Brian Johnson's PhilosophersNotes
More Wisdom in Less Time

## THE BIG IDEAS

**Brain Rules**
12 to be precise.

**Move**
Like our Olympian ancestors.

**Sleep**
Sleep loss = brain drain.

**Attention**
Multitasking is a myth.

**Memory**
How we learn.

**Exploration**
Scientists and our experiments.

# Brain Rules

12 Principles for Surviving and Thriving at Work, Home, and School

BY JOHN MEDINA · PEAR PRESS © 2014 · 304 PAGES

"Because we don't fully understand how our brains work, we do dumb things. We try to talk on our cell phones and drive at the same time, even though it is literally impossible for our brains to multitask when it comes to paying attention. We have created high-stress office environments, even though a stressed brain is significantly less productive than a non-stressed brain. Our schools are designed so that most real learning has to occur at home. Taken together, what do the studies in this book show? Mostly this: If you wanted to create an education environment that was directly opposed to what the brain was good at doing, you probably would design something like a classroom. If you wanted to create a business environment that was directly opposed to what the brain was good at doing, you probably would design something like a cubicle. And if you wanted to change things, you might have to tear down both and start over.

Blame it on the fact that brain scientists rarely have a conversation with teachers and business professionals, education majors and accountants, superintendents and CEOs. Unless you have the *Journal of Neuroscience* sitting on your coffee table, you're out of the loop.

This book is meant to get you in the loop."

~ John Medina from ***Brain Rules***

I got this book after reading *Make Time* in which they raved about it.

Dr. John Medina is a developmental molecular biologist focused on the genes involved in human brain development and the genetics of psychiatric disorders.

He's also a professor at the University of Washington School of Medicine in its Department of Bioengineering.

And, perhaps most importantly for our purposes, he's a great writer and storyteller.

This is a fascinating look at his 12 "brain rules." I loved it—especially the first five rules which are a nice confirmation of why our fundamentals are so important! (Get a copy here.)

Of course, the book is packed with Big Ideas and, as always, I'm excited to share some of my favorites we can apply to our lives Today so let's jump straight in!

## BRAIN RULES (12 TO BE PRECISE)

"My goal is to introduce you to 12 things we know about how the brain works. I call these Brain Rules. For each rule, I present the science, introduce you to the researchers behind it, and then offer ideas for how the rule might apply to our daily lives, especially at work and school. The brain is complex, and I am taking only slivers of information from each subject—not comprehensive but, I hope, accessible."

*"Though we know precious little about how the brain works, our evolutionary history tells us: The brain appears to be designed to (1) solve problems (2) related to surviving (3) in an unstable outdoor environment, and (4) to do so in nearly constant motion. ... Though we have been stuffing them into classrooms and cubicles for decades, our brains actually were built to survive in jungles and grasslands. We have not outgrown this."*

~ John Medina

"Your brain acts like a muscle: The more activity you do, the larger and more complex it can become. Whether that equates to more intelligence is another issue, but one fact is indisputable: What you do in life physically changes what your brain looks like."

~ John Medina

The 12 Brain Rules. Each gets its own chapter. We'll explore a few of my favorites in a moment. First, the quick overview.

1. **Survival** - *The human brain evolved, too.*
2. **Exercise** - *Exercise boosts brain power.*
3. **Sleep** - *Sleep well, think well.*
4. **Stress** - *Stressed brains don't learn the same way.*
5. **Wiring** - *Every brain is wired differently.*
6. **Attention** - *We don't pay attention to boring things.*
7. **Memory** - *Repeat to remember.*
8. **Sensory Integration** - *Stimulate more of the senses.*
9. **Vision** - *Vision trumps all other senses.*
10. **Music** - *Study or listen to boost cognition.*
11. **Gender** - *Male and Female brains are different.*
12. **Exploration** - *We are powerful and natural explorers.*

## MOVE: LIKE OUR OLYMPIAN ANCESTORS!

"All of the evidence points in one direction: Physical activity is cognitive candy. Civilization, while giving us such seemingly forward advances as modern medicine and spatulas, also has had a nasty side effect. It gives us more opportunities to sit on our butts. Whether learning or working, we gradually quit exercising the way our ancestors did. Recall that our evolutionary ancestors were used to walking up to 12 miles *per day*. This means that our brains were supported for most of our evolutionary history by Olympic-caliber bodies. We were not sitting in a classroom for eight hours at a stretch. If we sat around the Serengeti for eight hours—heck, for eight *minutes*—we were somebody's lunch. We haven't had millions of years to adapt to our sedentary lifestyle. That lifestyle has hurt both our physical and mental health."

Welcome to Rule #2: MOVE!!

Our ancient ancestors? Picture super-fit Olympians. They moved all day every day and walked up to 12 miles EVERY DAY.

And I love the image of being eaten if we didn't move on the Serengeti for 8 hours and/or 8 minutes. (I'll have that image in mind when my Timex timer beeps after its endless 1,000-second loops—commanding me to get up and MOVE!)

"Cutting off physical exercise [by removing PE classes]—the very activity most likely to promote cognitive performance—to do better on a test score—is like trying to gain weight by starving yourself."

~ John Medina

John walks us through all the staggering stats on just how important exercise is. We touch on some similar goodness in John Ratey's *Spark*. And Katy Bowman's *Movement Matters* + *Don't Just Sit There*. Plus Joan Vernikos' *Sitting Kills, Moving Heals*.

We could bombard you with more information but my hunch is you know (at least!) one thing you could be doing to Optimize your movement a little more TODAY.

What is it?

P.S. I just banged out my 1,000-meter row right before working on this—officially completing my 1 + 10 + 100 + 1,000 + 10,000 cycle by 11 AM. Ah... Fresh brain says: MOVEMENT ROCKS!

P.P.S. John is a great storyteller and teacher. He kicks this chapter off with a story about Jack LaLanne. You know how he celebrated his 70th birthday? By towing 70 boats a mile and a half around Long Beach harbor. As he swam. (Oh! And he was handcuffed and shackled.)

*" If you want people to pay attention, don't start with details. Start with the key ideas and, in a hierarchical fashion, form the details around these larger notions. Meaning before details."*

~ John Medina

## SLEEP: SLEEP LOSS = BRAIN DRAIN

"One study showed that a highly successful student can be set up for a precipitous academic fall just by getting less than seven hours of sleep a night. Take an A student used to scoring in the top 10 percent of virtually everything she does. If she gets just under seven hours of sleep on weekdays, and about 40 minutes more on weekends, her scores will begin to match the scores of the bottom 9 percent of individuals who are getting enough sleep."

Welcome to Brain Rule #3: Sleep.

(btw: Notice we've covered 2 of our top 3 core fundamentals: Moving and Sleeping. Alas, John skips "Eating" but I'd say it *definitely* makes the Top 10 if not the Top 5 if not the Top 3! :)

Those (shocking!) stats make me think of my own academic experience in high school.

Quick context to establish my nerd credentials before making the point and then (hopefully) applying the wisdom to your and your family's lives.

I was a 4.4 student in high school. (I laugh as I type that.) And, I was a National Merit Semifinalist. I actually didn't even know what that meant (other than that I did really well on my PSAT) until I just Googled it. Apparently, that means I placed in the Top 1% on my PSAT.

So... I did really well on the PSAT which means I should have done about as well on SAT.

Only, I didn't.

It wasn't until looking back on it that I realized what was likely the primary reason for the diminution in my performance.

Short story: My dad worked in a grocery store for 38 years. I got a job at our local store the day I turned 16. (As did all of my four older siblings.)

Here's why that's relevant. You know what I was doing the Friday night before my SAT? I was working. Until, if my memory serves me correctly, 11:00 P.M.

Now, I'm not sure what time I got to bed but I'd be willing to bet (a lot) that it was 3 to 4 hours later than when I went to bed the night before I took the PSAT. And, I'm pretty sure I got up at the same bright and early time.

Of course, other variables could have played a role but... Knowing what I now know about how (poorly) my brain functions after a bad night of sleep, I'd be willing to bet (a lot) that the primary reason I performed sub-optimally on that test was because I got a sub-optimal amount of sleep.

I mean, I did alright and it all turned out fantastic, etc. But... I actually get a little misty as I type this, reflecting on the first-generation-college-student version of me (and all the kids like me) whose family didn't know the value of that test and how it would impact my life's trajectory and how important a good night of sleep was to my performance.

All of which brings us back to YOU and your family...

Got an important test coming up? GET A GOOD NIGHT OF SLEEP!!! :)

(And remember that some peak performance guys say that it's the night *before* the night before that really matters so GET TWO GOOD NIGHTS OF SLEEP!!! :)

And get a quick workout in before. And breathe. And... Well, rock it. :)

P.S. Check out Sleep 101 and our Notes on the mind-blowing science on *Why We Sleep* for more.

## ATTENTION: THE BRAIN CANNOT MULTITASK

"As a professor, I've noticed a change in my student's abilities to pay attention to me during

" Multitasking, when it comes to paying attention, is a myth. The brain naturally focuses on concepts sequentially, one at a time."

~ John Medina

a lecture. They have a habit of breaking out their laptops while I'm talking. Three researchers at Stanford University noticed the same thing about the undergraduates they were teaching, and they decided to study it. First, they noticed that while all the students seemed to use digital devices incessantly, not all students did. True to stereotype, some kids were zombified, hyperdigital users. But some kids used their devices in a low-key fashion: not all the time, and not with two dozen windows open simultaneously. The researchers call the first category of students Heavy Media Multitaskers. Their less frantic colleagues were called Light Media Multitaskers.

If you asked heavy users to concentrate on a problem while simultaneously giving them lots of distractions, the researchers wondered, how good was their ability to maintain focus? The hypothesis: Compared to light users, the heavy users would be faster and more accurate at switching from one task to another, because they were already so used to switching between browser windows and projects and media inputs. The hypothesis was wrong.

In every attentional test the researchers threw at these students, the heavy users did consistently worse than the light users. Sometimes dramatically worse. They weren't as good at filtering out irrelevant information. They couldn't organize their memories as well. And they did worse on every task-switching experiment. Psychologist Eyal Ophir, an author of the study, said of the heavy users, 'They couldn't help thinking about the task they weren't doing. The high multitaskers are always drawing from all the information in front of them. They can't keep things separate in their minds.' This is just the latest illustration of the fact that the brain cannot multitask. Even if you are a Stanford student in the heart of Silicon Valley."

That's from Brain rule #5 on Attention, sub-section "The brain cannot multitask" in which, you guessed it, John emphatically makes the point that our brains simply CANNOT MULTITASK.

No matter how much you *think* you can.

In fact, the better you *think* you are at multitasking is more likely to be correlated to diminished performance than exceptional performance. (Hah.) (Oops.)

As John says: *"Multitasking, when it comes to paying attention, is a myth. The brain naturally focuses on concepts sequentially, one at a time."*

What our brains *really* do when we *think* we're "multitasking" is called "task switching." We've talked about this a LOT. See Notes on everything from *The Distracted Mind* and *The Distraction Addiction* to *Manage Your Day-to-Day* and *My Morning Routine*.

" Is this caused by nature or nurture? As Stephen Jay Gould says,' It is logically, mathematically, and philosophically impossible to pull them apart.`"

~ John Medina

It's REALLY important we REALLY understand the fact that (am I repeating myself? YES!), as John says: *"Multitasking, when it comes to paying attention, is a myth. The brain naturally focuses on concepts sequentially, one at a time."*

Cal Newport brilliantly comments on this in *Deep Work* where he tells us: *"The problem this research identifies with this work strategy is that when you switch from some Task A to another Task B, your attention doesn't immediately follow—a residue of your attention remains stuck thinking about the original task. ...*

*'People experiencing attention residue after switching tasks are likely to demonstrate poor performance on that next task,' and the more intense the residue, the worse the performance."*

Plus: *"To produce at your peak level you need to work for extended periods with full concentration on a single task free from distraction. Put another way, the type of work that optimizes performance is deep work."*

There ya go. Quit thinking you're some multitasking super-efficient ninja. (Hah.)

FOCUS. On one thing at a time.

" Psychologist Howard Gardner believes we have at least seven categories of intelligence: verbal/linguistic, musical/rhythmic, logical/mathematical, spatial, bodily/kinesthetic, interpersonal, and intrapersonal."

~ John Medina

## MEMORY: HOW WE LEARN

"If scientists want to know whether you are retrieving a vivid memory, they don't have to ask you. They can simply look in their fMRI machine and see whether your left inferior prefrontal cortex is active. Scientist Anthony Wagner used this fact to study two groups of students given a list of words to memorize. The first group was shown the words via mass repetition, reminiscent of students cramming for an exam. The second group was shown the words in spaced intervals over a longer period of time. The second group recalled the list of words with much more accuracy, with more activity in the cortex showing up on the fMRI (that's 'functional magnetic resonance imaging) machine. Based on these results, Harvard psychology professor Dan Schacter wrote: '[I]f you want to study for a test you will be taking in a week's time, and are able to go through the material 10 times, it is better to space out the 10 repetitions during the week than to squeeze them all together.'

Scientists aren't yet sure which time intervals supply all the magic. But taken together, the relationship between repetition and memory is clear. Deliberately re-expose yourself to information if you want to retrieve it later. Deliberately re-expose yourself to information more elaborately if you want to remember more of the details. Deliberately re-expose yourself to the information *more elaborately* and in fixed, spaced intervals if you want the retrieval as vivid as possible."

That's from a chapter on the 6th Brain Rule on Memory in which we explore a lot of the same Ideas we talk about in Learning 101 and all the Notes associated with that class like *How We Learn*, *Make It Stick*, *A Mind for Numbers* and *How to Become a Straight-A Student*.

Highlights of topics explored include the importance of spaced learning, elaboration and repetition. Check out all those Notes for more.

For now, know this: From *Make It Stick*, we learn about the importance of repetition and spaced practice: *"If it's important, it needs to be practiced, and practiced again. And don't put stock in momentary gains that result from massed practice. Space your testing, vary your practice, keep the long view."*

Then there's Cal Newport's (always) brilliant thoughts on the subject. In *How to Become a Straight-A Student* he walks us through real work vs. pseudo work (INTENSITY!!) and gives us a bunch of tips to Optimize our learning including: *"Embrace the quiz-and-recall method. It's the single most efficient way to study."* And: *"Smart students avoid these issues by working constantly on assignments, in small chunks, every day."*

## EXPLORATION: SCIENTISTS AND OUR EXPERIMENTS

"Babies are born with a deep desire to understand the world around them and an incessant curiosity that compels them to aggressively explore it. This need for exploration is so powerfully stitched into their experience that some scientists describe it as a drive, just as hunger and thirst and sex are drives.

All babies gather information by actively testing their environment, much as a scientist would. They make a sensory observation, form a hypothesis about what is going on, design an experiment capable of testing the hypothesis, and then draw conclusions from the findings. They use a series of increasingly self-corrected ideas to figure out how the world works."

That's from the last chapter on the last rule: "Exploration." It could have been (perhaps more accurately) called "Experimentation." Our exemplars? Babies.

As you know if you have kids (or nieces/nephews/etc.) they're CONSTANTLY "exploring"/"experimenting." They're like little scientists in diapers. :)

*"The brain gobbles up 20 percent of the body's energy, even though it's only about 2 percent of the body's weight. 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 brain's energy supply becomes so quickly exhausted that you will faint."*

~ John Medina

That drive to understand our world never stops. And, it's constantly rewiring our brain.

This Idea regarding the importance of constantly experimenting was actually the theme of our last Idea in our last Note on *Make Time* by Jake Knapp and John Zeratsky.

Here's how they put it: *"Don't worry. Science is simple. Sure, some of it—particle accelerators, astrophysics, photon torpedoes—can be a little tricky. But the scientific method itself is straight forward:*

*1. OBSERVE what's going on.*

*2. GUESS why things are happening the way they are.*

*3. EXPERIMENT to test your hypothesis.*

*4. MEASURE the results and decide whether you were right.*

*That's pretty much it. The scientific know-how behind everything from WD-40 to the Hubble space telescope all came from following those four steps."*

To recap: Observe. Guess. Experiment. Measure.

Optimize.

Repeat.

Most importantly: What experiment will YOU run Today?

High fives and here's to our incessant exploration and evolution as we *"use a series of increasingly self-corrected ideas to figure out how the world works."*

**Brian Johnson,**
*Heroic Philosopher CEO*

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## About the Author of This Note

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Brian Johnson is the Founder + CEO of Heroic. He's spent half of the last 25 years as a Founder/CEO and the other half as a Philosopher. Brian loves integrating ancient wisdom and modern science to help YOU become the best, most heroic version of yourself so we can create a world in which 51% of humanity is flourishing by 2051. Learn more at heroic.us.