

Brain Rules

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

John Medina

Reviewed by David Hanlon.

For some time now this book has been on my list to review. The core reason lies in the fact that, so many of us are increasingly looking for the edge – whether that edge is in business competitiveness or personal satisfaction. And in our searching we are seeking principles and practices that may have once been considered on the fringe or not relevant for either success or contentment. Take for example respected management

consultant and author, Gary Hamel who in *The Future of Management* suggests we “look someplace weird, someplace unexpected, far beyond the boundaries of ‘best practice’ for inspiration on our management innovation journey, because ‘uncommon insights usually come from uncommon places’”.

Uncommon insights usually come from uncommon places.

Gary Hamel

Historically, our focus on improvement has been through refinement of structures and frameworks. However this has occurred in the absence of a deep understanding of how we function neurologically.

John Medina introduces us to this world – some of which we know, and maybe are already doing, (yet perhaps don’t or can’t see the application) and, more excitingly, some of which we don’t know. As always with new frontiers, we will struggle with the practicalities of parts of what is suggested, however there are some no-brainers, which if taken on-board by organisations and individuals, greatly assist productivity in the workplace.

Medina’s approach is to break the functionality of our brain into 12 rules.

Rule #1 – Exercise boosts brain power

Despite the fact that the importance of exercise is being taken on board by many organisations and individuals the sad sobering fact is that obesity and diabetes are accelerating at an alarming rate in western countries. Medina provides some more reasons to focus on exercise. He reviews some of the latest research into exercise and cognitive ability, which shows a strong correlation. Interestingly Medina bases this relationship on our ancestors evolving and populating the planet – this required around 10-20 km per day of movement for all parts of the planet (see also Jared Diamond’s great book for more on this, *Guns, Germs and Steel*).

The importance of exercise on mood is highlighted, and again exercise is encouraged for people at the extreme of mood disorders (depression) with good results.

However, the general relationship between exercise, cognitive skills and general brain well-being is perhaps the most fascinating. Many are aware of the fact that the brain is a hungry animal, requiring some 15% of all oxygen and 20% of all glucose despite being 2% of our body weight.

Research now shows that our brains can continue to grow and regenerate in certain areas under certain conditions. Exercise plays an important role here. There is a simple relationship between exercise and increased blood flow throughout the body. For the brain early studies indicate exercise stimulates one of the brain's most powerful growth factors (for the more technically curious, this is called the Brain Derived Neurotrophic Factor) which keeps neurons healthy and also stimulates the growth of new neurons.

There is a strong school of thought with less conclusive evidence that suggests a linkage between aerobic exercise and ageing diseases such as dementia and Alzheimers. However, if exercise helps you beat the odds of getting these two insidious diseases, why not?

As for the solution, desk bound all day is not the answer. Have more meetings whilst walking, reading on treadmills, etc. as part of the daily activity.

Rule #2 – Survival

In my view, a rather disjointed chapter however, I have attempted to summarise the key components that help us be better learners and adaptors.

Symbolic reasoning

He draws on research by Judy DeLaoche who identified the factor which separates us from the rest of the animal world: which is the development of symbolic reasoning.

Symbolic reasoning is the ability to attribute characteristics and meaning to things that don't actually possess them. We take the symbol for a Mercedes-Benz car and that very sign can represent something quite beyond that it is a particular brand of car. It can immediately mean money, safety, status, etc. Examples of symbolic systems include the language style we use and the non-verbal communications associated with those language styles. Put simply, symbolic reasoning is our ability to make things up about what is not there: it is our ability to fantasise.

Symbols play a far greater role in our learning and culture than many think. Symbols are constantly being formed whether we like it or not. So, in the absence of agreed cultural symbols in an organisation, the workforce will subconsciously generate its own.

There is also an unbroken intellectual link between symbolic reasoning and our ability to create culture.

Adaptability

Charles Darwin revolutionised the scientific world with the concept of natural selection. Medina extends this through drawing on the work of Richard Potts, which helps explain some of neurological basis that augments natural selection and has ramifications for our learning styles today.

Potts theory - Variability Selection Theory – suggests that we have a constant interaction between two parts of the brain: our **database** where we store what we know and the ability for **improvisation** off that database. In other words, we have:

- A Database – from which we can tell if we have made a mistake
- Improvisation – allows us to learn from the mistakes

In our modern day world, we learn best if we can incorporate both into our systems. Rote learning doesn't prepare how to predict and interact in changing circumstances. Improvisation on its own, doesn't give us the deep and rich database of knowledge from which to base our improvisation. It is like saying a jazz player simply needs to jam with others and he will be great. Without a sound knowledge of structure and skills, this will be less effective. On a similar note (no pun intended), many classically trained musicians simply cannot improvise.

The ability to feel

Richard Dawkins referred to "pitiless indifference" when talking about universal suffering and it is the antithesis of this that has made us different. As Medina says, "The ability to peer inside somebody's mental life and make predictions takes a tremendous amount of intelligence and, not surprisingly, brain activity."

Getting to be "top of the tree" he suggests possibly occurred, not because we were the strongest, but because our intelligence gave us the ability to understand one another's intentions and motivations thus allowing us to co-ordinate within a group.

Medina then postulates that our ability to learn has deep roots in relationships and this learning is impacted by the emotional environment, where learning takes place. In other words, "If someone does not feel safe with a teacher or boss, he or she may not be able to perform as well. If a student feels misunderstood because the teacher cannot connect with the way the student learns, the student may become isolated."

As Medina states, "Relationships matter when attempting to teach human beings." Nothing new however, when it comes to training, we often work on technical skills alone rather than the trainers ability to engage and emotionally connect."

Rule #3 – Wiring

We all joke from time to time about the fact that every brain is wired differently. However, we spend less time exploring what the specifics of these differences are and how best to capitalise on the differences.

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What makes Michael Jordon (one of the world’s greatest basketballers) a complete flop when he tries to switch to baseball yet Anthony Mundine can make a far greater switch from league football to being a world champion boxer? Both know intellectually what has to be done yet they have vastly different abilities in having their brains transfer that knowledge to their muscle behaviours.

What you do and learn impacts on how your brain is wired and we all are wired very differently.

The answer partly lies in the work of Nobel Prize winner, Eric Kandel, who discovered when you learn something, the wiring in your brain changes. Part of the reason for the different responses that Jordon and Mundine had is the fact that our brains are so sensitive to external inputs that their physical wiring depends upon the culture in which they find themselves. For Jordan, his identity may have still remained with basketball that he couldn’t mentally shift (indeed he went back to basketball) and did great things.

How do we see things?

Our ability to see and respond is the result of three separate yet interdependent systems. These are:

1. Experience independent. Things like knowing how to move ones tongue, moving ones feet, etc.
2. Experience expectant. This is where knowledge comes from seeing and language
3. Experience dependent. So here our brains develop according to the culture they are placed in. Experiments with identical twins being shown the same movie, showed they recalled the movie differently based on their experiences.

What does this mean for organisations?

Values is a nice example where more and more organisations are striving to have values based behaviour and find it difficult. Mostly the difficulties arise because of our experience and the time lag between reinforcements around the values. Secondly, because values are abstract, we can all extrapolate what are “reasonable” and “unreasonable” behaviours (more concrete) around any particular value.

Rule #4 – Attention

This is an important section in today's overcrowded world of messages and a shortage of time to deliver them.

Meaning and emotion before details

This is something that all marketers know and work on. They know they have a very short space to grab our attention (a 30 second ad on TV, a flash past billboard, etc.). So to get our attention, they work hard for us to have an "experience".

What we pay attention to is profoundly influenced by memory. In every day life, we use previous experience to predict where we should pay attention.

Details come later – get the attention around specific messages of meaning and then, in a logical fashion, fill in the details.

Multi-tasking

There is a significant amount of evidence of the negative impact of multi-tasking on general wellbeing and increased stress. Loehr and Schwartz (*The Power of Full Engagement*), draw on their wealth of experience to back up Medina's claims here.

We are biologically incapable of processing attention-rich inputs simultaneously.....more than 50% of the visual cues spotted by attentive drivers are missed when using a mobile phone.

In the brain, multitasking is managed by what are known as mental executive functions. These executive functions control and manage other cognitive processes and determine how, when and in what order certain tasks are performed. According to researchers Meyer, Evans and Rubinstein, there are two stages to the executive control process. The first stage is known as "goal shifting" (deciding to do one thing instead of another) and the second is known as "role activation" (changing the rules from the previous task to rules for the new task). It is this constant "changing of the rules" that causes stress.

Rule #5 – Repeat to Remember

Medina covers a wide range of topics in this section, many of which may be interesting but don't help directly with memory. What he does tell us and what many of us know already (some more acutely than others!) is that we will forget around 90% of what we learn in a class within a month and that the majority of this is lost within the first few hours after being taught.

Whilst there are a series of sequential steps that the brain goes through in encoding, storing, retrieving and forgetting information the two most important here are how we encode and how we retrieve.

Encoding

The more elaborately we encode information at the moment of learning, the stronger the memory. Put simply, encoding is attaching meaning to what we talk about. For most of us, that meaning has to do with making examples practical, using stories (there is much written in many other areas about the Power of the Story), and making the learning enjoyable.

Medina suggests that examples work because they appear to take advantage of the brain's predilection for pattern matching. Information is more readily processed if it can be immediately associated with information already present in the learner's brain.

Recalling – the hard bit

Retrieval may best be improved by replicating the conditions surrounding the initial encoding. Retrieval works best when the environmental conditions at retrieval mimic the environmental conditions at encoding. If this is true, then the most effective environment in which to learn would be on-the-job.

Rule #6 – Remember to Repeat

Medina draws on some early work of Alan Baddeley to explain how the brain processes information in what he calls the auditory, visual and executive modes. More importantly for those of us who wish to improve long-term memory and our capacity to manage more effectively in the moment is his referral (without mentioning his name) to Professor George Miller's most quoted work – the rule of 7 plus or minus 2. This work demonstrates that our working memory has very limited capacity and a limited duration in which it holds bits of "stuff".

Memory takes an almost ridiculous amount of time to settle into its permanent form, in the process of which it is maddeningly subject to amendment.

This rule has been taken up and used by many of the world's best sports coaches of which San Francisco coach Bill Walsh repeatedly had his players learn, practice and perfect no more than 4 pieces of play. As Walsh said, under pressure, these were the ones they would recall.

Medina confirms this by suggestion that the solution to creating reliable long-term memories is repetition, doled out in specific timed intervals. This is enhanced by thinking or talking about an event immediately after it has occurred.

Referring back to the loss of information in the short-term Medina suggests that effective training will repeat what is learned within a 90 minute period. A process referred to by many others as the embedding process.

Rule #7 – Sleep well, think well

We are all aware of how we feel if we have been up late, had our sleep broken by kids, etc., however many place less importance on the impact of constantly cheating a bit on sleep.

How do we sleep

Sleep can be divided into two entirely different behavioral states: REM (rapid eye movement) sleep, and non-REM sleep.

Additionally, non-REM sleep can be subdivided into 4 sub-stages, distinguishable by levels of EEG (a measurement for the bioelectric activity of the brain). Each successive stage of non-

REM sleep is indicative of a deeper sleep, with stage 1 as the lightest and stage 4 as the deepest.

REM sleep accounts for about 25% of our sleeping time this is the time when the brain is trying to scan the events in the dream world. In other words, if you look left and right during a dream, your eyes will follow the dream gaze and move left and right under his or her eyelids.

Our deepest sleep occurs in Stage 4 of the non-REM sleep.

How much sleep?

Sports coaches are rigorous in stressing the need for plenty of sleep, generally stressing the 8 hour rule, yet many of us in the workforce think we can get away with 6 or less hours. This has been taken up by modern Management coaches such as Jim Loehr who stress that even the busiest of executives should target around the 7 hours on a regular basis.

Whatever the number (and Medina says we really don't know what it is for each individual), any less and you get a whole range of negatives.

**NASA demonstrated that
26-minute nap improved
pilots performance 34%.**

The nap?

The after lunch dead zone is well known and many presenters dread this time at conferences. And research shows a high proportion of traffic accidents occur at this time.

Physical Impacts of sleep loss

The physical impacts of sleep loss are just as disturbing. A study of healthy 30-year olds deprived of sleep (averaging 4-hours per night for 6 days) showed that parts of their body chemistry revert to that of a 60-year old. Recovery takes at least a week for this to return to their biological age.

Rule #8 – Stressed brains don't learn the same way

It is helpful to look at the three factors that generate stress from a biological perspective.

These are:

1. Physiological Arousal. We react to something.
2. Adverse. The stressor is considered adverse.
3. Control. We feel we have no control over the situation.

When all three are present we feel stress. There are two impacts of stress. The first is the effect on the immune system and the second is on the brain.

Immune system impacts

Most of us are aware of catching a cold when we are "run-down" (another word for continuing physiological stress). Research shows that stressed people are three times more likely to catch a

cold. However less known is the fact that they are more likely to suffer from autoimmune disorders such as asthma and diabetes.

Brain impacts

With mild stress the brain is more effective – it can solve problems more effectively and is more likely to retain information.

However, allow the stress to continue and we don't function as well. Our ability to do maths drops, we don't process language well. Under prolonged conditions, our ability to generate BDNF (see Rule #1) decreases. Finally, prolonged stress can lead to depression.

Rule #9 – Stimulate more of the senses

Part of our evolutionary success has been our ability to utilize the multi-sensory world we live in. Drawing on the work of Richard Mayer on how we learn, Medina suggests there are 5 things we should do to help retain information.

1. Multi-media principle. We learn better from pictures and words than words alone.
2. Temporal contiguity principle. We learn better when words and pictures are presented simultaneously than successively.
3. Spatial contiguity principle. We learn better when the words and pictures are presented near to each other rather than far from each other or the screen.
4. Coherence principle. We learn better when extraneous material is excluded rather than included.
5. Modality principle. We learn better from animation and narration than from animation and on-screen text.

Hence you can see why experienced trainers avoid powerpoint.

Odour is also one that is ignored. It is one of our most powerful senses (incidentally, one that frequently helps in denial breakdown in criminal investigations). Starbucks is cited as having staff not wear perfume so that the odour of the coffee beans is not masked.

Rule #10 – Vision trumps all other senses

We actually experience our visual environment as a fully analysed opinion about what the brain thinks is out there.

We do not see with our eyes. We see with our brains.

Recalling the ability to hold very few objects in our short-term memory, Medina suggests the more visual the input becomes, the more likely it is to be recognised - or recalled. The phenomenon is so pervasive, it has been given its own name: the pictorial superiority effect, or PSE.

Text and oral presentations are not only less efficient than pictures for retaining certain types of information, they are **way** less efficient.

We pay lots of attention to colour. We pay lots of attention to orientation. We pay lots of attention to size. And we pay special attention if the object is in motion.

Rule #11 – Male and female brains are different

This is a topic that is covered in other books with more humour and relevance, so I will cover a few points worth noting.

The fact is that men's and women's brains are different structurally and biochemically however, as Medina points out, we don't know if these differences have significance.

He draws on the work of Larry Cahill and others which demonstrates women recall more emotional autobiographical events, more rapidly and with greater intensity than men do.

The other factor which has significance for negotiating, is that women are better at seeking consensus. Results from school studies show boys become very directive early in life, saying “Do this” versus girls saying “Let’s do this”.

Rule #12 – We are powerful and natural explorers

We are natural explorers, even if the habit sometimes stings us. The tendency is so strong, it is capable of turning us into lifelong learners.

The greatest brain rule of all is the importance of curiosity.

We learn best, not by passive reaction to the environment but by active testing through observation, hypothesis, experiment and conclusion. This forms the basis of the Action Learning Model, popular in the 1990s.

More importantly, since some regions of the adult brain stay as malleable as a baby's brain, maintaining the desire to learn is important and the stimulation assists in growing new connections, strengthen existing connections, and even creating new neurons.

Summary

Brain Rules offers good insights into how the brain sciences might influence the way we teach our children and the way we work. It does make many scientific explanations easy to understand through the use of metaphors.

I have three criticisms of the book. The first is Medina throws out a number of interesting ideas but doesn't develop many of them thoroughly. The second is there is a lot of waffle and side-tracking in the book. Finally, Medina fails to live up to his rules in the presentation – all words, no diagrams, breakouts or animations and giving extraneous information when, in my opinion, it is not needed.

Those interested in making sure their workplace or training messages are imparted with impact will do well to read this book.



Availability

"*Brain Rules*" is available in good bookstores and also in audible form. The hard back edition comes with a CD containing short video clips on each rule.

About the reviewer

David Hanlon is the founder of the Right Mind International Pty Ltd. He conducts his consulting and training activities globally. His leadership program, Conversations for Growth®, was a 2010 finalist in the Australian Institute of Training and Development's Australian Learning Innovation award.