

Here's a continuation of the principles list I started back in January. Much like then, the goal of these principles is to guide me in my pursuit of growth. Right now, at the end of August, is perhaps the most stressful, intellectually and personally demanding time I've ever faced. A deadly mix of PhD applications, a thesis, classes, deadlines, and personal health problems have conspired against me. Without these guides, I will fail. I have two conference deadlines to make on September 22. I have another RL project waiting for me beyond that. I have PhD applications waiting still beyond that. It's true—we're in a hole so dark you can't see your own hands in front of you, where uncertainty lurks behind every corner, where fear and self-doubt could consume you at any moment. Stress has crept into my dreams, seeps through the shower head every morning, blunts the taste of my food. We simply cannot live without truth in the pursuit of what is meaningful, however difficult it may be. When reality is too difficult to face, we suck up into the recesses of our minds, a fantasy land of nostalgia and cowardice. We cannot always make great decisions in a conscious fashion—this is why automatic, deeply ingrained principles are so important. Otherwise, the same problems will confound us again and again. This being the antithesis of growth, we cannot allow this. We cannot merely seek out new experiences for their own sake, however. This is the way of the dilettante, the hedonist, the aimless wanderer. With the ball in my hands in crunch time, I have no choice but to make the shot. No running to the locker room.

Most people remain in this dark for many decades until it's too late to do anything about it. Then they can allow themselves to grow old and give up. Then they don't have to make the tough choice of sacrificing for their beliefs. Some even do this at my age. Not so for me. I believe that successful, fulfilling lives can be led and are possible—more than possible: **necessary** for both yourself and the world. Hence, here the principles:

1. *Keep the Sabbath:*

- a. The Sabbath is the real deal, and it's totally ironic that the first commandment is just a roundabout rediscovery of an actual Commandment (I promise the rest are different). For the past year, at times, I have given myself free license to work as hard as my body will allow me. In return, I lost a bit of weight, felt like shit, and did some of the worst work I've done in the past few years. I also turned a major mental corner and did some of the best work I've ever done, period. When? Well, back in February and early June. Why? Easy. I was coming off a month's rest in February and a good week in June. I was fresh. I had big thoughts, and I had consolidated the experiences of Fall 2021 or Spring 2022 into myself, integrated them into my personality and character. As a result, in spring for example, I felt much more comfortable being myself. I was funnier. I was more brazen. I

took more risks because I felt able to expand, not just survive. I had the energy and the right mindset.

The Sabbath is not just about physical rest (although it's a part). What it's really about is allowing your mind to breathe in, to think those big thoughts and to reflect on the unknown, what's working and what's not. *It's not merely rest, but a period of structured reflection.* Now there really isn't an "end of the semester." In PhD World, research continues 24/7, alive or dead, awake or not. It doesn't care, and it moves on without you. We want to be at the forefront of that pack. We want to be asking the questions and doing the work that leads the field, not gasping for breath just to keep up with it. That means asking if what you're currently doing is meaningful and important, what else could we be missing. Yesterday after just a few hours I found some blogs that cemented (in words) something I had been trying to say for months but couldn't: symbolic vs connectionist AI is just another rephrasing of "algebra" vs. "geometry." That's it. But NOW you have a mathematical rephrasing that was yesterday only some vague philosophical debate. This is a highly nontrivial accomplishment to make this verbalization. You lose stuff like this when you don't take a Sabbath. Work 7 days a week at your own risk....

2. *Negative emotion or feeling is not a tragedy but a signal, a call to action to pursue what is true and good, but has been left untouched*
  - a. This back pain the past few weeks has been murderous. Finally, this weekend, we seem to be turning a corner, however. Good. But pain is also a clarifying experience, washing away all that is unnecessary and refining what matters. It made me stop and think: "Christ, I need to exercise more. That's a part of this pain. A bit of inflammation is surely part of my diet as well. I've lost the plot." Pain says "What you are doing is wrong." Even for the things that cause us pain that we cannot control, it says "You didn't handle the situation correctly." In *Crime and Punishment*, Raskolnikov rationalizes and acts out the murder of his scumbag landlady, whom nobody likes. Of course, his conscience doesn't let him live it down—it literally cannot. What you tell yourself in your head is not at all what your body, what the world knows to be true. It will eat you alive until you lose all sanity. Millions of years of programming will always win no matter what. The shrewd, cunning Raskolnikov is left a babbling mess by the end of the book, begging to be punished. Dostoyevsky is the greatest psychological writer who ever lived, and I won't argue with him on this one. Sometimes you really do just have to fight it out, but the fight must always be punctuated with silence (or intermittent Sabbaths). Listen to your pain or it will destroy you.

3. *Always invert*

- a. Thanks, Jacobi, for this brilliant idea. Always reformulate, think backwards, ask what would make this *not* work instead of work. Think of the negative. If one wishes to find joy, one must first think “How could I make my life totally miserable and unbearable?” In math, counterexamples are always easier to find than direct proofs. And usually in trying to construct a “perfect counterexample,” you stumble upon the key insight that allows you to move forward in the direct fashion. This graph Laplacian has me stumped, but I can’t help but think we are *looking at the wrong Laplacian*. The original formulation is all that matters, and this might not even be correct as we have it! Never look for the solution, look for the question. Then ask it in a thousand different ways. You’ll be able to answer at least a few of those, which either begets more questions or is itself of interest. RE-search. It’s always in looking to see familiar land with new eyes, not discover new land.

4. *Do the work...fully*

- a. Sometimes I find my brain chugging along, thinking it is working, when in reality I’m thinking about nothing. It doesn’t always happen—I do reach the flow state often. I still can’t help but think we should just give up on the 8 hour workday altogether. Schedule one hour of nothing but moving around and writing, then one hour of true, serious work. I don’t believe you can get more than 4 hours of true work done in a day. Some stuff like writing or poetry comes so easily to me that I could do it for 24 hours if my hands wouldn’t cramp up. But science is a different beast altogether. It requires more than intuition and impulse. It requires insight. Not easy.

In light of this, when you are working, not a single word should be uttered. No play, no jokes. Think about how serious you would get as a kid playing baseball, or anything really! It wasn’t play, it was life or death. Glory or shame. Keep that intensity in your work, but on the side, love like mad, joke as much as you please, whatever. Pure order in one endeavor, pure chaos in the other. You don’t need to exactly copy how everyone else works. That’s how you end up doing work that everybody else does. If you have to steal some of their tricks, do it. But don’t feel bad about your sleep schedule, your erratic habits, your odd ways. You can emulate high-level principles of “normal work” while not forcing yourself to be the same. I get that my methods are rather unconventional (working at 3AM is not ideal, but it’s when my brain is most active), yet we still keep up with our peers and grow nonetheless. I’m not exactly where I want to be, sure. None of this is an excuse to slack off, if anything just the opposite. Part of this is to

allow your scientific style to shine through without limit, to recognize that I am what I am, and that I can only truly get work finished in a certain way. Sit down and do the work, totally and completely, in a Jon Huml fashion that steals from the greats. Experimentation.

5. *Writing is sanity*

- a. Pen to paper forces oneself to actuate what has been felt and seen. You can only realize yourself through this ritual. Speech is a close second (perhaps even first), but writing is its own endeavor. You need dialogue between the different versions of yourself that are fighting for airtime, fighting to be seen and heard. They will otherwise tear each other to shreds without an honest assessment of the due owed to each. Just as words explain to others what you have thought, those same words also reflect past versions of yourself that you are still interacting with today. Many of the conversations I've had with myself on paper then are the same exact ones I'm having with myself now. Perhaps I know a few more words and have seen a few more things, but the battles are the same. Unlike speech, writing leaves itself behind as an artifact to be studied and re-evaluated at a later time, where more information and more maturity can unlock its true meaning. A person is never a static thing, but always under their own microscope. "Traumatic experiences" sometimes turn out only to be traumatic over a certain time period, where a reflective period can transform those into truly proud or strong moments that reveal one's character. When you fail to write, you rob a future version of yourself of this clarity, and my memory is only getting worse, too. Concrete words are of utmost importance. Only then can we truly glean what a younger me may have been thinking at that moment.

6. *Body is mind*

- a. We've hinted upon this earlier in the principles. I really let myself go to shit at times over the past year. Drinking a ton of caffeine and sugar to stay awake only got me a cavity after never having one my whole life. Failing to exercise over long stretches let me do more work in the immediate future until my back flared up for two weeks and destroyed my sleep and my productivity in a time where I most needed to bare down, with two deadlines looming. If you fail to take care of your body, it will abandon you when you actually need it to carry you to victory (or at least not be a nuisance). Imagine 40 years of this, what damage it could cause. That's why you eat healthy; that's why you exercise. I don't care to live to 100, I just want to be able to work well right now. I can't do that if I have to wake up for 8am dentist appointments or lay down so my back won't catch fire. The body needs rest. Ironically enough, I take great care of my room. It's constantly

swept, mopped, with laundry and dishes always done, trash always emptied, shirts ironed. If we took the same approach to our body, our mind would continue its ascent towards greatness. As it stands, however, you won't even make it to the September 22 deadline. Respect your body, treat it as more than a vessel for your brain, or else pay the consequences.

7. *You are not a degree*

- a. Harvard, Stanford, MIT...it's all a party trick. I'm not saying it's nothing, cause it's something. But it doesn't take away any loss or pain or anything that characterizes human existence. When you confuse yourself with your goal, you rob yourself of the complexity that you've been naturally endowed with. You freeze up, you focus on one thing, and all else fades into the background. While there's something beautiful about focus, there is also something deeply corrupting about it. Oftentimes we run into that thing to escape whatever it is we're running from. See *Citizen Kane* or any of the hundreds or thousands of movies about this. Don't be afraid to have goals and pursue them with your most honest effort, but also mediate your goals with questions of why those things are worthwhile. In the event that you find that they are truly worthy of pursuit, as I now have, remind yourself that you are no better, no morally superior or above anyone (even past versions of yourself) because you have found this wonderful thing. Love and passion for your work is to be celebrated. Left unchecked, however, it will eat you in your sleep. No amount of recognition or fame or money or houses or degrees or designer clothes will save you. All you get is the labor, not its fruits. If I am recognized for my work, fantastic. If not, I get the work as the payoff. That's really what the PhD is for me anyway: the ability to do math in an uninhibited environment where no boss is breathing down my neck telling me to "think how we can make this into a product." Craft is terrifying because it judges us most harshly, and does not care who we are or where we come from. "You talentless hack," it says, "Fuck off until you can write something that doesn't suck." It's cruel, soulless, and yet honest and correct and insightful. *Anyone can cook*. That means greatness can come from anywhere, and it means greatness can leave anywhere. Being at Harvard doesn't mean you can continue to do good work, only that you've done at least a few things right to get there in the first place. How much of a shame would it be if we let our foot off the gas pedal because we got exactly what we wanted? Remember: the most interesting folks I've met in Boston have not always been the professors (although it's close), but the blue collar guys like bus or truck drivers, front desk men,

MBTA workers. Those guys have the best stories and the most honest perspectives. You can learn something from everyone, and you only rob yourself if you forget this.

8. *Never as dumb or as smart as you think*

- a. Stay humble and stay encouraging. Nothing is good or bad, just IS. All is perspective. This sort of mindset is full of generosity—not only does it graciously accept knowledge (or even judgment) from others, it also forgives you for your own mistakes. Be lenient in your own judgment. Give the benefit of the doubt. I would much rather be labeled a naive optimist than to be a pessimist or continue to hate myself for my mistakes, or think others are worthless for theirs. Recognize that intellect (or anything you consider valuable) is just one aspect of what a human is in all of their glorious complexity. People are valuable for *just being themselves*. They don't have to prove anything to anyone to show their value. They can just BE. And that goes for you, too, my friend. Boring? Dumb? Dull? We're all of those things, too. All of us can be anything sometimes. If you let go of your need to always be seen as dominant, you might tease less and be less harsh. I know for a fact that many women I've been with don't like this aspect about me. When you label someone as "attractive" or "smart," for example, you're carrying around assumptions of what those words mean. I doubt you have the full picture to make this call...

9. *Addictions as a circle*

- a. This list is about growth. Addictions can hold us back in this arena: addictions to food, sex, pornography, suffering, busy-ness, work, etc. They all involve that awful feeling of *deja vu*: we've been here a million times, and not in a good way. I kicked soda for a few months and went right back on it the last few weeks when my sleep schedule was deeply disturbed. I doubt you'll kick a lot of this stuff. You need to eat, sleep etc. That's what makes addictions so shitty: you slam the door shut on their face, only to crawl back to them a few months, years, or decades later. Forget it. Just because you fail doesn't mean you haven't grown in other ways. (Now, don't do this with hard drugs or alcohol, but for the stuff I'm addicted to, it's fine). If you slip back into your old awful diet, or you watch that midget porn, just crawl back out. Do it again and again and again. A lot of this stuff just washes itself out. One of the nice parts of having a short attention span and craving new experiences is that old stuff tends to lose itself in the shuffle out of sheer interest. The impulse doesn't leave, but it shifts elsewhere to a new avenue.

The point is this: guilt sucks. Don't hate yourself for falling short. You can mess up a lot and still do pretty damn well in this life. The bar isn't as high as we suppose it to be. Now to be fair, addictions feel different than mistakes. That much is true. But you can

shake a bad habit like anything else. I've had bad habits in the past, like visiting certain social media sites daily, that I've completely kicked. Like these principles, you just have to get creative in finding ways to kick the habit. And at the very least, one thing to satisfy your contrarian spirit and call you to action is this: all of your habits are *designed* to be addictive. Coca-Cola is designed to be a sugary, carb-loaded hit of meth. Sites are designed to keep you scrolling for hours. Fast food is gonna taste good. Anything with butter or oil or salt does. Duh. So just keep in mind: it's a hack. And like anything, the first step is to realize and verbalize this fact. Once you do this, you can literally catch yourself in the act, and knock it out of your hand. Stick it to the man and overcome the addiction.

#### *10. Life is short*

- a. Man, a whole year has gone by in Boston. I'm not remotely the same person I was when I got here, which is both scary and exciting. I've changed a lot, but even more so when I consider my journey with math starting back in undergrad. What an amazing thing, that we can say what we want, get it, and see its positive effects radiate in our life. At the same time, life moves on all around us. Friends get married, people settle down or move to new cities or even die. Nothing will stop for us. We get older, dreams wither or become refined versions of themselves, and reality caves in on us. At times we feel totally alone or incapable of moving forward. We wonder what others would think about us if we failed, or if they'd abandon us if we succeeded. Fear! We become paralyzed by fear. We stress too much, ride ourselves too hard, and forget those values that brought us to the heights we've climbed to. Every moment we don't take to soak it all in is a moment lost in time forever. Every dream not shared is burned in the furnace, lost to all of humanity. We are here for only one reason: to share what we have with others. Sometimes we feel that we have nothing to share, but this isn't true. As long as we are alive, we can share ourselves. We can smile at people when they look at us on the street. We can laugh off the difficult waitress or the late bus. We can tell a dumb joke and have people laugh at us for a few moments on a tough day. We can listen and truly care about what others have to say. All of that makes you the man you are and could be. Life is short. There's no time to be miserable, to hate, to be bitter, to despair. There's no time to bullshit, or to pretend to care about the meaningless noise that is now becoming so loud today. There's no substitute for spending a sunny, 80 degree day with a beautiful woman or an old friend. No money, no degree can guarantee that. The woman and the friend might not always be there for you to enjoy, nor you for them. Life moves on regardless, and it will move on

for all of those after me just as it did for those before me. When I think back on these principles, I think of gratitude for Being itself. Any laughter I can cause, any warmth, any sanity I can provide: let me feed it to others, and them to me. Life is short. Make it count.

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### **January Principles** (originally a Latex document)

This list is a living document of principles to constantly remind me why I do what I do, and how I should do that in a somewhat abstract, but also actionable way. I have done very well at some of these tasks at some times, and completely lost the path at other times. There may be considerable overlap in the ethos of some points. As I realize this, I will combine and come up with new principles. The spirit of these Commandments, at a high level, is `\textbf{growth}`. If I am not evolving, I am decaying.

### **EXTRAS?**

1. Intellect and insight is derived from simplicity. When you have failed to progress, it's because you didn't think in the most basic, first principles way. You didn't break the problem down into small enough pieces. Didn't get the paper? Go back to the textbook.
2. In that same sense, any work of great meaning must eventually become obvious, and obliterate the need of its own insight
3. Any man with his ear to the ground can see that a degree of delusion is necessary for survival. Indeed, the basic unit of thought is probably delusion: simulation is itself a form of delusion. But we must be careful, and only let live those delusions whose necessity we understand and comprehend

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1. Research without `\LaTeX` (or pen and paper) is like playing tennis without a net. If you're not condensing/constraining, you've lost the plot. If it isn't written down, it doesn't exist. There are no mind games in math, or really any part of life. Rough drafts are key. `\textbf{Have something in`



your hand to show people}. The memory is forgetful, but ink is not. \textbf{Write down what you need to do. Write down your goals on a daily basis.} The planner is your best friend. \\\

2. *Be greedy, be local. Be suspicious of grandiose, abstract thoughts about "the environment," or "respecting women," for example. Really what those statements are either ego-driven, or excuses to not do something (in those cases, maybe not do laundry or dishes, or not talk to some girl). Stop using morality as a veil when you clearly can't even enumerate what your morals are at this point.* Didn't see this one play out for us much this past semester. **Possible Update:** \textbf{The Hazard Sign Principle} \\\ We mostly know what's good and bad for us. The key isn't to figure this out, but to remind us why we should stick to the straight and narrow. You don't need advice. Nobody does. It's ridiculously vague and shallow. You mostly just need to be creative in the reminders. Like a hazard sign, we know being caught in an explosion or a nuclear meltdown is bad. It's so bad that it even seems trivial or somewhat humorous to point it out. So we have to change what a hazard sign looks like constantly because we just become accustomed to its form. These Commandments might have already worn off because I \textbf{know} what they look like, how they sound, how they read. If anything, memorization here is a bad thing. At the same time, we have to keep some general form. I can't get around writing a list of  $n$  things. If it's been around since the Bible, and so effective, I probably can't escape that. But I can constantly update these rules, culling the weakest principles. Maybe, could it be that the principles changing is what makes them useful in the first place?
3. Consistency over "spectacular pushes." If you're tired, another hour of study isn't heroic or honorable, it's dumb. Know when to step off the gas, which also means being \textit{able} to step off the gas (i.e. not procrastinating). Schedule your meals at a consistent time. You will wake up and go to bed easier, and more consistently. I think \textbf{8AM}, \textbf{12PM}, and \textbf{6PM} are reasonable meal times, plus snacks as you need. I would rather work on something every day for 1 hour than one day a week for ten hours. \textbf{Discipline is freedom}.\\\
4. There are no enemies, no adversaries except yourself. Everyone is looking out for themselves, watching what they will say, just as afraid as you to look dumb. Nobody is trying to screw you over, again, except for yourself. That implies several things. You shouldn't compare yourself to others unless you enjoy being miserable. Comparison isn't a well-defined operator: I can choose any arbitrary dimension along which I'm worse or better than somebody else. That doesn't make it meaningful. Keep the attitude that we can all help and lift each other up. \textbf{Eschew zero sum games in your mind and in practice}. Collaboration and a cheerful attitude, being lenient with your judgement and generous with your patience and knowledge, will beat jealousy and a

hoarder's attitude any day. **The problem is not to keep people from stealing your ideas, but to make them steal them.** Be grateful, not **bitter**, to be surrounded by people smarter than you. Mimic them in the ways you admire, but be grateful that you're not a copy of them.

5. What goes out is what comes in. The bare minimum, I **know I need 9 hours of sleep to be at my best.** If you deprive yourself of sleep, you won't last long. I need to eat healthier so I can **feel better.** It's not some crap about living to be 200. Fast food is paradoxically more **expensive** and makes me feel like shit. It is also the antithesis of growth: it's boring, processed, nothing new. Instead of going out 5-6 times a week, try to go out once or twice, but make that time special and new. Get high quality protein: a great plate of barbeque, or a steak, perhaps. Stay away from the fried crap. Eat as much protein and fat and fiber as you can.
6. You will look more dumb down the line if you don't get help now than if you ask a dumb question now. Establish a rapport with people now, because they might be able to help you later, and you won't feel intimidated to ask for help later. That means going to office hours early in the semester. Don't be afraid to say you need help, don't be afraid to not be independent. **No man is an island.** Pride is a dumb policy. Silence isn't golden.
7. Negative thoughts will come. **Failure will come. You will abandon most or all of these Commandments the first moment you're able to forget them.** The key is to not chastise yourself, hate yourself for your mistakes and bad thoughts. **You are not a bad person. You are a person.** Acknowledge these thoughts, perhaps try to give a positive example why the self-doubt is wrong or what made me feel that way, then move on. **Forward, always forward.**
8. On thoughts: we are stuck in our own inner monologue. Don't be Hamlet. Get out of your head with exercise or hanging out with a friend, for example. Stop the dumb fantasies, the nostalgia, the repetitive observations. These don't help anyone. "The only true voyage of discovery, the only fountain of Eternal Youth, would be not to visit strange lands but to possess other eyes." The strange lands here are the fantasy in all its possibilities, but the other eyes are hard-fought experience. You **have** to meet new people. You **have** to go outside and explore. You **have** to make yourself uncomfortable. That's the price of living in the real world with real consequences. **Be biased towards action, even if that action might be wrong or regrettable. Omission is the sin above all sins.**
9. One thing at a time. One place at a time. Where else do you have to be that's better than here?
10. Ask yourself what your goal is everyday. When you want to lay in bed and relax, or watch that Youtube video or listen to that song, **ask why.** **Demand good answers from yourself in how you live your life.** You have one life, and you don't get to correct your past, or know your future. He who has a why can bear almost any how. **Be an extremist in your**

life goals.} Go **above and beyond** in any concrete task you set out for yourself, always doing more than what the **average effort would be**.