

**IF AT FIRST
YOU DON'T
SUCCEED... .**

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**...TRY DOING WHAT
YOUR COACH TOLD YOU
THE FIRST TIME.**

Introduction

- What is, “Talent?”
- The closer we look at the idea the more it seems to not be what we think.
- The views of talent.
 - Research shows that there is no fast track to improvement. Level of accomplishment always correlates with amount of practice.
 - Don’t measure yourself against where you want to be, measure yourself against where you have been and how you have improved over the course of months, at least.
 - Setting goals is great, setting deadlines may not be.
 - Adults and older children thinking they should learn brand new concepts, as they do in science and math and reading (All things they’ve had a massive amount of practice in over the years). They will not be able to assimilate a brand new skill like playing a sport the way they acquire higher level knowledge in those fields.
- Don’t compare yourself to others by age. Compare by hours put in and, more specifically, the type of work done during those hours.
- IQ, short of developmental disability, does not seem to matter.
 - Doctors with 103.
 - James Flynn and his population IQ research. How can IQ across populations reliably rise whenever an area becomes industrialized if it is a fixed factor?
- Are kids encouraged because they are talented, or talented because they are encouraged?
- Whatever talent may be it is clear that it is not something one person can have that another cannot work to attain.
- 10 years 10,000 hours to become world class in any complex domain, and that number is rising.
- The point is not to do 10 years 10,000, but to take the same steps as one would if one were to follow that process however many hours they may work to improve.

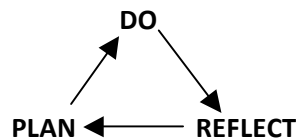
What Does it Look Like?

- Mozart and Tiger Woods explained (Colvin 25-30).
 - Children of motivated master teachers.
 - Put in thousands of hours of guided practice starting at a very early age.
 - There is no magic here other than the unusually young age they started focused, guided, serious work with excellent coaching.
- Drew Brees, a general consensus future hall of famer. Either way he is pretty darn good.
 - Projected to go in the middle of the first round of the 2001 draft he dropped because he was considered too short to play quarterback in the NFL. He was the first pick in the second round to the San Diego Chargers.
 - Allowed to develop. Became a bust.
 - After his third season (during which he played so poorly that he was replaced by backup Doug Flutie) the Chargers draft Quarterback Phillip Rivers, essentially, first.
 - Rivers is a holdout and Brees shows up to camp ready to go. Is named the starter by default.
 - Has a season for the ages. He started 15 games and led the team to a 12-4 regular season record completing 65.5% of his passes for 3,159 yards, with 27 touchdowns to only 7 interceptions, giving him a 104.8 passer rating. The Chargers won the AFC West and he was selected to the 2004 NFL Pro Bowl and named 2004 NFL Comeback Player of the Year

- What happened, where was his talent before this?
- Jerry Rice, the greatest wideout the NFL has ever seen
 - No significant college scholarship (Mississippi Valley State in a town of under 2,000 people).
 - Did not have elite NFL speed.
 - Drafted 16th in the first round. 15 other teams missed his greatest of all time 'talent'.
 - How did he do it?
- How you can do it. . .

Deliberate Practice

- Effortful activity generating constant feedback that guides the refinement of that activity over and over and over.
- The term was first coined in the 1993 paper, "The Role of Deliberate Practice in the Acquisition of Expert Performance," published in *Psychological Review* by the leading researcher in skill development K. Anders Ericsson and some of his colleagues and (Ericsson, Krampke, and Tesch-Romer).



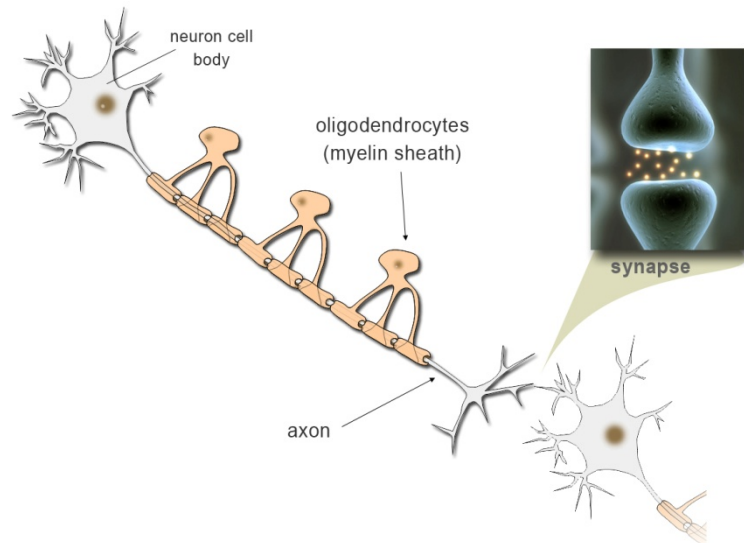
- Focus (get your mind right!) what it is and how to train it.
 - What many people think is focus and work toward improvement is not. Thus significant improvement is rare. Getting work off of one's desk is much different than getting the work done right which is the essential concept of skill development.
 - Attention to every detail, the smaller the better – build up from there.
 - 10x perfect game.
 - What if. . .

Neuroplasticity

- It turns out that the brain works just like your muscles, I mean exactly like your muscles. You first have to get whatever you are training into proper form then do massive amounts of proper reps. Over time this will *change the area(s) of your brain* devoted to that particular skill physically or functionally. Just like your muscles, with reps of increasing difficulty you get stronger and stronger. That difficulty feels like frustration (don't you love being forced by a coach to do something again and again?). I call it the burn of learning, or the Blearn. Feel the Blearn! Just like your muscles you need to deal with that type of discomfort to get stronger. If you don't then you won't. Now do you see why coaches are screaming for your attention all of the time?
- Training your brain - Everything we do or think is a neural representation in the brain. Neurons talking to other neurons. We have billions of neurons and each has about 10,000 dendrites (Greek for branches) for receiving signals (in most cases). These signals are sent by axons (1 per neuron) which has its own set of branches at the end called axonal arborization each of which

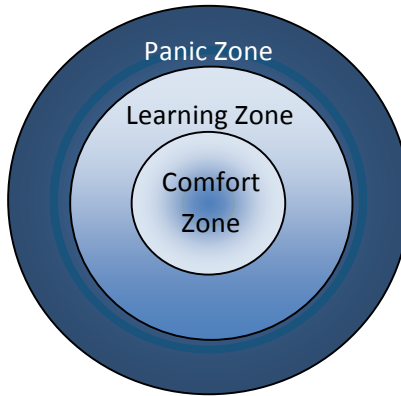
has its own 'transmission' terminal. Each branch is capable of communicating with other neurons. Such communications are neural networks.

- Synapses are gaps between axons and dendrites across which action potentials (electrochemical nerve impulses) travel.
- Action potentials travel the axon which is punctuated by little gaps called the nodes of Ranvier.
- Just as with the electricity we use, if the conduit is not insulated then the action potential leaks out and the signal is not as powerful (does not travel as fast). The more insulated the axon the faster it travels.
- There are cells attached to axons called oligodendrocytes. Each time an action potential travels through an axon oligodendrocytes are activated to produce an insulating substance called myelin which forms a covering known as the myelin sheath (Araque and Navarrete 1588; Wake, Lee, and Fields 1649-1651).
 - As an example; multiple sclerosis is a breakdown of myelin along pathways governing physical movement. The action potentials are leaking out and the signals can't get to the appropriate places. If a loss of myelin leads to loss of control (speed, accuracy) then what do you think extra myelin might do?



- The more insulated the axon the faster the action potential travels (i.e. faster cognition, finger movements, etc.). That is why thoughtful repetition over and over creates solid technical foundation and speed *in all domains*.
 - Learning; slow accurate movements/thoughts create accurate neural representations ready for myelination.
 - Speed and facility comes from thoughtful repetition not trying to do everything at once. When we make mistakes on any small component part of what we are trying to build we are myelinating different neural connections that represent the mistake. Practicing mistakes leads to playing mistakes. Activate the right oligodendrocytes instead of practicing mindlessly.
- One characteristic of deliberate practice is that it is not that it is not inherently enjoyable. (ibid 368)
 - It is work. Whereas physical work is taxing on the body, this type of intellectual work is taxing on the brain.

- This state of difficulty is the ‘sweet spot of learning’. Two UCLA researchers have described this condition as, “Desirable Difficulty,” (Bjork and Bjork 58). Writing about the current state of education professor Bjork states, “optimizing instruction will require unintuitive innovations in how the conditions of instruction are structured (ibid 56).” Or to put it colloquially – learning is not what many people think that it is.
- Vygotsky’s Zone of Proximal Development



Deliberate Practice Finer Points

- Cognitive researchers have developed an inclusive model for the Plan-Do-Reflect model calling the three phases Forethought-Performance-Self Reflection, as well as addressing other environmental and psychological factors surrounding the paradigm of skill development (Zimmerman 707-715, 705-719).
 - Video yourself.
 - Keep a journal.
- Recovery periods and sleep.
 - Studies show that high achievers take more naps (Ericsson, Krampke, and Tesch-Romer 376-377).
 - Sleep is where memory is consolidated.
 - Recently it has been discovered that a ‘sanitation system’ called Metabolite Clearance that is not active during waking hours flushes out waste in the brain during sleep (Xie et al.).
 - Leisure activity (Ericsson, Krampke, and Tesch-Romer 377).
 - Recovery Periods.
 - Engaging in deliberate practice is intellectually taxing (mental fatigue) and breaks need to be taken when serious confusion occurs.
 - Current research shows that world class experts cannot engage in more than 4-5 hours of deliberate practice daily (Ericsson 699). 90 continuous minutes of deliberate practice at a time seems to be the limit. Consider this if you want to introduce your students to this concept. Generally 45 minutes on and 15 minutes off works for high level study. For beginners start with five minutes. This is far better than 15 minutes of unfocused practice.
 - When true mental confusion occurs, however long that takes, a recovery period is necessary.

- Focus is like a muscle. Those new to this type of intense concentration will only be able to lift a little intellectual weight until exhaustion. Start with little bits at a time, it will grow.
 - The amount of time one can engage in deliberate practice without a break (recovery period) increases as one exercises it, but do not push through genuine mental fatigue. Take a break and do something that takes little intellectual investment.
 - How most kids do homework and practice sports is not deliberate practice. No wonder classes seem hard. Kids who do all the assignments *as assigned when assigned* in their homework do not need to study for tests to get A's (rich mental model). I have known plenty of honors students who do this, and it has everything to do with how they prepare not 'giftedness'.
- Repetition – I can't stress enough the importance of massive amounts of thoughtful repetition (did I do it right? If not how do I fix it? If I don't know then ask my coach, etc.) thousands of times in the pursuit of effortless enjoyable performance. Playing is fun, practicing is work; the more work you'll do the more fun you'll have.
 - Getting something 'right' is on only the *first* step. Then repetition can begin with an eye for anything that can be improved for each subsequent repetition. This process can take days, weeks, or months depending on the challenge. We'll address the psychology of the attitude and patience needed for this in the final section.
 - It is fine to make mistakes, don't let that bother you, but if you want to learn you must try correct it the next rep every time. Pay attention.
- Interestingly there is a way to supercharge the brain's learning potential when doing reps. . .

Varied Repetition

- The Power Law of Practice (Newell, Allen, and Rosenbloom) – What many of us call the '80/20 rule'.
- "The Strategy Specific Nature of Improvement: The Power Law Applies by Strategy in Task," Delaney et al.
- Don't just try these once or twice. Try one or a few and rep them many times in each practice for a week. Don't give up on new ideas too soon. Some of these will work better for you in certain situations. They all work, and you will also begin to find after using them for a while that you will be able to identify the strategy needed for specific circumstances when necessary.
- Daniel Coyle, *The Little Book of Talent*.
- If you are learning something in the playbook learn it backward as well as forward.
- If you are a wide receiver run a route you are learning and stop after every step, then every other, then every third and so on. Then take one step and start the process again. Try three steps forward one back, run it with your eyes closed, on and on. This puts constant pressure on the brain to work through those small areas of confusion that exist within what you are already learning. In other words it – GETS YOUR MIND RIGHT!
- So, if all of the previous turns out to be true then what stands in the way of anyone, really everyone, being really great at whatever they choose? It turns out it is. . .

Self Control

- Also called executive function by researchers. This refers to the basic ability to choose “should” over “want.”
- This is wired up in the pre-frontal cortex of the brain.
- The PFC is very underdeveloped in the young and will not finish developing until the age of 25 (ever wonder why your insurance goes down, or you can’t rent a car until you are 25?).
- Self control is learned just like other skills – we engage in the behavior (create the neural network) and then reinforce it by repeating it over and over (myelination).
- Because this control of impulse is unpleasant for a young person many times they have to be taught, and sometimes structured into these behaviors. That is why your coach yells to get your attention and you don’t like it. It takes a good deal of self-control on the part of parents and teachers to make children do things that appear to make the child uncomfortable in the interest of making them self-reliant adults. That is one of the greatest acts of love we can do for a child: not praising them effusively for doing nothing or being their friend.
- Habit pattern development. Practicing, and doing work properly, can be developed incrementally into a habit. (Duhig)
- Self esteem movement of the late 70’s onward.
 - Studies show self-esteem correlates with good grades (self control) (Baumeister and Tierney)
 - Educators and others believe that praising children for nothing (everyone gets a first place trophy!) will impart self-esteem thus facilitating better grades.
 - Researchers ran with it, with one in 1994 praising it. It made news, but what did not make news was the end of his report in which he said it was “disappointing” to see the lack of really solid evidence “to date”. (ibid)
 - Yes this does not identify the causal factor. Why believe that self-esteem leads to good grades *when it seems obvious that good grades lead to self-esteem*, and that is indeed what later research found and it seems this movement is coming to an end. But not after a generation was raised to believe they are superstars for doing nothing and expect to be treated that way. They have underdeveloped pre-frontal cortices and many of them are living with their parents as adults *with no intention of accomplishing anything else*. They may expect their parents to treat them a certain way, but that is not going to work with society at large.
 - Google, “You Can do Anything,” a Saturday Night Live sketch for a hilarious view of this phenomenon. After you laugh you may cry when you realize how accurate it really is.

Habit Pattern Development

- Practicing, and doing work properly, can be developed incrementally into a habit. (Duhig)
- 30 days to build a solid habit. (Coyle)
 - Let’s address practice.
- What we are working on is the *type* of work (as discussed earlier) being done. The ability to do this can be developed as one would develop a muscle. Start with a little resistance and increase as strength increases.
 - Type of practice. Focus; what it is and how to train it.
 - Start with a little. Choose a task and pay attention to detail, the smaller the better. This will become uncomfortable after a few minutes. Stop and continue practicing as you used to until you feel you can focus that hard again. When

ready do a few more minutes. Keep doing as much as you can each practice. It will become easier and increase over time.

- What many people think is focus and work toward improvement is not. Thus significant improvement is rare. Getting work off of one's desk is much different than getting the work done right which is the essential concept of skill development.
- Coaches; endeavor to ask questions instead of give answers to create desirable difficulty as students find the solution themselves. This is harder than just giving information and is a mark of master teaching. If you are new to doing this it will be a bit confusing and mentally uncomfortable. You are going through desirable difficulty (Feel the Blearn!), don't abandon it, embrace it.
- Meta coaching.
- 10x perfect game.
- What if. . .
- We're going to run a play, and after I'm going to ask you what you did well and what you could have done better. Then you will talk about what everyone else did. Be prepared to speak for 2-3 minutes about every aspect of everyone's performance. This brings the student to acute awareness paying attention to as many details as possible in order to fill the time (I usually start by becoming totally silent for 30 seconds. It seems like an eternity and then I tell them I'll want them to fill at least four times that amount with their critique). I do not make them speak, but they always perform better on that attempt and learn what good focus is.

Mindset

- Researcher Carol Dweck and growth vs. fixed mindset.
 - Her three decades plus of research has addressed why, to put it colloquially, most of us can't get out of our own way when it comes to learning.
 - See attached handout
 - Praise the work, not the 'talent'. This is simply the truth and not a manufactured motivational strategy.
 - Perseverance/patience.
 - Setting goals is good, setting deadlines may not be.
- Don't believe the road signs that nature puts up along your quest for skill development.
 - Research shows that there is no fast track to improvement. Level of accomplishment always correlates with amount of practice.
 - Don't measure yourself against where you want to be, measure yourself against where you have been and how you have improved over the course of months, at least.
 - Older students thinking they should learn music, or other brand new concept, as they do in science and math and reading (All things they've had a massive amount of practice in over the years). They will not be able to assimilate a brand new skill like playing an instrument the way they acquire higher level knowledge in those fields.
 - Do what they did, not what they do.
 - Don't compare yourself to others by age. Compare by hours put in and, more specifically, the type of work done during those hours.

- How progress is measured. Days vs. weeks or months. The long arc of performance development.
- Skill acquisition is set up backward to what most people perceive it should be. Many perceive that because something is hard at first and little progress is made with great effort that they do not have talent. In reality it is pushing through this initial phase and getting to a level of competence in which higher level accomplishment can be trained *is itself* 'talent'. Many tend to think that being really good at something right away (which never happens, the research is overwhelming on this) reveals a 'talent' and then hard work to reach one's potential can begin. This is part of the misunderstanding of talent.

Real Accomplishment as Motivator

- We cannot get there without pushing through the initial learning (Bleary, motivation, allocation of time, acquisition of instruction, etc.) just like your muscles would be sore and you would hurt for a while if you started working out, the brain will 'hurt' as one engages in meaningful skill acquisition. It is a myth that any given individual begins learning a skill *with no previous exposure or participation in that domain* significantly faster than anyone else.
- Development and Adaptation of Expertise: The Role of Self-Regulatory Processes and Beliefs by Barry J. Zimmerman.
 - Using several domains this research showed that genuinely getting better (good) at something through proper training created a genuine interest in participating in *and improving* in a given domain. "Because successful learners view strategic processes as effective means to an end, they are motivated more by the attraction of positive outcomes of these processes than by the fear of adverse outcomes (Pintrich 2000),"
 - This is the source of real self-esteem and self-efficacy.
 - Passion can be developed and nurtured. Could all passion for life pursuits come from here?
- Flow – Mihaly Csikszentmihalyi
- The good news is that it appears the brain is designed to crave high level problem solving/cognition, after all that is how humanity has advanced over the course of time, but the price of this productive state of enjoyment is persevering through the initial unpleasant stages.

So, then why not do it?

Recommended Reading

Start with the first three, they are the jumping off point for everything you need to know and research. There is a more extensive list at www.ggoodhart.com/books

Talent is Overrated: What *Really* Separates World-Class Performers from Everybody Else

Geoff Colvin

For my money the single best reference on the nuanced overarching idea of talent, how we wrongly perceive it, and how these implications inform teaching and learning. Unlike *Outliers* Colvin describes the things that you need to do to be successful. He also points to research you can review on your own. It is scholarly, but also it is an entertaining read.

Willpower: Rediscovering the Greatest Human Strength

Baumeister and Tierny

These researchers have done some amazing work on what happens in the brain with regard to self control and how it is been trained. They also cite other relevant research and weave together a compelling take on how discipline is learned. Another scholarly entertaining read. This, TIO, and *Mindset* are the fundamental must-reads of this list.

Mindset: The New Psychology of Success

Carol Dweck

Professor Dweck has spent over three decades researching the *psychology* of learning. Since learning is different than what most people think it is things like failure and mistakes seem to indicate a lack of ability to them. In an attempt to appear competent they cover this by not participating in learning. It is, of course, more complex than that and her work is fascinating. You will recognize it all around you and likely, as did I, in yourself to some extent.

The Little Book of Talent

Daniel Coyle

An owner's manual containing specific things great coaches and teachers use to maximize skill development. I am amazed that an investigative journalist could figure this out so well. I thought one would have to do thousands of hours of teaching. This is an invaluable resource.

The Talent Code: Greatness isn't born. It's grown. Here's how.

Daniel Coyle

Mr. Coyle elucidates an exciting theory at the time (2009), and proposes that all human improvement can be traced to a single biological process. This process is myelination. Myelin is an insulating sheath around axons in the brain. The more insulation the faster the nerve impulse travels. Thus faster cognition, motor skills, etc.

Since 2009 important research has been published showing evidence that the underpinning process Mr. Coyle writes about is indeed accurate. As you read it keep in mind that starting in 2011 it has been shown scientifically that sending an impulse through an axon does cause an oligodendrocyte to produce myelin.

The Genius in All of Us: New Insights into Genetics, Talent and IQ

David Shenk

Another take on the same theme. He identifies a new paradigm for nature vs. nurture (nature *times* nurture) and explains how much of what we think about genetics is not correct. This is partly an introduction to epigenetics.

The Power of Habit: Why We do What We do in Life and Business

Charles Duhigg

How hard is self control really? It can be developed into a habit. This is a well-researched, practical and interesting look into how our brains ingrain and act on habits and what we can do about them for ourselves and in teaching others.

Outliers: The Story of Success

Malcom Gladwell

Gladwell uses good storytelling to show how the environment we create influences success and that it is not innately limited. It is probably the most interesting read, but the least scientific, and he does not explain *how* the process works. I describe it as *Entertainment Tonight* to Colvin's *60 Minutes*. In any case it is a worthwhile read. The information on Canadian hockey players and how that speaks to the talent myth is worth the price alone

Good Business Leadership: Flow, and the Making of Meaning.

Mihaly Csikszentmihalyi

Csikszentmihalyi (pronounced 'Csikszentmihalyi') first described the concept of flow in the late 1990's. This is the state experienced when time melts away as you are working on a task. You've worked hard, done a lot, but it feels like hours have passed in moments. In *Good Business*, one of his several books on flow, he describes the concept on its own and relates to business structures. In any case the application of flow in any group setting has benefit and this book is quite illuminating. Don't dismiss it upon first read, it took a while for this to sink in, but when it did it had a profound effect.

The Willpower Instinct: How Self-Control Works, Why It Matters, and What You Can Do To Get More of It

Kelly McGonigal

A great companion to the Baumeister/Tierny book. Suggests exercises you can try for a week at a time and looks at some of the issues from a different angle.

*Whether you think you can, or you think
you can't – you're right.*

-attributed to Henry Ford

Addendum:

The Cambridge Handbook of Expertise and Expert Performance

Edited by K. Anders Ericsson et al.

Ericsson has established himself and his team as the leading research authority on skill acquisition and expertise over the last 30 years. This is not a book per se but a collection of peer reviewed studies on all aspects of performance development including how it is done in specific fields, how motivation works, the specific process of skill acquisition (deliberate practice) and more. It is not a light read, very clinical, and at 900+ pages I myself have not read it all. I have read much of it and its organization makes it easy to pick which studies one wishes to read (I have found no need as of yet to read how one becomes an expert in software design, for instance).

The Role of Deliberate Practice in the Acquisition of Expert Performance. 1993

Anders Ericsson et al.

The seminal paper that first described the path to world class performance. It is available online. He updated it in the Cambridge Handbook as, "The Influence of Experience and Deliberate Practice on the Development of Superior Expert Performance," but what he wrote in 1993 is still accurate. If you like the 1993 paper then spend the \$60 on the book.

The Strategy Specific Nature of Improvement: The Power Law Applies by Strategy in Task

Delaney et al.

The paper that first studied and identified the efficacy of strategy changes.

*“...optimizing instruction will require
unintuitive innovations in how the
conditions of instruction are structured.”*

-Drs. Bjork and Bjork

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