chapter, he describes a brain rule - what scientists know for sure about how our brains work - and then offers transformative ideas for our daily lives. Medina's fascinating stories and infectious sense of humor breathe life into brain science. You'll learn why Michael Jordan was no good at baseball. You'll peer over a surgeon's shoulder as he proves that most of us have a Jennifer Aniston neuron. You'll meet a boy who has an amazing memory for music but can't tie his own shoes. You will discover how: Every brain is wired differently. Exercise improves cognition. We are designed to never stop learning and exploring. Memories are volatile. Sleep is powerfully linked with the ability to learn. Vision trumps all of the other senses. Stress changes the way we learn. In the end, you'll understand how your brain really works - and how to get the most out of it.

## Book Information

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## Customer Reviews

John splits the book up into twelve different sections, each with findings in neuroscience, as well as how to apply those findings practically. These sections are Survival: How our brain is a product of

our evolution, and some traits it has adopted as a result Exercise: How exercise improves our cognitive abilities and staves off dementia Sleep: What the brain does during sleep, how people are biologically predisposed to various sleep patterns, and how to use naps to improve performance Stress: The various biochemicals involved with stress and how to have less stressful relationships and life Wiring: How neurons interact, develop, and function Attention: How multitasking works (or doesn't work), the relationship between emotion and attention, and the need for relaxation to enhance focus Memory: How memory formation works and the optimal way to remember things Sensory Integration: How all of the senses work together to provide a cohesive experience, and how multiple senses can be utilized to improve learning Vision: How vision trumps all of the other senses and can be used to create more effective presentations Music: How music can cause improvements in cognition, be therapeutic, and how music training can improve cognition Gender: Differences between the genders in physiology, socialization, emotional reactions, and memory. Exploration: How the brain is constantly exploring and looking for novel thingsA lot of reviewers have pointed out that many of the tips that John gives are common sense - that may be true. However, I found that knowing the neuroscience behind many of the things which John advocates ensures their adoption into day-to-day life.Overall, a great read that has caused me to change the way I give presentations, how much I exercise and sleep, as well as how I interact with people.

This book does a tremendous job of distilling scientific research on how the brain works and presenting it in a neat, organized manner. While there is obviously a common unifying theme that runs through the book, each chapter is self-contained in that it covers a single topic and the research around it. In almost all cases findings are presented backed by scientific, peer-reviewed research ("supporting research for each of my points must first be published in a peer-reviewed journal and then successfully replicated. Many of the studies have been replicated dozens of times." (p. 6)), except in those cases where there is not sufficient research, which the author points that out himself. This book is also an attempt to disabuse people against what are mostly urban myths and plausible-sounding theories of brain development, peddled by marketers with noble and not-so-noble intentions."It is an attempt to vaccinate against mythologies such as the "Mozart Effect," left brain/right brain personalities, and getting your babies into Harvard by making them listen to language tapes while they are still in the womb. Each chapter in the book is organized around a single theme, or "rule", that describes an attribute of the brain."For the sake of context, here are the rules:1. Exercise - get the butt off the couch; it may help you think straight and live longer2. Survival - our brains evolved to help us survive in the Savannah, to avoid becoming food. The rest is detail.3.

Wiring4. Attention - we cannot pay attention for more than 15 minutes at a time...5. Short-term memory - remember the magic number seven, plus or minus two.6. Long-term memory - it can take years, even decades for some memories to truly become embedded in our brains.7. Sleep - the less sleep you get, the dumber you can get. Really. A short nap in the afternoon can do wonders for our concentration and productivity. A siesta is really not a bad idea. Workplaces refer to these as post-lunch meetings.8. Stress - it's not good for your heart, it's not good for your brain.9. Sensory integration10. Vision - our eyes can deceive us. Our eyes have evolved to help us survive, first. Obling came much later.11. Gender - yes, there are some differences that can be explained by gender. But do not believe the ancients, like Aristotle who remarked, "... the female is an impotent male..." [location 3308]12. ExplorationIt does then make for interesting and engrossing reading as you go through each of these twelve rules. Some chapters you will naturally be more interested in, while others are informational without being too entertaining, so to say. For me, the most interesting chapters were the ones on memory (both short-term and long-term), stress, and sleep. Minor Quibble-----A quibble, minor if you don't particularly care about references in books. The author states that to keep the book "reader-friendly" extensive references are available at [...]. I actually found this detracting from the utility of the book. I am used to flipping to the end of the book where the references are noted, and then back to the page I was reading. Reading an ebook on the Kindle makes this job of navigating to a reference at the end of the book easier (though Nicholas Carr, author of *The Shallows: What the Internet Is Doing to Our Brains* may disagree). Having to go to a web site is a distraction - the author should know that. Secondly, the website itself is not very well organized if all you are interested in are the references. You have to click to go to a different page for each chapter (rule) in the book, and from that page click on a link at the right that reads, "References for this rule [PDF]". Each chapter's references are in a PDF file ([...] for instance). These could so easily have been included in the book itself. Keep the online references too by all means - they can serve as a place where these references are updated and new ones added. Thirdly, the book itself does not contain any numbering of the references within the text, so it is doubly difficult to figure out where in the PDF of references for a chapter to look for as a reference to something you have read in the book. This is certainly one experiment that has failed. On to the rest of the book now...Ever wonder why the sages in ancient India developed the science of yoga? Even though these sages were supposed to sit and meditate on the meaning of life? And in which case what was the use for doing artistic aerobics? Well, yoga is exercise that is nectar for the body as well as the brain. What held true for the sages thousands of years ago is relevant even today."A lifetime of exercise can result in a sometimes astonishing elevation in cognitive performance,

compared with those who are sedentary. Exercisers outperform couch potatoes in tests that measure long-term memory, reasoning, attention, problem-solving, even so-called fluid-intelligence tasks. Most important, these data, strong as they were, showed only an association, not a cause. In the laboratory, the gold standard appears to be aerobic exercise, 30 minutes at a clip, two or three times a week. Add a strengthening regimen and you get even more cognitive benefit. Exercise improves children. Physically fit children identify visual stimuli much faster than sedentary ones. They appear to concentrate better. "Whereas the great Greek philosophers thought the brain was basically a dead piece of meat encased in a skull ("The Greeks didn't think the brain did much of anything. It just sat there like an inert pile of clay" (p. 200)), modern science has revealed the brain to be the, heart, so to say in a manner of speaking, of our human existence. The fact that the brain can consume massive amounts of energy also helps explain why we get tired even when we are sitting in a chair, but thinking furiously about some problem. The brain is at work, and it sucks in energy in huge gulps." The brain represents only about 2 percent of most people's body weight, yet it accounts for about 20 percent of the body's total energy usage--about 10 times more than would be expected. When the brain is fully working, it uses more energy per unit of tissue weight than a fully exercising quadricep. In fact, the human brain cannot simultaneously activate more than 2 percent of its neurons at any one time. More than this, and the glucose supply becomes so quickly exhausted that you will faint. "Did you get that? The oft-repeated truism that we use only 2 percent of our brains is only partially true. The fact, as it turns out, is that we cannot physically make use of more than 2 percent, at ANY given point in time. It does NOT mean that we use only the SAME two percent of our brain. This little, but significant, distinction is often lost in repetition. Here is a conundrum. When we are distracted or accused of being distracted, it usually means we are focusing on more than one thing at a time, and paying less attention to the task at hand. When it comes to the brain however, the reverse is true in some contexts, especially when the brain is tasked with remembering things. Whether you are a waiter or a brain scientist, if you want to get the particulars correct, don't start with details. Start with the key ideas and, in a hierarchical fashion, form the details around these larger notions. "Studies show that a person who is interrupted takes 50 percent longer to accomplish a task. Not only that, he or she makes up to 50 percent more errors." Ever ponder as to why we forget almost everything we learn in class? Of course it is because the teacher was boring, the subject was boring, you were tired, you were distracted, the room was too hot, there was a cricket match going on, and of course because there was this new movie you had to catch at the theater after school, and of course the cute girl in class looked at you and smiled for a second, which was enough for you to forget what happened in class during the

next hour. Well, partly true. The part about the cute girl looking in your direction would be an ECS. An "emotionally charged event (usually called an ECS, short for emotionally competent stimulus) is the best-processed kind of external stimulus ever measured." (p. 80). But seriously, you don't have cute girls eyeing you in every class? So why do we forget what we learn, and that too so fast?"Hermann Ebbinghaus was born in 1850. As a young man, he looked like a cross between Santa Claus and John Lennon, with his bushy brown beard and round glasses. He is most famous for uncovering one of the most depressing facts in all of education: People usually forget 90 percent of what they learn in a class within 30 days. He further showed that the majority of this forgetting occurs within the first few hours after class. This has been robustly confirmed in modern times.

[page 100, location 1352]"The things we learn are also usually associated with a mood. Recall the event and you usually recall the mood also. Which is why it is better to be happier when learning than sad. Or, look at it this way; if you are sad when learning mathematics, because you are having to learn about differential calculus and finite integration, then you will be sad when you have to remember calculus, and before you know it you will have associated math with sad feelings."Learn something while you are sad and you will be able to recall it better if, at retrieval, you are somehow suddenly made sad. The condition is called context-dependent or state-dependent learning.the passage of time inexorably leads to a weakening of events and facts that were once clear and chock-full of specifics. In an attempt to fill in missing gaps, the brain is forced to rely on partial fragments, inferences, outright guesswork, and often (most disturbingly) other memories not related to the actual event. It is truly reconstructive in nature,"Another nugget about memory, both short-term and long-term is that the key to remembering is repetition and associating facts and events with other facts and events. Look at it as a highly sophisticated form of indexing and cross-referencing (relational joins, if you will). To help remember something effectively, make the association vivid. Why do people usually associate the actress Zeenat Aman most with the movie Satyam Shivam Sundaram? It's the vividness of the imagery sir."Why do examples work? They appear to take advantage of the brain's natural predilection for pattern matching. Information is more readily processed if it can be immediately associated with information already present in the learner's brain. At relatively early periods post-learning (say minutes to hours to days), retrieval systems allow us to reproduce a fairly specific and detailed account of a given memory." "the relationship between repetition and memory is clear. Deliberately re-expose yourself to the information if you want to retrieve it later. Deliberately re-expose yourself to the information more elaborately if you want the retrieval to be of higher quality. Deliberately re-expose yourself to the information more elaborately, and in fixed, spaced intervals, if you want the retrieval to be the most

vivid it can be."In the chapter on sleep, a couple of nuggets stand out in their illustration on how sleep deprivation affects the brain."When people become sleep-deprived, for example, their ability to utilize the food they are consuming falls by about one-third. The ability to make insulin and to extract energy from the brain's favorite dessert, glucose, begins to fail miserably....For example, if healthy 30-year-olds are sleep-deprived for six days (averaging, in this study, about four hours of sleep per night), parts of their body chemistry soon revert to that of a 60-year-old. And if they are allowed to recover, it will take them almost a week to get back to their 30-year-old systems....While "emotionally competent stimuli" can help us remember things more effectively, and such events "persist much longer in our memories", it is important to distinguish such ECS from outright stress. When you subject the brain to stress, it collapses into a primal, survival state. So forget about learning.Stressed brains do not learn the same way as non-stressed brains. My grief at least had an end-point. Imagine growing up in an emotionally unstable home, where the stress seems never-ending. Given that stress can powerfully affect learning, one might predict that children living in high-anxiety households would not perform as well academically as kids living in more nurturing households....One of the greatest predictors of performance in school turns out to be the emotional stability of the home."And here is more, a lot more on stress. Now, don't get stressed reading about what stress can do to you and your brain."... brain's hypothalamus, that pea-size organ sitting almost in the middle of your head. When your sensory systems detect stress, the hypothalamus reacts by sending a signal to your adrenal glands, lying far away on the roof of your kidneys. The glands immediately dump bucketloads of adrenaline into your bloodstream. The overall effect is called the fight or flight response. [page 174]Consequently, our stress responses were shaped to solve problems that lasted not for years, but for seconds. They were primarily designed to get our muscles moving us as quickly as possible, usually out of harm's way....Over the long term, however, too much adrenaline stops regulating surges in your blood pressure. These unregulated surges create sandpaper-like rough spots on the insides of your blood vessels. The spots turn into scars, which allow sticky substances in the blood to build up there, clogging your arteries. [page 176]Over the long term, stress ravages parts of the immune system involved in producing antibodies. Together, these can cripple your ability to fight infection.the hippocampus is deeply involved in many aspects of human learning. Stress hormones can make cells in the hippocampus more vulnerable to other stresses. Stress hormones can disconnect neural networks, the webbing of brain cells that act like a safety deposit vault, storing your most precious memories. They can stop the hippocampus from giving birth to brand-new baby neurons. Under extreme conditions, stress hormones can even kill hippocampal cells. [page 179]"In summary, with the exception of the misstep over references,

this is an excellent book. Highly recommended.

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