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Deliberate Practice in the World of Investing

Introduction: different environments require different types of experts

Experts can be defined as those who consistently perform above average in a particular activity over long periods of time. They have accumulated deep knowledge and skill through deliberate practice.

Specifically, deliberate practice means engaging in an activity with a clear awareness of the precise skills aiming to master and the path required to achieve them. This is highly painful as it doesn't come easy, but extremely rewarding over the long-term if done consistently. Great performers build their lives around deliberate practice.

The path to expertise varies according to the type of environment. Some environments are linear, static, and rules-based, while others are non-linear, dynamic, and probabilistic. The former calls for specialists. Due to its pattern nature and automatic feedback, deliberate practice is carried out in the form of repetition. Over time, the task becomes almost automatic. For instance, top performing athletes, chess players, or cardiologists fall into this group.

Conversely, the latter calls for generalists. In *Range*, David Epstein comments that in these environments "the rules of the game are often unclear or incomplete, there may or may not be repetitive patterns and they may not be obvious, and feedback is often delayed, inaccurate, or both." Therefore, deliberate practice is conducted through multidisciplinary thinking, that is, understanding the big ideas of many disciplines and connecting them continuously. Great CEOs, economists, politicians, historians, and investors are among those who follow this approach.

This distinction has its roots in biology. Generalist animals are able to adapt to different environments, while specialist ones need specific conditions to survive. Archilochus, a Greek poet of the 7th century B.C., was making reference to this idea when he wrote: "the fox knows many things; the hedgehog one big thing." The fox has multiple defensive skills (it can run, jump, pounce, or hide), though not being the best at any of them. The hedgehog just rolls up into a spikey ball, being unique at it. Hence, it can be said that generalists are more like foxes, while specialists are more like hedgehogs.

Specialists and generalists have their own strengths and weaknesses. Both have a role to play in this world. However, being aware where each one is demanded, as well as which one fits one's personality best, is crucial. Specialists tend to screw up when engaging in complex areas, while generalists struggle in highly specialized tasks. As ever, staying within one´s circle of competence is of most importance.

The purpose of this paper is to explain why investing is a fertile land for generalists, as well as to describe some of the most important domains great investors engage in as part of their deliberate practice. As you will see, such an approach is intended to train the mind to thrive in complex and changing environments. The domains raised here are closely interconnected to each other in various ways, and thus must be learned and internalized in the same way. This is probably a life´s work (or many).

Investing deals with a complex adaptive system

Complex adaptive systems seem to be the ubiquitous character of the world. We can find them in cities, climates, earth's crust, animal ecosystems, diseases, human anatomy, social networks, stock markets, etc. They are characterized by a large and diverse number of individual parts that interact with one another, and adapt their behavior based on these interactions and the changing environment they themselves affect. This evolving dynamic gives rise to a system that is greater than the sum of the parts, and thus cannot be understood from an individual level. As Michael Mauboussin explains in his article *Are You an Expert?*, "one crucial feature of CAS is the lack of additivity: you can't understand the whole by adding up the parts. You can take most mechanical systems apart, identify the role of each piece and resemble the system. Cause and effect are transparent. Not so with CAS; the system emerges from the interaction of the individual agents."

Complex adaptive systems are persistently in a critical state. In his book *Ubiquity*, Mark Buchanan defines a critical state as "a special kind of organization characterized by a tendency toward sudden and tumultuous changes, an organization that seems to arise naturally under diverse conditions when a system gets pushed away from equilibrium." In other words, complex systems are governed by chaos, non-linearity, and unpredictability. There are no normal or typical events in such systems. Upheavals are no more unusual than minor events. Because these systems are in a constant critical state, they live on the edge of disruption. How events develop has nothing to do with their initial condition. The very essence of a critical state is that a chain reaction of minor events can have an enormous effect.

Consequently, complex adaptive systems are best explained by power laws, not bell-shaped curves. In contrast to bell curves, power laws have fat tails which indicates that extreme events are far more likely than we tend to predict. Bell curves, Slingerlend and Johns explain in their work *Complexity Investing*, "are great for equilibrium—situations that do not evolve or adapt. Normal distribution curves are really bad at explaining phenomena in more dynamic conditions such as those found in complex systems (like the world we live in)." As previously mentioned, complex systems are in a continuous evolution as individuals' decisions and the environment itself change. Therefore, if we were to use bell curves we would be vulnerable to them. By applying power laws we become prepared for their common large scale events.

Investing must be approached with this in mind. The notion of complexity, change, and adaptation lies at the center of the stock market. "When I give advice about investing, I

always emphasize the need to recognize change", Jim Rogers explains. Because of this dynamism, the market functions far from equilibrium. As a result, movements in prices follow a power law distribution. If they were to behave like bell curves, large events seen repeatedly throughout history would have been impossible.

Most importantly, being aware of complex adaptive systems elevates us. By doing so, we recognize that we are dealing with a force that is beyond our control and capacity to fully comprehend. We realize how much we don't know. Eventually, we become more humble and prudent.

Building a latticework of mental models

Many disciplines converge in the world of investing. History, philosophy, politics, psychology, biology, physics, engineering, just to name a few, interrelate and make up this complex system. Therefore, one´s knowledge must expand beyond just finance, economics, and markets in order to invest successfully.

But, since there are too many disciplines to learn about, becoming a specialized expert in each one of them is almost impossible. Consequently, investors must follow the generalist approach. This means that the main ideas of each area should be understood through mental models. Put simply, mental models are a representation of how things work, and are hugely useful for simplifying complexity because they allow us to think through analogy.

However, knowing the big ideas of each discipline isn't enough. We wouldn't be able to do much if we kept them as isolated pieces of information because they just represent superficial knowledge. The real power comes when we actively connect them in multiple ways and build a broad latticework of mental models. Doing so expands our toolbox for navigating complex systems. Investment decisions are more likely to be correct when something is true in more than one field. Hence, as Robert Hagstrom explains in *Investing: The Last Liberal Art*, the multiplidisciplinary approach is "an ongoing process of first, acquiring the significant concepts—the models—from many areas of knowledge and then, second, learning to recognize patterns of similarity among them. The first is a matter of educating yourself, the second is a matter of learning to think and see differently."

Great lattice workers are "learning machines", as Charlie Munger describes Warren Buffett and himself. This requires lots of passion and curiosity. They are aware that in such a rapidly changing world, continuous learning is the main competitive advantage. Lifelong learners expose themselves to as many different experiences as possible. As they do, their knowledge accumulates and compounds. Even more importantly, such an attitude makes life much more fun.

Reading across diverse fields is one of the most important habits for developing a multidisciplinary mind. The following quote from Munger never loses its power: "In my whole life, I have known no wise people (over a broad subject matter area) who didn't read

all the time - none, zero. You'd be amazed at how much Warren reads - and how much I read. My children laugh at me. They think I'm a book with a couple of legs sticking out." In addition, through reading, we learn about other people's mistakes. This saves us lots of painful first-hand experiences. This doesn't mean learning from our own mistakes isn't valuable, but why not avoid those that we can by assimilating what others have already figured out? Our personal experiences will never be broad enough. In this matter, Otto von Bismarck said: "only a fool learns from his own mistakes. The wise man learns from the mistakes of others."

Leonardo Da Vinci and Benjamin Franklin were probably the greatest of all time at recognizing the power of multidisciplinary knowledge. Although he is best known for his art, Da Vinci also immersed himself in history, mathematics, science, engineering, botany and military, to name a few. Franklin was a writer, publisher, printer, scientist, inventor, diplomat, among others. Both of them had almost no schooling, but educated themselves through intense reading and curiosity. They were aware that other disciplines could better inform their main focus area. Just by taking a look at their to-do lists one realizes that they were way ahead of their time.

In short, read voraciously and continuously connect ideas.

Investing requires probabilistic thinking

Investing is about determining the range of possible outcomes and assigning probabilities to each of those outcomes. It is not about prediction, it is about assessing the odds accordingly. As new information comes along, those scenarios and their probabilities must be updated.

Probabilistic thinking improves our decisions as it forces us to develop second-order thinking. We are wired to seek the immediate and easiest solution, what is called first-order thinking, but that does not give us an edge over others. Exceptional performance comes from second-order thinking, that is, the ability to think about the long-term ramifications of events and seeing things other people can´t. In his book *The Most Important Thing*, Howard Marks explains that first-order thinking is "simplistic and superficial, and just about everyone can do it (a bad sign for anything involving an attempt at superiority)", while second-order thinking is "deep, complex and convoluted". Second-order thinking pushes us to ask ourselves the question "And then what?".

In this regard, Bayes´ theorem is a useful way to become better at probabilistic and second-order thinking. The theorem provides a simple way for calculating a conditional probability. Specifically, the formula enables us to calculate the probability of an event based on prior information. The spirit of the theorem is that we must continuously update our probabilities as we encounter new data. As mentioned before, we tend to focus on what we have most available, losing track of the bigger picture and failing to update our prior knowledge. In *The Signal and the Noise*, Nate Silver and Allen Lane, describe this issue perfectly by stating that "we tend to either dismiss new evidence, or embrace it as though

nothing else matters. Bayesians try to weigh both the old hypothesis and the new evidence in a sensible way."

In sum, probabilistic thinking is an extremely valuable tool for improving the accuracy of our decisions in complex systems. We will never know with precision what the future holds. Nevertheless, despite the inherent unpredictability of the world, we can act with a high level of conviction by identifying the most likely scenarios, and being sensible to how the odds and assumptions change as we become more informed.

Investors have much in common with scientists and detectives

Scientists and detectives observe, recognize patterns, imagine hypotheses, and test those hypotheses through experiments. They are in a constant search for clues. Some clues emerge from investigating, examining, and observing. Others arise from luck. As new clues come along, scientists and detectives update their premises with the sole purpose of getting closer to the "truth". In short, they are great Bayesian thinkers.

In addition, scientists and detectives have the ability to detach from their beliefs and emotions throughout the process. They are fully mindful that hypotheses are just suppositions with limited evidence. This comes natural to them as they are only interested in dealing with reality, not in being right. Such a stance requires an immense amount of open mindness, critical for setting the scientific flywheel going. In *Think Again*, Adam Grant explains that "thinking like a scientist involves more than just reacting with an open mind. It means being actively open-minded. It requires searching for reasons why we might be wrong—not for reasons why we must be right—and revising our views based on what we learn." Scientists "favor humility over pride and curiosity over conviction."

Open mindedness is reflected in the way people communicate. When in presence of it, the voice carries healthy caution and uncertainty, making sure every possible outcome is weighted accordingly. Open minded people have no intention at all to impose or confront others. On the contrary, their tone invites feedback, which then accelerates the flywheel. Acting otherwise would be counterproductive as they would simply be feeding their egos.

Leonardo Da Vinci was probably the best at scientific thinking. His relentless curiosity and keenness to change his mind were unique. As Walter Isaacson describes in his book, Da Vinci´s "uncanny abilities to engage in the dialogue between experience and theory made him a prime example of how acute observations, fanatic curiosity, experimental testing, a willingness to question dogma, and the ability to discern patterns across disciplines can lead to great leaps in human understanding."

Sherlock Holmes´s approach is also worth learning. In *Mastermind*, Maria Konnikova explains that "one of the things that characterizes Holmes´s thinking—and the scientific idea—is a natural skepticism and inquisitiveness toward the world. Nothing is taken at face

value. Everything is scrutinized and considered, and only then accepted (or not, as the case may be)."

Successful investors follow a similar method. Based on their knowledge and collected data points, they develop their investment thesis, make assumptions, and test for their validity. Throughout the due diligence process, they leave their ego aside and try to view the world as it really is. Because they are comfortable with being challenged and proven wrong, they are constantly seeking opposing views. They are quick to admit mistakes and cut losses. Stanley Druckenmiller, one of the best at it, said: "probably one of my greatest assets over the last 30 years is that I'm open-minded and I can change my mind very quickly." In a nutshell, investors who consciously apply the scientific method are mindful of the fact that investing is rooted in a complex adaptive system.

Imagination is often "the mother of truth"

We humans tend to avoid engaging in imagination when it comes to decision making. First, doing so requires a lot of mental energy, which our brain isn't wired for. Since the age of the caves, our brains became programmed to save energy for times when our lives were at risk, which were quite frequent. Second, imagination calls for embracing uncertainty. We tend to seek things we can control and predict because it makes us feel safe. Uncertainty makes us uncomfortable and frightened.

Imagination, however, turns out to be such a critical tool in order to thrive in complex adaptive systems. It enables us to think of potential outcomes without yet having collected all the evidence. Through imagination we can think in "what would have happened if" or "what could happen if" terms. As you can see, this is Bayesian thinking at its core. Being able to imagine empowers us to think probabilistically. It helps us see beyond the obvious. As Albert Einstein said, "imagination is the highest form of research".

When imagining we are engaging with the hypothetical. Through creative thinking, we come up with things that may or may not end up explaining reality. But such hypotheses don´t come out of the blue. Effective imagination is rooted in the observations and knowledge acquired to the present moment. In other words, while most hypotheses turn out to be wrong, they could have very well played out at the time they were made given the available facts.

Sherlock Holmes teaches us that lack of imagination can lead to poor decision making no matter how good we are at the other facets of problem solving. For instance, in *The Adventure of the Norwood Builder*, Holmes warns Scotland Yard detective Lestrade for not using his imagination: "You do not add imagination to your other great qualities, man, but if you could for one moment put yourself in the place of this young man, would you choose the very night after the will had been made to commit your crime?" As he explains to Watson, imagination is often "the mother of truth".

The importance of taking a step back

The art of investing involves the art of knowing when to step back. This allows us to reflect, come up with new ideas and perspectives, and think more effectively. There are various mechanisms to do so. We can engage in activities such as sports, walking, listening to music, taking a shower, traveling, meditating, among others.

Taking a step back essentially means we are leaving time between practice sessions. This makes our knowledge much more sticky and flexible, which is key for changing environments. Epstein also refers to it as "deliberate not-practicing between bouts of deliberate practice", and explains that it "creates the hardness that enhances learning." Cognitive psychologist Nate Kornell adds that "there is a limit to how long you should wait, but it's longer than people think."

Stepping back may sound contradictory since we are moving away from the problem we are trying to solve. However, as Konnikova explains, "when we switch gears, we in effect move the problem that we have been trying to solve from our conscious brain to our unconscious. While we may think we are doing something else—and indeed, our attentional networks become engaged in something else—our brains don't actually stop working on the original problem." That's why "aha moments" feel so magical. We think we were suddenly gifted with the solution when in fact we have been doing all the reasoning subconsciously.

Hence, distancing prompts creative thinking. Our brain continues to play around with the facts already gathered, connecting them in multiple ways. That's the very essence of creativity. As Steve Jobs said, "creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something. It seemed to them after a while."

Lastly, while distancing, our cognitive abilities recharge. In *Chatter*, Ethan Kross mentions that distancing activities such as getting in contact with nature acts like a "battery of sorts, recharging the limited attentional reserves that the human brain possesses." Once we get back to the problem, we are able to think much faster and lucidly. Therefore, we should try to organize our days such that we allow our brains to refill themselves.

Conclusion

In summary, experts can be divided into two groups: specialists and generalists. They tend to outperform in different types of environments. Investing, deeply embedded in a complex adaptive system, is a fertile land for generalists. Successful investors thrive in this changing and uncertain terrain by developing a multidisciplinary mindset, engaging in probabilistic thinking, adopting the scientific method, embracing imagination, and taking a step back from time to time. These domains are some of the main components of their deliberate practice.