

Spark – A Book Worth Reading

Rather than write a normal review, below are various comments and quotes from this very interesting book.

I have looked up and added references because these were not given by the author, who mentioned author names only. (Page numbers below refer to paperback published in Great Britain 2010)

Ratey, John J & Hagerman, Eric (2008) *Spark* London: Quercus

The body was designed to be pushed, and in pushing our bodies we push our brains too. Learning and memory evolve in concert with motor functions allowed our ancestors to track down food, so as far as our brains are concerned, if we are not moving, there's no real need to learn anything." (p.53)

"the brain activity caused by exercise generates molecular by-products that can damage cells, but under normal circumstances, repair mechanisms leave cells hardier for future challenges. Neurons get broken down and built up just like muscles – stressing them makes them more resilient." (p.60)

"... stress seems to have an effect on the brain similar to that of vaccines on the immune system. In limited doses, it causes brain cells to overcompensate and thus gird themselves against future demands. Neuroscientists call this phenomenon stress inoculation... Assuming that the stress is not too severe and that the neurons are given time to recover, the connections become stronger and our mental machinery works better. Stress is not a matter of good and bad – it's a matter of *necessity*." (p.61) (italics in original)

"humans are unique among animals in that the danger doesn't have to be clear and present to elicit a response – we can anticipate it; we can remember it; we can conceptualize it.... There is an important flipside... we can literally run ourselves out of [stress]... we can alter our mental state by physically moving..." (p.63)

People with ADHD "have to get stressed to focus... it's only when stress unleashes norepinephrine and dopamine, that they can sit down and do the work. The need for stress also explains why ADHD patients sometimes seem to shoot themselves in the foot. When everything is going well, they need to stir up the situation, and they subconsciously find a way to create a crisis." (p.65)

"... Cortisol isn't simply good or bad. Little helps wire in memories; too much suppresses them; and an overload can actually erode the connections between neurons and destroy memories." (p 67)

"Palaeolithic men had to walk five to ten miles on an average day, just to be able to eat." (p.69)

Helen Mayberg "inserted an electrode into the subgenual cortex in half a dozen severely depressed patients, for whom every other form of medical treatment had failed.... All six patients spontaneously described sensations such as a "disappearance of the void" right there on the operating table, the second the electrodes were switched on. Four of them eventually achieved full remission." (p133)

"anti-depressants seem to work through a bottom-up chain of events... [They] relieve the physical effects first – we feel more energetic before we feel less sad.... With cognitive behavioral therapy and psychotherapy, we feel better about ourselves before we feel better physically.... The beauty of exercise is that it attacks the problem from both directions at the same time." (p.134-135)

"... the prefrontal cortex, which is responsible for inhibiting impulses, doesn't develop fully until we are in our early twenties." (p.158)

"... effects of exercise in ADHD kids... in boys, rigorous exercise improved their ability to stare straight ahead and stick out their tongue, for example, indicating better motor reflex inhibition... Girls didn't show this improvement... [for] another measure related to the sensitivity of dopamine synapses... Boys fared better after maximal exercise and girls after submaximal exercise..." (p.159)

[Addiction] "Exercise builds synaptic detours around the well-worn connections automatically looking for the next fix." (p.169)

Olds & Milner found that a rat would return to a corner to be stimulated with an electric shock even when food was placed in a different corner. The rat also learned to push the lever to give itself electric shocks, which it did until the power was switched off, after which it fell asleep. (p.170)

“for the developing substance abuser, the overload of dopamine has tricked the brain into thinking that paying attention to the drug as a matter of life or death.” (P.171)

Once a reward has the brain’s attention the scenario and sensation are remembered and the synaptic connections get triggered – in addiction, the brain has learned something too well – we have a habit. (p. 172)

Gene-Jack Wang quoted “In the Chinese language, a subject is an animal, and an object is a vegetable... You cannot ask a vegetable to jump from here to there. If you don’t move, you are not an animal any more – you become a vegetable!” (p.175 in Ratey & Hagerman)

“A groundbreaking study in 1990 revealed, for instance, that a lot of alcoholics have a gene variation (the D2R2 allele) that robs the reward centre of dopamine receptors, lowering levels of the neurotransmitter. Presence of the D2R2 allele doesn’t guarantee you’ll end up as an addict, but it’s more likely.... Results tell of similar story with gamblers and the morbidly obese... If the reward centre isn’t receiving enough input, your genetically predisposed to be constantly craving, relentlessly searching for a way to compensate for the deficit.... The amygdala gets involved because it thinks survival is at risk... (p. 176)

“... Fits in high-risk sports like skydiving, display less inhibition and more thrill-seeking behaviour than, say, rowers... Many skydivers don’t experience pleasure from typical daily life. Both skydivers and addicts have a higher-than-normal threshold for excitement... Other research shows that drugs... Damage D2 receptors... The more drugs you take the more drugs you’ll need to feel the same rush.” (p.177)

“... neurotransmitters anandamide and 2-arachidonoylglycerol (2-AG) ... Marijuana, exercise, and chocolate all activate the same receptors in the brain.” (p.183)

“... Both exercise and abstinence from alcohol not only stop the damage but also reverse it – increasing neurogenesis and thus regrowing the hippocampus of adult rats.... A group of Australian researchers... measured the effect of a two-month exercise program... [found that] behaviour related to self-regulation took a turn for the better.... [the students] increased “their visits to the gym... smoked less, drank less caffeine and alcohol, ate more healthy food and less junk food, curbed impulse spending and overspending, and lost their tempers less often. They procrastinated less and kept more appointments. And, they didn’t leave the dishes in the sink – at least not as often.” (p.188)

PMS – in another study it was found that women with PMS had an impaired ability to ‘trap’ tryptophan in the prefrontal cortex so that less serotonin was produced, and those with this depletion had an increased tendency towards aggressiveness. (p.194-195)

Catherine Monk “... found that when pregnant mothers with clinical anxiety are asked to participate in a stressful event, such as making a short speech in front of the group, their fetuses’ heart rates are overactive and don’t calm down as quickly as fetuses of mothers without clinical anxiety.” (p.199)

James Clapp found that babies from a group of mothers who exercise during pregnancy were more responsive to stimuli and better able to call themselves following a disturbance. He theorised that physical activity jostles the baby in the womb, and he found statistically significant differences in IQ and oral language skills at five years of age. (p.201)

Similar results are found in rat pups, who had fewer neurons in the hippocampus at birth but had 40% more after six weeks than those born of rat mothers who did not exercise. (p.202)

However, Brian Christie found that brain damage in rats born to mothers who had consumed ethanol could be reversed after birth through exercise. (p.203)

“in the brain, when neurons get worn down from cellular stress, synapses erode, which eventually severs the connections.... the brain is designed to compensate by rerouting information around dead patches in the network and recruiting other areas to help with trafficking.... we’re talking about one hundred billion neurons, each of which might have up to one hundred thousand inputs. It’s a very social network that thrives on making new connections and, as I’ve mentioned, is constantly rewiring itself and adapting – provided there is enough stimulation to spur the growth of new connections.” (p.222)

“The intensity level of strength training seems to affect results, in that moderate weights have been shown to have a more positive impact than heavy weights, at least in a small group of older women. Other research has shown that high-intensity strength training actually increases anxiety levels in both men and women.” (p.259)

Ekkekakis has researched the relationship between exercise intensity and discomfort. “... He has found that once they cross the line [from aerobic to anaerobic metabolism] almost everyone reports negative feelings on psychological tests and high ratings on scales of perceived exertion. It’s your brain putting you on alert that there is an emergency. The point is, if you feel lousy even at lower intensity level, don’t take on interval training in the early stages of your new routine.” (p.260)

References

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Wang, Gene-Jack – unable to trace a publication in which the comment about Chinese language appeared