

# Summary of "Range" by David Epstein

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Discover Why Generalists Triumph in a Specialized World

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#### Introduction

You've probably heard the stories of Tiger Woods and Roger Federer. Two sports superstars who seemed blessed at birth with an innate talent for their sport. Despite their widespread success, their stories are drastically different. For instance, Tiger at just ten months old, climbed down from his high chair, grabbed a golf club, and imitated his father's swing. His father, knowing he was responsible for fostering his son's gift, drew pictures to show him how to place his hands on the club. At the age of two, when children are typically developing milestones like "kicking a ball" and "standing on tiptoes," Tiger was driving a golf ball further than most adults and won his first tournament in the ten-and-under division. By age three, he was learning how to play out of a "sand twap;" meanwhile, his father was mapping out his destiny, coaching him through interviews and prepping him for the inevitable media coverage that would soon follow. At four years old, his father dropped him off at the golf course for eight hours where he occasionally won money from those foolish enough to doubt his talent. At eight, he beat his father in a game of golf for the first time. From then on, Tiger's path was paved for him and he went on to become one of the greatest golfers of all time.

Roger Federer loved any sport that involved a ball. While his mother was a tennis coach, she surprisingly never taught her son. "He would have just upset me anyway," she states. By his teenage years, Federer began to gravitate towards tennis. During his matches, his mother often wandered away to chat with friends and his father's only advice was "Just don't cheat." Eventually, he quit all other sports, like soccer, to focus on tennis. He began working with strength coaches, sports psychologists, and nutritionists. Soon, he became one of the most legendary tennis players in the world, ranking number one well into his thirties. So whose path is better? Roger's or Tiger's? Are those who practice early on in life more likely to have success? Throughout *Range*, Epstein explores how breadth and range (like Federer's journey) is more likely to produce results than specialized expertise (like Woods' journey).

#### The "Head Start" Myth

Tiger Woods represents the pinnacle of how getting ahead and practicing intensively can have extraordinary results. As soon as his father recognized the innate talent of his young son, he devoted his time and passion to teaching Tiger everything about golf, public speaking, etc. This type of thinking has spread to other areas outside of sports as well. For instance, take a look at oncologists who rarely focus on cancer alone. Instead, they specialize in the cancer of a particular organ. Atul Gawande even states that when doctors joke about "right-ear surgeons," we shouldn't assume that they don't actually exist.

But is specializing in one area the route we should go? Well, according to David Epstein, the answer is *no*. In fact, when we build up our expertise in just one area, we fail to perform to the best of our ability. Let's take a look at the case of Laszlo Polgar, a Jewish man born after the Second World War. As a result, most of his family was gone, but his father survived the war and remarried. Laszlo was determined to create a family of geniuses and refused to teach them the traditional way in which the education system does. After marrying Klara, the two began working on their vision of creating child geniuses.

Their first child, Susan, was their first experiment, and the Polgars chose chess as their main focus. By the age of four, Susan was a wizard at chess, winning junior championships and even beating grown men. Additionally, she excelled in math and reading. Her sisters Sofia and Judit soon joined her, and all three excelled, becoming grandmasters and international masters of chess. While none became the top-ranked player in the world, they were all incredible players. The secret? Starting early! However, psychologists Daniel Kahneman and Gary Klein largely disagree about this claim of specializing early.

Instead, Klein believes that experience is the key to success in certain fields. For example, firefighters spend years training and analyzing the behavior of flames, which allows them to make 80 percent of their decisions in mere seconds. Kahneman, however, noted that experience in other areas didn't mean a thing. While studying the assessment of officer candidates in the Israeli Defence Forces, Kahneman found that the recruiters' ability to predict the future performance of recruits was nothing more than guesswork. Even as recruiters received more and more feedback, their predictions didn't get any better. Therefore, Kahneman concluded that there was a clear disconnect between experience and performance.

In some fields, like golf, chess, or fire-fighting, there is constant repetition that allows people to instinctively know the best moves available to them. Unfortunately, life is not like golf or chess. Many variables in life don't fit neatly into a pretty package. In other words, a creative generalist that can hone many skills can perform better than a specialist.

#### As the World Becomes Modernized, Our Brains Evolve With It

In 1981, James Flynn of New Zealand noticed something about the soldiers of WWII. He recognized that their IQs were much higher than those who fought in WWI. Was this simply by chance or was there something bigger happening? Flynn decided to conduct an experiment and research this phenomenon on a global scale. In 1984, Flynn received data from a researcher in the Netherlands revealing a huge generational difference in IQ. This change soon became known as the "Flynn Effect," which stated that each generation scored a few points higher than the previous generation.

What can explain this rapid rise in intelligence? A look inside the work of Russian psychologist, Alexander Luria, can help explain this phenomenon. In 1931, the Soviet Union was going through some drastic changes. Animal and plant farmers that occupied much of the territory began rapidly evolving as the lands quickly developed into more complex towns and cities. To survive, citizens needed to learn how to engage in new, complex trade agreements and social interactions. Additionally, areas with high illiteracy were now building schools. These isolated villages were the perfect places for Luria to conduct his experiments.

In one experiment, Luria asked villagers to sort wool into separate groups. In the modern villages, citizens happily grouped similar pieces of wool according to shades of blue. In remote, premodern villages, however, participants simply refused to separate the wool. According to these people, each piece of wool was vastly different, the task was just too impossible. Similarly, a villager named Rakmat was promptly shown a picture of three adults and one child and asked to identify which person did not belong. Rakmat failed to think about the question abstractly, as modernists might, and identify the child as different. Instead, Rakmat insisted the child stay with the adults and help them with necessary tasks. From Luria's findings, he was able to conclude that exposure to modernization allowed people to conceptualize and focus on the bigger picture; meanwhile, premodern people focused more on the specifics and couldn't see the bigger picture. Think of it this way: Postmodern people can see the forest but not the trees. Premodern people see the trees but not the forest. Luckily, the modern world needs people to see the bigger picture. You see, similar to firefighters and chess players, the premodern villagers demonstrated a deep understanding of the world they were used to. The moment they were forced to enter a way of thinking that was outside their scope of experience, they completely shut down and couldn't figure out how to respond.

As the world evolves, we need people with experience to understand it and match it. Minds today are much better at understanding a wide range of topics and can make connections better than ever before.

# Learning Should be Difficult and Slow

As we've learned so far, learning through experience and repetition doesn't produce the best results. For instance, imagine a math class where a teacher is teaching his students about variable expressions. He asks "How much will you spend if you buy '*x*' amount at three dollars?" He then informs the students that *x* equals two. The students then respond by throwing out guesses until one student understands that 3 multiplied by 2 equals 6. While the answer is correct, this method fails to teach children the concept of variable expression! You see, according to University of Chicago professor Lindsey Richland, children solve conceptual problems with procedural answers. Like most humans, they take the shortest path to a solution, even if it hurts them in the long run.

In the case of the math class above, the students are simply using the process of elimination until they arrive at the correct answer; meanwhile, the math teacher assumes the children are learning because they eventually arrive there. Instead of thinking about the problem in their heads, the children are simply recognizing a pattern in their answers that will eventually lead them to the correct one. This type of learning experience doesn't work well for long-term procedural learning. Professor Nate Kornell proves this through experimenting with monkeys. When monkeys are given hints, they became better students during the memorization practices. However, those same monkeys performed terribly on test days. Meanwhile, the monkeys who were given no hints, performed worse during practice but much better on test days.

Similarly, a study of teaching at the US Air Force Academy tracked students and their professors in Calculus I classes. The study found that the professors whose students' scored higher grades on exams were also highly rated by their students. Professors of students who did not receive good grades received more negative feedback. But economists who conducted the study then evaluated the long-term results and found something rather shocking. Those professors who initially received positive feedback had a net negative effect on their students in the long run. On the other hand, professors who initially received harsh feedback ended up inspiring better student performance later on.

This experiment simply showed how professors who didn't just teach to the test were able to facilitate a deeper understanding of underlying mathematical concepts. While their classes were rather frustrating and difficult, the effort paid off in the long run. These professors were using a technique called *desirable difficulties* which may be a harder way of learning, but will end up becoming more rewarding. One such technique that enables desirable difficulties is called *spacing*. An example of spacing can be seen in a 1987 study when Spanish students were separated into two groups. In one group, they were tested on vocabulary learned that same day while the other group was tested weeks later. Eight years later, the two groups were tested again. The results showed that the latter group remembered over 200 percent more words.

At the end of the day, we should embrace the slow and difficult learning process. If learning is quick and easy, then it likely won't help you in the long run!

# Thinking Outside the Box

In the 1500s, the universe was believed to be fixed and unchanging. That is, the celestial bodies were set in place and rotated around the Earth by spiritual forces. While some astronomers and philosophers argued about these ideas, nothing ever changed. Some of these heretics were even burned for such radical beliefs! That was until Johannes Kepler noticed a few things about the sky. For instance, he noticed that certain constellations would gain or lose a star, which was simply the changing brightness of the stars. Regardless, these changes made Kepler question the fixedness of the space. Without much data or research to go off, Kepler was forced to think differently and conceptualize space, applying new ideas to old concepts.

This thinking is largely seen today as well. For instance, if a toilet becomes clogged, you use a plunger to fix it. Now that the sink is clogged, you use the same technique to see if it will work. It does! However, as we become more experienced in the ways of life, we must become more creative and apply different forms of thought to our problems. In fact, Epstein suggests that we should view problems with an *outside* view rather than an *inside* view that is largely dictated by our own biases and specialty.

In a study by University of Sydney professor Dan Lovallo, private equity investors were asked to provide a detailed assessment of the businesses they were considering investing in, including their estimated return on investment. Next, those investors were asked to provide notes about other projects happening that may be similar. As it turns out, the investors' estimates of returns for the businesses they were investing in were about 50 percent higher than the alternative projects they had known about but hadn't looked into in great detail. As a result, the investors were surprised to learn about the differences and quickly cut down their estimated profit for their original investments.

You see, psychology experts have consistently proven that the more details an individual is given on a topic, the more selective their judgment becomes. For example, students once rated the quality of a university if they were told about the success of *one* department rather than being told about the success of each, individual department. In other words, this narrow specialization can cause gaps in our thinking and lead to bad decision-making.

# **Breadth of Experience Increases Creativity**

Let's take a look at the story of a young boy. Born into a family of artists and art dealers, the boy sat down to draw a picture expecting to be as naturally talented as the rest of his family. However, the picture was so bad, he simply crumbled it up and threw it away. Bored of drawing, he wandered outside and observed the animals and insects. As he went, he categorized each into their Latin names. Such aimless exploration was perceived as detrimental to a child's development. Instead, someone of his age should be specializing in a topic and narrowing his focus.

Meanwhile, the young boy did well in school, except in art class where the modern perspective of art confused him, causing him to clash with the teacher. Eventually, his life began to revolve around the arts and his uncle gave him a job as an art dealer. Initially confident that he had found his lifelong career, he soon learned to hate haggling for prices, thinking he was trying to cheat people out of their money for a profit. He eventually went on to work as a tutor, a priest, and a clerk in a bookstore. Lost in what he wanted to do with his life, he joined art school but during one of his first drawing classes, he was told he should join a beginner's class for children. A few weeks later, he dropped out.

Then one day he brought an easel and some paint to a sand dune during a storm. While he didn't have much experience in painting, he became inspired by the flexibility of the paint and the storm further inspired his creativity. He felt free for the first time in his life. This boy was Vincent Van Gogh, one of the most well-known artists in history. He wasn't a child prodigy, he didn't even begin painting until his later years of life. In fact, if he had died just a few years earlier, we may not have ever learned his name. His broad life experience allowed him to explore different areas of art until he found one that best suited his talents and interests.

We can further see this phenomenon through the careers of comic creators. Dartmouth business professor, Alva Taylor and Henrik Greve from the Norwegian School of Management decided to examine the impact that breadth might have on an individual's creativity. As they looked at the successful comic books from 1971 and on, they predicted that the more comics a creator made, the better the comics would be. Additionally, they believed more resources would produce higher quality, more successful products. Shockingly, all these predictions were wrong. Success didn't come from experience nor financial resources. So what drives success?

According to their research, success came from the breadth of a comic creator's experience across many genres. With 22 genres, creators could work in comedy, crime, fantasy, non-fiction, or more. The more genres the creator worked in, the more success they experienced. Of course, this phenomenon can be seen in other areas as well. For example, Robert Root Bernstein of Michigan State University once compared Nobel-prize winning scientists to other scientists. His research showed that Nobel laureates are 22 times more likely to be an amateur, actor, magician, dancer or performer. In other words, they had many areas of expertise.

At the end of the day, this knowledge is important for hiring managers who are looking for new employees. If you look to hire someone who fits nicely into the position, you may be missing out on someone with a breadth of experience who can bring a valuable outsider's perspective.

# **Experts Are Less Likely to Make Accurate Forecasts**

In 1948, political psychologist Philip Tetlock began a project to collect and assess the predictions of 284 experts. The project took 20 years, and the results were shocking: The average expert, according to Tetlock, was a *horrible forecaster*. In other words, they are terrible at making predictions. He further found that an expert's years of experience and academic degree made no difference in his or her ability to make accurate forecasts.

For instance, when an expert predicted that a potential event was impossible, the event happened in 15 percent of the cases. Meanwhile, events that were declared to be absolute failed to occur 25 percent of the time. Tetlock further found that there was a perverse relationship between fame and accuracy. In other words, the more an expert appeared in the media, the more likely they were to be wrong. To prove his point, Tetlock famously stated that a well-known expert's predictions were "roughly as accurate as a dart-throwing chimpanzee."

In the case of Mikahil Gorbachev's reforms in the Soviet Union, most experts agreed the USSR was inherently illegitimate, but the question of whether it would survive or fail could never be agreed upon. As it turns out, both predictions proved to be correct. Gorbachev's reforms benefited citizens while undermining the state's legitimacy. This caused the entire system to collapse in just a few short years. So how did experts predict this scenario? They simply collected information from different sources rather than making predictions based on their narrowed experiences.

Tetlock coined these experts as "foxes;" meanwhile, the narrow experts became "hedgehogs." The hedgehogs, according to Epstein, are valuable to foxes because of their knowledge of a particular topic. However, they are less experienced in integrating information and communicating it as well as foxes. In fact, foxes embrace ambiguity and contradictions. They view these ideas as "hypotheses in need of testing" rather than immediately disregarding them as false. Furthermore, hedgehogs will bend information to fit their own theories, whereas foxes are more likely to change what they regard as truth when they are faced with information that contradicts their own. So how can we avoid becoming hedgehogs and become a fox?

Yale professor Dan Kahan argues that an important personality feature of foxes is staying open-minded in the way you think about the world. Instead of scientific knowledge, which is largely about *how much* you know, Kahan emphasizes *scientific curiosity*. Scientific curiosity is the desire to learn more and requires a willingness to look at new evidence with an open mind.

#### Expanding Our Knowledge is Key to Changing the World

The problem in today's society is that specialization has led to a decline in progress. This is largely because scientists who have head starts and specialize in one area don't know how to think properly. Unfortunately, this lack of thinking can lead to detrimental mistakes. For example, a simple problem, like discovering how the body responds to a paper cut, has become complex because specialists (a hemotologist and an immunologist) only study their portion of the puzzle and fail to see the big picture. According to Epstein, specialists stay in "parallel trenches" and are unable to take a look at other trenches to see what people are doing.

Think about the following question. If disease *x* has a prevalence of one in 1,000 people, and the test for the disease has a false positive rate of five percent, then what is the chance that someone receiving a positive test result has the disease? The answer is 1.96 percent. However, 75 percent of physicians and students at Harvard and Boston University have gotten this very question wrong. Their answer is vastly different at 95 percent. Think about the problem this way: In a sample of 10,000 people, ten will have the disease and get an accurative positive result. 500 people, or five percent, will get a false positive. So out of the 510 people with a positive result, only 10, or 1.96%, are genuinely sick. Unfortunately, many students fail to think this way because schools fail to teach them how to conceptualize information.

So how do we change this way of thinking? Well, experts like Arturo Casadevall are currently developing programs focused on understanding a variety of topics, like philosophy, ethics, statistics, and logic. In Casadevall's role at the John Hopkins Bloomberg School of Public Health, Casadevall is creating courses in which students examine different types of evidence in a variety of academic disciples and encourage them to find signs of misconduct or poor methodology in scientific research. Through these courses, Casadevall hopes students will be provided with more rigorous training in multidisciplinary thinking and become better prepared to make an impact on society.

But how else can society broaden their horizons and expand their range of knowledge? The best thing that we can do is embrace our failures. Epstein points out that great innovators fail a lot, but the times in which they succeed, they have changed the world. Few people can achieve great accomplishments without going through major challenges and setbacks. Thomas Edison, for instance, held over 1,000 patents, most of which became failures. But his successes, like the light bulb, have been revolutionary. So in the words of Supreme Court Justice Oliver Wendell Holmes, "All life is an experiment."

# **Final Summary**

As Epstein points out, broadening our knowledge and being open to new information is often more successful than specializing in a specific area. If you want success, you'll need to be open-minded and develop a scientific curiosity. This will all allow you to foster creativity and generate innovation in ways that people who specialize are unable to do. Furthermore, you'll need to approach learning as a lifelong journey, one that is slow and difficult so that you can learn how to navigate new problems. Those who are successful in doing so will experience immense success as they generate new innovations and contribute to society in a meaningful way.



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