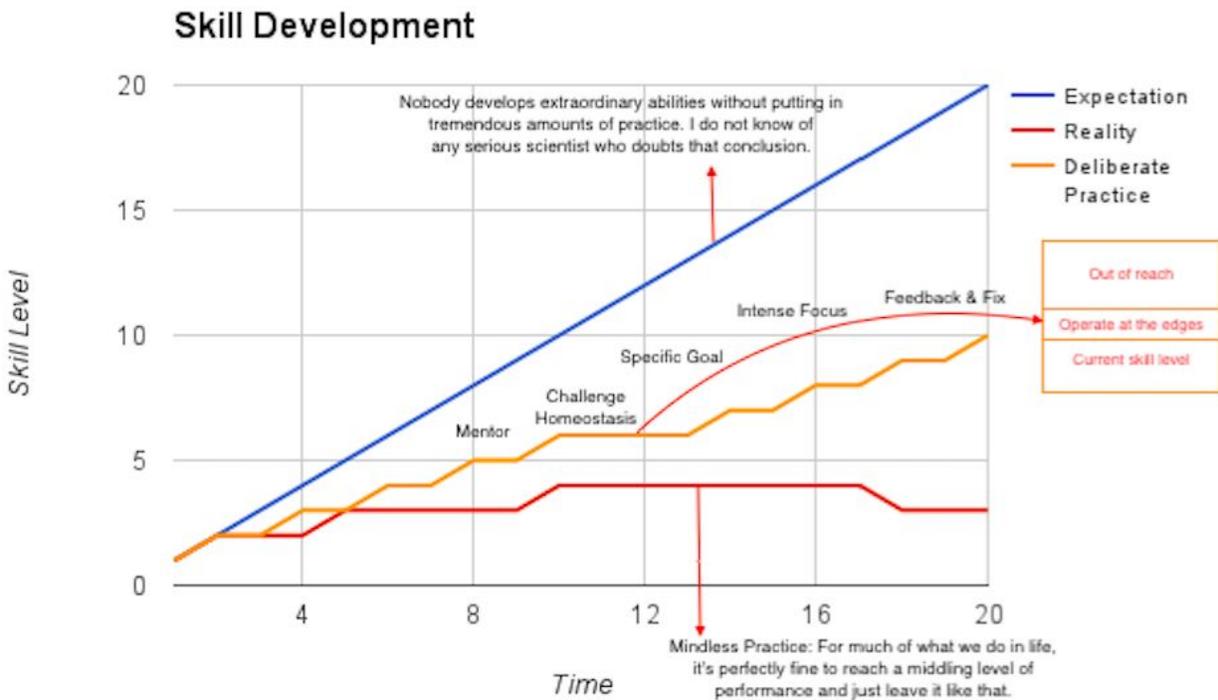


Peak: Secrets from the New Science of Expertise

I rarely buy the same book in three different formats [Physical, Kindle, Audible]. The recent one I made a triple purchase was for the book [Peak](#). The book came out of a collaboration between a psychological scientist [Anders Ericsson] and a science writer [Robert Pool]. Together they spent 5 years to write this book.

Anders Ericsson, student of Herbert Simon; a Nobel Prize laureate, spent his entire life studying expert performers. From his vast experience of studying experts, Ericsson extracted out general patterns that make the experts tick. Through this book he is sharing the general patterns with us all. Whenever I find a book written by an exemplar who is sharing his life work then I don't just read, but autopsy the book.

Around 13.7 billion years ago, there was an infinitesimally small and dense dot which exploded and out came the universe. This explosion is called as the Big Bang. Every human cell which is measured in micrometers contains 2 meters worth of genetic information. It contains all the necessary information to make a human body. We call this as DNA. Like the Big Bang and the DNA can I compress the entire book [Peak](#) in a single chart? Click on the chart to view it clearly.



The chart shown above is my mental representation of the book. What does a mental representation actually mean? A mental representation is a mental structure that corresponds to an object, an idea, a collection of information, or anything else, concrete or abstract, that the brain is thinking about. In this chart focus on three key legends— **Expectation, Reality, and Deliberate Practice**. Let us discuss each one of them in detail.

Most of us want to develop extraordinary abilities and become the next Warren Buffett or Sachin Tendulkar without putting in tremendous amounts of practice. This mindset is captured by the legend Expectation. But this is not a realistic expectation. Why is that? In order to develop extraordinary abilities in any skill [hard or soft] we need to create the best mental representation of that skill in our brain. For this to happen our mental and sometimes our physical structure needs to change. But there is a catch.

Over hundreds of millions of years of evolution, our ancestors developed a preference for stability. Human body maintains a steady internal temperature, blood pressure, and heart rate. The technical term for this is [homeostasis](#), which simply refers to the tendency of a system— any sort of system, but most often a living creature or some part of a living creature— to act in a way that maintains its own stability. Make sure to etch the meaning of homeostasis in your brain. To me this is a billion dollar word.

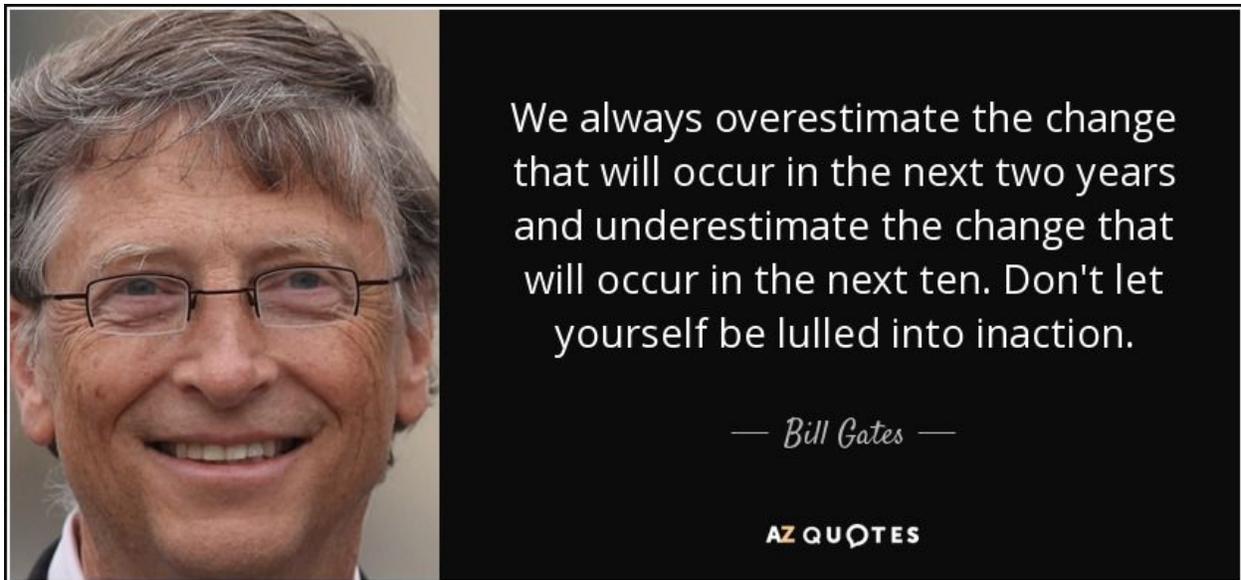
Individual cells like stability as well. They maintain a certain level of water and also regulate the balance of positive and negative ions, particularly sodium and potassium ions, and various small molecules by controlling which ions and molecules stay and which exit through the cell membrane. More important to us is the fact that cells require a stable environment if they are to function effectively. If the surrounding tissues get too hot or too cold, if their fluid level moves too far outside of the preferred range, if the oxygen level drops too far, or if the energy supplies get too low, it damages the functioning of the cells. If the changes are too big for too long, the cells start to die.

Thus, the body is equipped with various feedback mechanisms that act to maintain the status quo. Consider what happens when you engage in some sort of vigorous physical activity. The contraction of muscle fibers causes the individual muscle cells to expend their supplies of energy and oxygen, which are replenished from nearby blood vessels. But now the level of oxygen and energy supplies in the bloodstream drops, which leads the body to take various measures in response. The breathing rate goes up to increase oxygen levels in the blood and to clear out more carbon dioxide. Various energy stores are converted into the sort of energy supply that the muscles can use and feed into the bloodstream. Meanwhile, blood circulation increases in order to better distribute the oxygen and energy supplies to those parts of the body that need them.

As long as the physical exercise is not so strenuous that it strains the body's homeostatic mechanisms, the exercise will do very little to prompt physical changes in the body. From the body's perspective, there is no reason to change; everything is working as it should.

It's a different matter when you engage in a sustained, vigorous physical activity that pushes the body beyond the point where the homeostatic mechanisms can compensate. Your body's systems and cells find themselves in abnormal states, with abnormally low levels of oxygen and various energy-related compounds, such as glucose, adenosine diphosphate (ADP), and adenosine triphosphate (ATP). The metabolism of the various cells can no longer proceed as usual, so there are different sets of biochemical reactions going on in the cells, producing an entirely different suite of biochemical products than the cell usually produces. The cells are not happy with this altered state of affairs, and they respond by calling up some different genes from the cells' DNA. (Most of the genes in the DNA of a cell are inactive at any given time, and the cell will "switch on" and "switch off" various genes, depending on what it needs at the time.) These newly activated genes will switch on or ramp up various biochemical systems within the cell, which will change its behavior in ways that are intended to respond to the fact that the cells and surrounding systems have been pushed out of their comfort zone. - [Peak](#)

In order to modify our mental and physical structures we need to challenge our homeostasis. This takes time and we need to stay much longer on our current skill level before progressing to the next level. From this we can safely conclude that nobody develops extraordinary abilities without putting tremendous amounts of practice. And our legend Expectation is unrealistic. In the world of instant gratification most of us don't want to challenge our homeostasis and work diligently for a long time at the current skill level. This is the reason why many quit before they even make a serious attempt. And Bill Gates will agree with my conclusion.



Let's move on to the next legend Reality. This legend is captured well by how I play Volleyball with my colleagues and friends. I found Volleyball really hard when I started playing the game. Serving the ball was unnatural for me. After playing for sometime, I learnt how to serve and return the ball to the other side. My skill improved to a point and reached a comfort level at which I can go out and have fun playing the game without much effort.

For the last 4 years, I have been playing Volleyball for at least once a week. But my skill level remained static and didn't improve in the last 4 years. I don't know how to smash nor know how to setup the ball properly for a smash. Why did my skill not improve? For the skill to improve I need to challenge my homeostasis. For that I need to focus on what I don't know [smash] and work hard in acquiring that skill. This requires a lot of effort which is not fun. But I was not focusing on what I don't know. Instead I was playing the game with what I already know and having fun without much effort.

We all follow pretty much the same pattern with any skill we learn, from baking a pie to writing a descriptive paragraph. We start off with a general idea of what we want to do, get some instruction from a teacher or a coach or a book or a website, practice until we reach an acceptable level, and then let it become automatic. And there's nothing wrong with that. For much of what we do in life, it's perfectly fine to reach a middling level of performance and just leave it like that. If all you want to do is to safely drive your car from point A to point B or to play the piano well enough to plink out "Für Elise," then this approach to learning is all you need.

But there is one very important thing to understand here: once you have reached this satisfactory skill level and automated your performance— your driving, your tennis playing, your baking of pies— you have stopped improving. People often misunderstand this because they assume that the continued driving or tennis playing or pie baking is a form of practice and that if they keep doing it they are bound to get better at it, slowly perhaps, but better nonetheless. They assume that someone who has been driving for twenty years must be a better driver than someone who has been driving for five, that a doctor who has been practicing medicine for twenty years must be a better doctor than one who has been practicing for five, that a teacher who has been teaching for twenty years must be better than one who has been teaching for five.

But no. Research has shown that, generally speaking, once a person reaches that level of "acceptable" performance and automaticity, the additional years of "practice" don't lead to improvement. If anything, the doctor or the teacher or the driver who's been at it for twenty years is likely to be a bit worse than the one who's been doing it for only five, and the reason is that these automated abilities gradually deteriorate in the absence of deliberate efforts to improve. - [Peak](#)

Let's move on to the final legend Deliberate Practice. This legend is captured well by how I do weight training with my coach [mentor]. Take a second look at the chart and focus on the words [Mentor, Specific Goal, Challenge Homeostasis, Intense Focus, Feedback-and-Fix]. These words are the key components of Deliberate Practice.

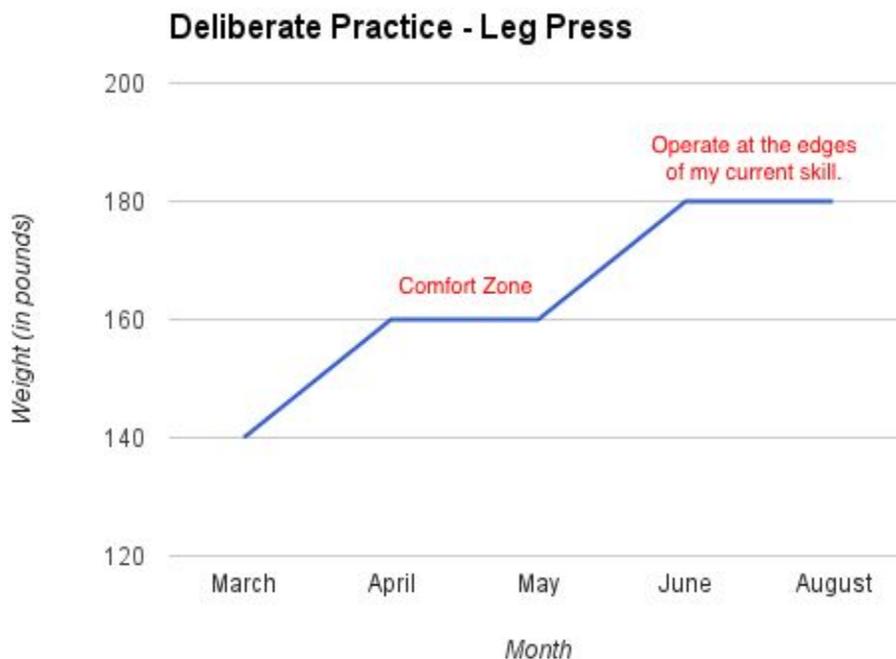
Every week I do intense weight training for a couple of times. Each session lasts for around 20-30 minutes. The reason I do weight training is to stabilize and strengthen all muscle groups so that I can live a healthy life. My coach translated my theoretical goal into an actionable one by coming up with a concrete exercise plan. He has been training people for almost 3 decades and has an effective mental representation to help me to achieve my goal. I am leveraging his

skill, well formed mental representation, to reach my goal. In order to stabilize and strengthen my muscle groups I need to challenge my homeostasis.

The way in which my coach challenges my homeostasis is very interesting. I can comfortably do a leg press of 160 pounds. He will make me do a leg press of 180 pounds which is slightly above my comfort zone. With 100 percent effort and intense focus I will be able to do a few reps. While doing the last-but-one rep my thigh muscles will burn, cry, and beg to give up. For the last rep the weights will hardly move an inch and my burning sensation will be at its peak.

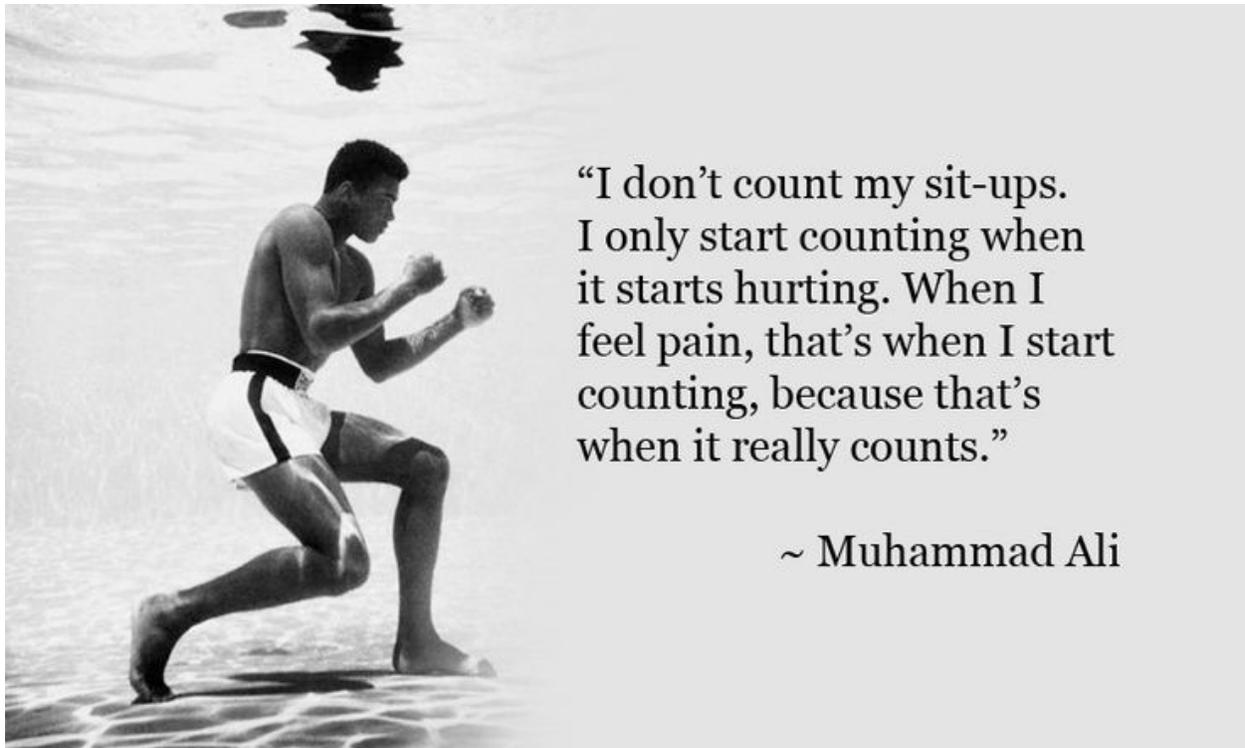
At this point my coach will tell me to not give up and ask me to give my best effort. This burning sensation gets transmitted to my brain. My brain has 2 choices— Give up or Continue. I don't want to give up in front of my coach and let him down. So I will continue. This will disturb my homeostasis. When a body system— certain muscles, the cardiovascular system, or something else— is stressed to the point that homeostasis can no longer be maintained, the body responds with changes that are intended to reestablish homeostasis.

Once the homeostasis gets disturbed the body responds to it by generating the necessary growth hormones. This results in muscle development and after sometime I would be able to leg press 180 pounds comfortably. At this point the body reestablishes its homeostasis level and my coach will push up the weight to 200 pounds to disturb the homeostasis again. The chart given below summarizes it all.



Do you know why my coach is asking me to do the last rep knowing that the weights won't move? It's not the movement of the weights, but the 100 percent effort from me after my leg muscles tire out that matters. That is what disturbs the homeostasis of my body. His response

made my associative brain to pull out the famous saying of Muhammad Ali, who was an American Olympic and professional boxer and activist.



The final component of deliberate practice is Feedback-and-Fix. Every time I make a mistake my coach will promptly point it out and make me to correct it immediately. This is an important step in deliberate practice. If not, I would be forming incorrect mental representation of that skill. And this is very hard to correct if it isn't not caught early. The importance of Feedback-and-Fix is very well captured in the narrative between a teacher and student.

TEACHER: Your practice sheet says that you practice an hour a day, but your playing test was only a C.

TEACHER: Can you explain why?

STUDENT: I don't know what happened! I could play the test last night!

TEACHER: How many times did you play it?

STUDENT: Ten or twenty.

TEACHER: How many times did you play it correctly?

STUDENT: Umm, I dunno . . . Once or twice . . .

TEACHER: Hmm . . . How did you practice it?

STUDENT: I dunno. I just played it.

I am very lucky to have a mentor who is pointing out my mistakes. Who is going to point out my mistakes if I am developing a skill without a mentor? It should be myself. But this is a very hard thing to do. Why is that? It's because of our enemy ego which won't let us accept our own

mistakes. But skill development doesn't happen without identifying our mistakes and working hard to fix them. The only way to make that happen is to get rid of our ego and focus on the process of improving our skill [process] without taking the mistakes personally [product]. This is one of the reasons why Ryan Holiday titled his latest book as [Ego is the Enemy](#).

Deliberate Practice is not everybody's cup of tea. Why is that? For deliberate practice to be effective, you need to push outside your comfort zone and maintain your focus, but those are mentally draining activities. This isn't fun for anyone. A lot of people attribute deliberate practice to passion. I don't agree with that as it's causality in reverse. Some attribute deliberate practice to willpower. I don't agree with it either. This is because willpower isn't just a skill. It's a muscle, like the muscles in your arms or legs, and it gets tired as it works harder.

It's motivation that pushes people into the paths of deliberate practice. Motivation can come from two sources: intrinsic and extrinsic. People get motivated for several reasons. My motivation to read a lot came out of necessity. I wrote about it [here](#). What makes Warren Buffett do deliberate practice every day even at the age of 86? The answer to this question is beautifully by Charlie Munger.

All human beings work better when they get what psychologists call reinforcement. If you get constant rewards, even if you're Warren Buffett, you'll respond – and few things give more rewards than being a great investor. The money comes in, people look up to you and maybe some even envy you. And if you buy a whole lot of operating businesses and they win a lot of admiration, there's a lot of reinforcement. Learn from this and find out how to prosper by reinforcing the people who are close to you. If you want to be happy in marriage, try to improve yourself as a spouse, not change your spouse. Warren has known this from an early age and it's helped him a lot. - Charlie Munger

To me it's not passion that leads to deliberate practice. But it's motivation that leads to deliberate practice which in turn becomes a habit which neutralizes pain and this positive feedback loop continues. If someone asks me to come up with a best example of deliberate practice, then without blinking my eye I would answer Evolution. Why is that?

Three billion years ago, evolution started its journey with an error [mutation]. But it corrected its mistake with a help of natural selection which acted as a cop to favor mutations that suited the environment. The formula evolution used was dogged, incremental, and constant progress over a very long time [3 billion years] resulted in all the living organisms that we see around us. This is the longest deliberate practice that I have ever seen in action. All we need to do is copy the algorithm of evolution and implement it in our daily lives— **Dogged, Incremental, and Constant Progress till we die.**

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