

From Misery to Mastery in 10,000 Hours: “Calvin, Go Do Something You Hate... Being Miserable Builds Character!”

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In one of my *Calvin and Hobbes* comic strips, Calvin's father has lost his glasses and asks Calvin's mother if she has seen them. In the next frame, Calvin appears, impersonating his father, combed hair, wearing his dad's glasses, and mocks his father: “Calvin, go do something you hate... being miserable builds character!” It's the kind of encouragement all of us need sometimes, suggesting that all the misery we've endured “doing something we hate” actually pays off somehow, even if it is not in building character. And maybe the current quest to gain expertise in some valued domain will pay off, if we just do enough work.

It's the kind of encouragement we all need sometimes, suggesting that all the misery we've endured “doing something we hate” actually pays off somehow, even if it is not in building character (maybe instead it builds characters?). And maybe the current quest to gain expertise in some valued domain will pay off, if we just do enough work.

Popularized by such works as *Outliers* (Gladwell, 2008), there may just be some truth to it as well: A spate of recent research suggests that if someone wants to be an expert in a domain of any complexity, then he or she had better spend 10,000 hours practicing the domain. It is not just working by rote, but deliberate practice (DP) improving rough spots, focusing on aspects that one hasn't quite yet grasped. Thus, practice doesn't count unless it is focused on problem-solving, progressively better refinement, and ultimately enhancement of internal representations for planning, evaluating and monitoring how one mentally represents the sequences (Chaffin, Imreh, & Crawford, 2002). As my daughter's violin teacher says, “You're not practicing unless you're practicing it right!” No pain, no gain.

Most of these same “metaexperts” (viz., experts about experts) maintain that enjoyment of the activity pretty much means that it is not DP at work, instead it's mere play (e.g., Ericsson, Roring, & Nandagopal, 2007). Meta-experts' studies of musical skill acquisition, for example, show that time spent in deliberate practice is a far better predictor of musical skill than time spent playing for enjoyment. The same pattern appears in studies of chess playing. Sorry to say, but it implies that if we are merely enjoying the activity without engaging in DPs, we might be maintaining the skill, but we are not actually improving it, any affect we experience appears to be unrelated to skill increases. Apparently, the enjoyment comes from making gains with our skills, not in gaining the skills themselves. In short, one must challenge or be challenged for quite a long time to develop pure expertise. Looks like we

should all expect to endure quite a bit of misery if we truly want mastery. Time to join a monastery, me thinks. (And by the way, if you are enjoying this piece, that's a sure sign that you are learning nothing. Get back to work!)

Because his novels reveled in dark humor, I was quite surprised that famed author Kurt Vonnegut could wax so inspirationally. He encouraged young authors to write novels, even though he was pessimistic about anyone's chances to make a decent living at it. He said that unless they write novels literature would suffer, and who knows? One or two young authors might actually make it. To those who were intimidated by his own “lucky” success, he remarked that they were seeing the end product, not the painful process of drafting and redrafting that he endured to produce his books. It seems that dark humor had its roots at least in part in Vonnegut's misery, but of course his readers loved the products and they miss him now that Kurt himself is a wisp of undifferentiated nothingness, to use one of his lines.

All of us who have engaged the publication process can relate to its miseries. I had taken the “hard” English classes through my high school years and fancied myself a fine writer; I suppose I imagined that the 10k of DPs was already under my belt. Indeed, it seemed that everyone admired my writing through my undergraduate years, and I even published a solo-authored paper before entering graduate school (Johnson, 1983). In retrospect, as Kruger and Dunning's (1999) work implies, praise about a dimension from those who lack expertise on it would seem poor predictors of actual expertise.

Back at Purdue University, when Alice H. Eagly became my major professor, reality abruptly changed. We met to discuss the first draft of a manuscript I'd given her and I saw that the margins were chockfull with pencil markings. To my horror, most of the remarks were related to grammar and style! I was so shocked that for several minutes my mind numbed and I couldn't follow what she told me. It dawned on me that my writing needed work and what purpose do mentors serve if not to mentor? And what role do mentees have but to concentrate on their DPs?

Practice, practice, practice.

Over a long enough time, you really do develop expertise and then, in persistently plying your trade with greater fluency, accomplishments accumulate. Anyone can become a good writer or a good scientist with enough practice and persistence. Draft, re-draft, repeat. (I've profited from it again and again, to the point where I am convinced that, with the pos-

sible exception of the current essay, I am much smarter in print than in person!) Johann Sebastian Bach is reputed to have once said, "I have done well. Anyone who works equally as hard will do equally as well." Success = Bach = Beethoven = Brahms \geq 10k hours of DP (plus a lot of work).

The peer-review process is an extension of the writing process with its own miseries. It's no wonder that the first articles are the hardest to write but that with practice they come easier, because reviewers use their considerable mastery (they *are* experts, aren't they?) to critique the work and as the process repeats, one not only develops the article itself but also develops related skill sets for doing better science and for anticipating critics' reactions. Ideally, a published scientific article represents mastery expressed, perhaps over several domains (knowledge of the domain in question, scientific method, one's discipline per se, writing). It makes you wonder how often classic discoveries were made prior to mastery, naïvely, and then developed into legitimate publications because of review feedback that demanded more DPs. Submit, re-submit, repeat. And keep the faith!

Of course, mastery pursuits are highly hydraulic: There are massive side effects for the completely obsessed mastery seeker, who will have no time for any other mastery pursuit or for other aspects of life. Unrelated skills and domains of life atrophy away. (Can you say, "increasingly one dimensional"? "Increasingly dysfunctional"?) Metaexperts agree that unless skills and knowledge are used and expressed, they begin to die and require some extra DPs to resurrect. As an example, after a long time pursuing research that is increasingly meta-analytic, a few years ago I had the experience of authoring an article based on a survey of a difficult-to reach population, HIV-positive Romanian adolescents. It was some of the most difficult writing I have yet done, as I had become too used to thinking of study results as study units rather than individual people. I got the job done, but it took more work than it should have, and it was not very pleasurable. As they say: Use or lose it.

Seriously, 10,000 hours of deliberate practice sounded like quite a lot to me, especially given the misery factor, so I gave it some thought. Let's say I wanted to master playing the piano. Let's make Bach's Goldberg Variations the mastery goal: I need to play this piece at professional speed with accuracy (and ok, I want to play it with feeling, too!). At 24 hours a day, I'll reach 10k hours in about 417 days, a bit over a year. But wait: Maybe I'll need to eat and sleep a bit, so perhaps 16 hours-a-day of DP would be a bit more manageable, and now 10k works out to be a bit less than 2 years. (See Figure 1's logarithmic learning curve.) Come to think of it, I may need to keep my day job and remain civil to my family, so maybe even 16 hours-a-day is a bit steep, and besides, meta-experts say that spaced learning is ideal, so maybe the 2-year plan is impossible even for the completely obsessed. And then there are physical constraints: My wrists have a tendinitis problem that flares up with repetitive motions... Darn it: Mastering the piano anytime soon appears quite a bit beyond my ken.

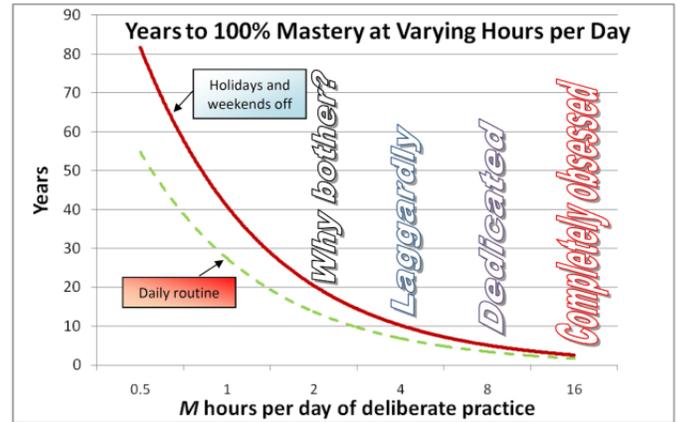


Figure 1. Number of years to attain mastery as a function of increasing length of deliberate practice (DP), either on a daily, 7-days-a-week routine or with holidays and weekends off, with descriptive labels for cumulative amount of DP.

Truth told, I do disturb a piano on occasion but estimate that to date, I have only put in about 4,000 hours, which by the 10k rule makes me only 40% expert. (And I have to admit that I enjoy it a bit more than the term DP would dictate: Any "mastery" I exhibit is probably just Type-I error, an instantiation of the alpha rate! Well, at least I am alpha at something.) At my laggardly pace, I will be lucky to hit mastery before death relieves my misery. Plus, if all I ever play are the Goldbergs, it will only make me a master of Goldberg's and other music Golbergesque, forget playing anything by Brahms, Prokofiev, or Mellits. Hmmm, maybe it is time to start taking lessons and dispense with the self-training routine?

Work life is another domain where mastery would seem key. If trainees only train during work hours, then it would seem mastery could be rare indeed. In the U.S., factoring out weekends and holidays, a work year is something like 245 days, which at 8 hours per day works out to just under 2000 hours, so it would take a trainee 5 years to gain complete mastery of a position. It would take less to the extent that the trainee already had prior DP. (And, hmmm, it would take more to the extent that the company expected some actual work out of the employee instead of pure training...)

Other countries' work weeks vary in informative ways. Given their generous vacation allotments and frequent worker strikes, the French work something like 200 days a year (and have only a 35-hour work week), which sounds awfully good, until you consider the implications for mastery, let alone practicing one's trade. In France, a trainee starting from zero DP, tabula rasa, will take a laggardly 7 years to gain complete mastery, 40% longer than in the U.S. In Japan, things are a little bit more obsessed: Work weeks tend to include half-days on Saturday and often stretch 10 hours; workers seldom take vacations, even when incentives are offered for employees to take them. So, applying the 10k rule, a Japanese trainee could gain mastery in about 3.6 years, 29% shorter than in the U.S. and almost twice as fast as the French trainee. International differences in GNP begin to

make sense. Maybe these differences are what give Japan such renowned technical expertise? And maybe it is why France renowned for its rich cultural life rather than its technical expertise.

Graduate training programs often confer Master's degrees to their students after about 2 to 3 years of work, which roughly matches Figure 1's "dedicated" zone. Ironically enough, therefore, it would appear that to attain a Master's degree truly indicates the possession of mastery, 10k of DP. If so, we ought to see that graduate students who are at least "dedicated" emerge as independent scholars during their 3rd year of study, less if they take the "completely obsessed" zone of the Figure or if they commenced graduate school with plenty of DP already under their belts (I pity the fool who really starts at tabula rasa!). It's no wonder graduate record examination scores are such poor predictors of graduate performance: Obsession picks up so much of the variance!

The 10k rule would seem to have more profound implications: If graduate students already attain mastery by the point of a Master's degree, then why do we continue to push our students toward doctorates? Look at Bill Gates: If a Harvard drop-out can become the richest person in the world, then what good is further education beyond the point of mastery? Seems like mere window dressing. Put all that hard-earned DP to work and publish some articles!

Meta-experts also tell us that there is actually only a razor-thin margin (if that) between recognized experts and novices who also have reached the 10k mark (e.g., Ericsson et al., 2007). It would appear, therefore, that the 10k of DP marks a point of diminishing returns: Fledgling scholars, you should not expect to become significantly more expert once you've hit that 10k point. And hmmm, doesn't this rule also imply that publishing in the best journals isn't as hard as it is made out to be? Just do your 10k DP duty and the world is your oyster. Just don't expect to be ever-increasingly expert, just ever-increasingly accomplished.

Most of us have trained as scholars so that we can gain academic jobs and use our cumulative DPs to best effect, investigating cool things and teaching others about it. Literally, professors are hired not just to generate knowledge, but also to profess what they know as masters of their respective domains. Put more obliquely from a meta-expertise perspective, they are paid to profess under the influence (PUI) of their DPs to relative novices who are on the path of misery to mastery.

Still, note that intelligence and skills are somewhat fluid and can be disrupted by such things as environmental stressors or even the time of day. Even the best experts have moments of extreme ineptitude: Mine routinely trip me up in that stretch after lunch, or, more disruptively, when experiencing jet lag or illness. And of course one can think of acute stressors like alcohol or drug consumption, which might actually equate PUI with DUI: Don't drink and profess!

To follow Calvin, being miserable (while doing deliberate practice) may build character. And the pursuit of mastery may well make you a character.

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