

Summary of "Smarter" by Dan Hurley

Written by Lea Schullery

The New Science of Building Brain Power

Introduction	5
Intelligence is a Construct that Makes it Difficult to Measure	6
Improve Your Cognitive Abilities Through Brain-Training Games	8
You Can Become Smarter By Becoming More Active	10
While There are Many Skeptics, the Military Continues to Research E Training Techniques	Brain- 13
Final Summary	15



Go to QuickRead.com/App now to download our app and get access to thousands of free book summaries as both text and audiobooks.

Get the key insights of non-fiction books in minutes instead of hours. Listen to our free audiobooks while you workout or on your commute to work.





Introduction

Human intelligence is a complex subject. We believe that if we read more, do more crossword puzzles, or learn a new language that we will increase our intelligence and become smarter. But is this true? As recently as 2008, intelligence researchers believed that human intelligence could not be significantly modified by training. While they agree that exposing children to an enriched environment can improve their chances of reaching their potential, it won't help by much. That's because unlike a physical test that measures your performance on a particular day, an intelligence test measures the limit of what you can do, like a cognitive glass ceiling. So is intellectual disability something we inherit that is beyond remediation? Well, this very thinking can be reflected in the United States' decision to sterilize sixty thousand people in the twentieth century, believing these people to be "imbeciles" or "feeble-minded." The eugenics movement was even championed by influential minds like Margaret Sanger, J.H. Kellogg, and Alexander Graham Bell; it was authorized by the U.S. Supreme Court and funded by the Carnegie Institution and the Rockefeller Foundation. Put more simply, intelligence is power. Intelligence is how we mastered fire and learned to farm instead of forage. It's also partly the reason people like Warren Buffett, Mark Zuckerberg, and Bill Gates are some of the richest people on the planet.

If you don't think intelligence matters, let's take a look at the statistics. "A recent study of 1,116,442 Swedish men whose IQs were tested at the age of 18, found that after 22 years, those who scored in the bottom 25 percent were over five times more likely to have died of poisoning, three times more likely to have drowned, and over twice as likely to have been killed in a traffic accident as those who scored in the top 25 percent." But what if intelligence is similar to everything else in the physical world, in that we can learn how to make it better? I mean, we can transplant hearts, construct bionic retinas to let the blind see, and even build robotic legs, so who's to say that we can't make ourselves smarter? Well, author Dan Hurley aims to answer this question and more through *Smarter*.

Intelligence is a Construct that Makes it Difficult to Measure

We talk about intelligence, we think we know what it is. But do we? Well, thanks to psychologist Raymond Cattell, we can categorize intelligence into two categories: fluid and crystallized intelligence to differentiate between the ways in which we think. Crystallized intelligence is the "treasure-trove of stored-up information and how-to knowledge, which just keeps growing as you age." This is the kind of knowledge that gets tested on *Jeopardy!* and is what you use when you ride a bike. On the other hand, fluid intelligence is the "underlying ability to learn and the capacity to solve novel problems, see underlying patterns, and figure out things that we were never explicitly taught."

Our crystallized knowledge constantly grows as we age, but scientists have long argued that fluid intelligence was unchangeable. It has long been known to peak in early adulthood, around college age, and then decline. This can perhaps explain why the most influential work of mathematicians, physicists, and musicians typically occur in their twenties and then quickly plunges. Unlike physical conditioning, fluid intelligence is impervious to the effects of training. You see, fluid intelligence is closely linked to how our brains are physically structured. This simply means that fluid intelligence is one of the defining characteristics of an individual, which is not subject to change. For example, we cannot train our blue eyes to turn brown or train men to become women. But what if we can train our intelligence?

Well, perhaps we can. But before we can answer that question, we must first learn how to measure fluid intelligence in the first place. But, unfortunately, like most things that psychology talks about, you can't observe intelligence. Similar to the field of cosmology, the nature of dark matter is simply inferred by equations. No one has ever seen it or measured it, but physicists know it's there. Like dark matter, intelligence is a construct. So we must come up with various ways of measuring them and defining them, even if we can't necessarily observe them. So do we use IQ tests? Not quite.

"The solution to the problem of measuring something can't be seen is to take multiple indirect measurements and then statistically calculate the degree to which they vary in sync with each other." This is known in statistics as *latent variable analysis*, and it allows psychologists and other researchers to bring mathematical precision to unclear concepts like happiness, wisdom, and intelligence. To begin testing intelligence, author Dan Hurley underwent an fMRI brain scan to determine the size of certain areas of his brain, which surprisingly *does* matter in terms of intelligence. In fact, about 6.7 percent of a person's fluid intelligence can be explained by the amount of "gray matter," or overall volume of neurons, in the brain. A further 5 percent is reflected in the size of the left lateral prefrontal cortex, a section located behind the upper-left edge of your hairline. It is this area that becomes highly active during tests of working memory.

This is perhaps the reason women, whose total brain size volume averages about 10 percent smaller than men's, are still just as smart as men on average. You see, women tend to have more gray matter than men, while men tend to have more white matter than women. Furthermore, men generally perform better on visuospatial tasks while women typically perform better in verbal fluency and long-term memory. When it comes to measuring intelligence, however, fMRI scans can be a much better indicator than IQ tests.

Improve Your Cognitive Abilities Through Brain-Training Games

Today, if you want to train your brain, there are dozens of resources that you can use. Some, however, are more effective than others. For instance, Dr. Kawashima's Brain Training also called Brain Age: Train Your Brain in Minutes a Day!, has sold over 19 million copies of the software. Neurologists have even been known to recommend it for the prevention of Alzheimer's. But the maker of the game, Nintendo, insists the software is purely for entertainment and doesn't support any of the benefits. Even more, only a few studies have ever found such benefits. Luckily, there are others out there that do work.

Imagine training your brain by playing fun games on your phone! Well, this is made possible through Lumosity, whose television commercials state they've helped as many as 40 million members train their brains. One of those games includes the N-back test that was introduced in 2008 by researchers Susanne Jaeggi and Martin Buschkuehl. Designed to test a person's working memory, the original N-back test goes a little something like this: Imagine that you are listening to a string of letters spoken aloud. You are asked to press a button each time you hear the same letter repeated twice in a row. That's 1-back. So, for example, if you hear the list *n-a-m-m-a-m,* you press the button when you hear the second *m*. That's easy.

Now, there's also a 2-back. In the series above, you would press the button when you hear the *last* letter in the series because this *m* was preceded two letters earlier by another *m*. Then, there's a 3-back. In this case, you would press the button when you hear the second *a* because it was preceded three letters earlier by the first *a*. And there's a 4-back, a 5-back, and so on. Of course, the list isn't just a short one consisting of six letters, it's a list that goes on and on for a minute and a half. It requires total concentration and if you let your mind wander for a moment, then you lose track of the entire series. This may sound difficult, frustrating, boring, and it might be. But that's why Lumosity's N-back test doesn't quite look like this. In fact, their version of N-back is unrecognizable from Jaeggi and Buschkuehl's, though they did work with the company on the game's construction. The Lumosity version shows a frog hopping among lily pads. Players begin by clicking on whichever pad the frog just left (1-back), then graduate to having to click on the pad the frog was on two, three, four, or more hops before. So do games like that really work? Can they improve our working memory? Back in 2008 when Jaeggi and Buschkuehl first released their N-back results, people remained skeptical. But their report showed what happened when college students played N-back for twenty minutes a day, five days a week, for four weeks.

The results showed that the longer the students practiced the N-back game, the better they got at it. Even more, after the four weeks, the participants' scores on fluid intelligence tests increased by 40 percent. In the years following the publication of Jaeggi and Buschkuehl's findings, many placebo-controlled studies have been published proving that cognitive training substantially improves intellectual abilities. Furthermore, similar training games have been implemented to improve the attention spans of children who suffer from Attention-Deficit/Hyperactivity Disorder (ADHD) as well as the cognitive impairment of those who suffer from Alzheimer's disease.

You Can Become Smarter By Becoming More Active

"A sound mind in a sound body" is a popular cliché suggesting that physical strength positively correlates with mental strength and intelligence- you can't have one without the other. But does this mean that a doctor should be prescribing exercise for patients at risk of developing Alzheimer's or a child struggling in school? After all, brawns and brains conjure two very different stereotypes; which is perhaps why fitness gurus Arnold Schwarzenegger and Sylvester Stallone have found even greater success in Hollywood portraying muscular goons.

Fortunately, research dating back to the 1960s and 1970s suggests that physical fitness does affect mental performance. For instance, a study in 1975 found that older people who played tennis or racquetball performed significantly better on a variety of simple cognitive tests compared to their nonexercising peers. Furthermore, psychologist Harold Hawkins collected data that proved that people aged 65 to 74 performed significantly worse than those aged 20-35 in activities that combined both auditory and visual components. In other words, their ability to split their attention suffered the most due to aging. But could exercise help them improve?

Hawkins intended to test this theory, so he designed an experiment involving 40 men and women between the ages of 63 and 82, none of whom had exercised regularly. 20 of the participants participated in a 10-week aquatic exercise program for 45 minutes a day while the others continued to do nothing. By the end of the study, the exercisers had become significantly faster in the combined audio and visual tests and their ability to multitask had improved in just 10 weeks. But is one type of exercise better than another?

In 2012, psychologist Teresa Liu-Ambrose sought to test the effects of aerobic exercises, like running or swimming, compared to resistance exercise, like weightlifting. In the study, 86 elderly women with mild

cognitive impairment, like minor memory problems, were randomly assigned to six months of either toning and balance training, resistance training, or aerobic exercise. At the end of the study, the aerobics group improved significantly in their balance, mobility, and cardiovascular capacity - but not on any cognitive tests. On the other hand, the resistance training group improved on tests of attention, conflict resolution, and memory. Additionally, on fMRI tests, only the resistance trainers showed signs of increased activity in three regions of the cortex. This is a good sign as resistance training can be performed more easily by the elderly population.

Exercise isn't the only way to improve your intelligence though. Psychologist Glenn Schellenberg completed a study that tested the link between learning music and fluid intelligence. Schellenberg recruited 144 six-year-olds and separated them into four groups; one group was assigned to keyboard lessons, another to voice lessons, another to drama lessons, and the last to no lessons at all. After 36 weeks, the IQ of all four groups had gone up slightly, which is a normal result of entering elementary school; however, the music-trained students went up significantly higher than the others. For those who received no lessons, scores went up by 3.9 points compared to 5.1 points for those who trained in drama, 6.1 points for those given voice lessons, and 7.6 points for those given voice lessons.

Lastly, a study completed by psychologist and neurologist Yi-Yuan Tang aimed to test the link between meditation and intelligence. Using a specific kind of mindfulness meditation he calls Integrative Body-Mind Training, or IBMT, the method stresses a state of restful alertness that allows a high degree of awareness of body, breathing, and external instructions from a compact disc. It also stresses a balanced state of relaxation while focusing attention. Participants in the study underwent an initial training session followed by five days of IBMT for 20 minutes per day, while the control group received relaxation training.

At the end of the study, those who meditated showed significantly better cognitive control than the control group. In 2010, Tang and Michael Posner

followed this study with another that showed that 11 hours of IBMT resulted in greater integrity and efficiency of white matter - the neural wires and cables connecting neurons. This area is known to work its hardest during tasks that require cognitive control and when a mental effort is required to learn or solve problems. So does mindfulness meditation actually make people smarter? Well, everyone is different, so some will have bigger effects than others. Ultimately, different kinds of training can improve attention, working memory, and intelligence.

While There are Many Skeptics, the Military Continues to Research Brain-Training Techniques

Despite all the studies that prove that intelligence can be improved through various training, there are still many skeptics. In fact, two skeptics Charles Hulme and Monica Melby-Lervåg published a new meta-analysis of 23 previously published studies of working memory. A meta-analysis simply uses various statistical techniques to find overall trends among a number of studies. Finding these patterns and trends allows researchers to gain clarity among conflicting research, like that of improving intelligence.

The meta-analysis completed by Hulme and Melby-Lervåg first concluded that training produced "large immediate gains on measures of verbal working memory," as well as "moderately sized immediate gains on measures of visuospatial working memory." Sounds good, right? Additionally, the meta-analysis sought to find out if training had any longterm effects; they wanted to see if *far transfer* could be found from brain training games, like the N-Back. Far transfer is when improvement on one task is also seen on a task that isn't directly related. For example, verbal working memory training improves non-verbal reasoning, like problemsolving.

"For *far transfer* to nonverbal reasoning, they found an immediate effect that was 'small but reliable' in 22 studies. For far transfer to a well-established test of executive attention, the meta-analysis found ten studies showing an effect that was 'small to moderate." Despite their findings, Hulme and Melby-Lervåg emphasized that they had not proved that working-memory training produces long-term improvements in reading, math, and other real-world outcomes.

While there are still many skeptics about the ability to improve intelligence, the U.S. military continues to actively put its men and women through

brain-training to improve their cognitive abilities and working memory. Harold Hawkins, the Office of Naval Research program manager, sought to provide training to improve cognitive abilities, executive control abilities, and even aspects of overall intelligence. Hawkins sees benefits in brain training and has even implemented a systems training program that was currently being used in the fleet. The simulation program now trains sea combat commanders and over 50 support personnel in war scenarios involving the deployment of fast-attack craft, mines, torpedoes, missiles, submarines, and more - all at the same time. The training prepares the military to juggle all these assets at once.

In fact, federal agencies in the United States have even put together a \$12 million program initiated by the Intelligence Advanced Projects Activities (IARPA) to use a variety of brain-training techniques to make their intelligence officers more intelligent. Overall, the U.S. military continues to support research in training its men and women to prepare them to make the best, and smartest, decisions in high-pressure situations.

Final Summary

There are still many skeptics surrounding the topic of improving intelligence, but as Dan Hurley and psychologists like Jaeggi, Buschkuehl, and Posner have proven, improving the brain and getting smarter is no longer just a pipe dream. In the end, there's no way to prove whether Lumosity, meditation, exercise, or learning a musical instrument will improve your intelligence, that's only because everyone's brain is different. However, Hurley confidently believes that combining exercise with a cognitive training method is likely to give better results than doing either alone. Doing something new and challenging versus sticking to your old ways will have more benefits than one. Ultimately, training your working memory and attention is likely to improve your general mental abilities and your ability to learn. So instead of wasting time playing solitaire on your phone or scrolling through social media, make yourself smarter by playing working-memory games.



Go to QuickRead.com/App now to download our app and get access to thousands of free book summaries as both text and audiobooks.

Get the key insights of non-fiction books in minutes instead of hours. Listen to our free audiobooks while you workout or on your commute to work.



