The Brain That Changes Itself (Norman Doidge)

• Stages of learning are followed by periods of consolidation.

• The loss of drills such as rote memorization and handwriting has been costly; they may have been the only opportunity that many students had to systemically exercise the brain function that gives us fluency and grace with symbols.

• The early years is when neuroplasticity is greatest.
• Mental training or life in enriched environments increases brain weight by 5% in the cerebral cortex of animals

• Trained or stimulated neurons develop 25% more branches and increase their size, the number of connections per neuron, and their blood supply.

• The competitive nature of plasticity affects us all. If we stop exercising our mental skills, we do not just forget them; the brain map space for those skills is turned over to the skills we practise instead.
• Second languages learned after the critical 0 to 8 period are not processed in the same part of the brain as is the native tongue.

• The competitive nature of plasticity affects us all. If we stop exercising our mental skills, we do not just forget them; the brain map space for those skills is turned over to the skills we practise instead.
• Postmortem examinations have shown that education increases the number of branches among neurons. An increased number of branches drives the neurons further apart, leading to an increase in the volume and the thickness of the brain.

• The idea that the brain is like a muscle that grows with exercise is not just a metaphor

• The brain is not an inanimate vessel that we fill; rather it is more like a living creature with an appetite, one that can grow and change with proper nourishment and exercise
• A powerful signal has greater impact on the brain. When we want to remember s’thing we have heard we must hear it clearly, because a memory can be only as clear as its original signal

• We often praise the ability to multitask. Yet while you can learn when you divide your attention, divided attention doesn’t lead to abiding change in your brain maps

• The nucleus can only be activated when something important, surprising or novel occurs, and if we make the effort to pay close attention
• ‘Rewards’ (eg a funny face on a screen) can be a crucial feature of learning. Each time a child is ‘rewarded’, his/her brain secretes neurotransmitters such as dopamine and acetylcholine, which help consolidate the map changes just made.

• Dopamine reinforces the reward, and acetylcholine helps the brain ‘tune in’ and sharpen memories

• Massive pruning back in adolescence has its merits. Getting rid of extras keeps the brain more focused and efficient
• In middle age, we still regard ourselves as active, but we have a tendency to deceive ourselves into thinking that we are learning as we were before
• We rarely engage in tasks in which we must focus our attention as closely as we did when we were younger eg trying to learn a new vocabulary or master new skills
• Such activities as reading the newspaper, practising a profession of many years, or speaking our own language are mostly the replay of mastered skills, not learning
• To keep the mind alive requires learning something truly NEW with intense focus
• However, you can’t improve a fading memory by asking people to do what they can’t. Instead, stimulate thru hearing / sight / tracing exercises
• Different chemistries are involved in learning than in unlearning. Evidence suggests that unlearning existing memories is necessary to make room for new memories in our networks.
• Massive neuronal reorganization occurs at two life stages: When we fall in love, and when we begin parenting
• Brain scans show that in action and imagination, many of the same parts of the brain are activated. That is why visualizing can improve performance.

• In some cases, the faster you can imagine something, the faster you can do it.

• The system is plastic, not elastic. Elastic bands revert to their former structure after being stretched. The brain doesn’t revert.
• Experts don’t store the answers, but they do store key facts and strategies that help them get answers, and they have immediate access to them, as though they were in short-term memory.

• This use of long-term memory for problem-solving is typical of experts in most fields.

• Becoming an expert in most fields usually takes about a decade of concentrated effort.
• Early childhood trauma causes massive plastic change in the hippocampus
• The longer people are depressed, the smaller their hippocampus gets
• Don’t get worked up about little things – stress releases glucocorticoids, which can kill cells in the hippocampus
• Activities that involve genuine concentration are associated with a lower risk of dementia
• Age-related memory loss seems almost certainly reversible with the right mental exercises
• Physical exercise is important, because the brain needs oxygen
• When we learn a skill during the day, we will be better at it the next day if we have a good night’s sleep.