

Advice to a Younger Self:

Research Is Like Riding a Bike Uphill

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*“Desde el fondo del obraje maderero
Con el anhelo del agua que se va.”*

— Jaime Dávalos

I had the fortune to spend my undergraduate years in Bogotá, Colombia. For the purposes of this story, you need to know two facts about Bogotá: (1) the traffic is horrible, and (2) it lies in a beautiful valley right in the middle of the Andes mountain range. Consequently, as an undergrad I started riding my bicycle everywhere. Eventually, I decided to try one of the most popular activities among bikers in the city: going up the Andes (I am so glad I picked that up, as I still do it whenever I get a chance!). Right around that time I started working on research, and I remember thinking that Einstein was right with his quote to his son: *“Life is like riding a bicycle. To keep your balance you must keep moving.”* But he was inadvertently more on point about how much research is like riding a bike uphill.

In this essay, I hope to convey why I am so convinced by this metaphor. Research, like biking uphill, demands patience, resilience, pacing, and a willingness to keep moving even when progress feels invisible. I want to write this down for two reasons. On the one hand, I have used this as a work philosophy that has kept me afloat through hard times, and I myself sometimes forget some of the points I wish to make here. On the other, I have seen many younger researchers fall into a similar negative mindset, and I’d be incredibly happy if this essay helped bring even one of them out of it. I should point out that everything here is merely anecdotal and personal. Hence, this serves as advice to a younger self. It has worked for me, but I am only one data point. So, please take it with a grain of salt.

The first time going up the Andes. I was 19 years old, and I can picture it as if it were yesterday. I had a Benotto mountain bike—nothing extraordinary, since I was an undergraduate student. It was a Wednesday, and I left home around 5 pm. The road up the Andes starts at the intersection between

85th Street and 7th Avenue. The distance to the top is approximately 6.5 kilometers, or 4 miles for my American friends. I started the climb and quickly felt that my lungs were struggling, my legs wanted to give up, and my butt hurt. Every inch of my body was telling me to stop. I knew this would happen, so I tried to persevere. I saw the mark for the first kilometer, then the second one. Yet, once I finished the third kilometer, I could barely hold it together, so I told myself: “*This is it, good enough for a first time.*” I got off the bike, recovered for a little bit, and then went back down.

Damn it! I can do this. When I got home I felt I had failed myself. I was young and thought highly of myself, so the next Sunday—the day when most bikers go up—I tried again. This time I convinced myself that no matter how much pain and discomfort I felt, I would not capitulate. The first three kilometers were the hardest. I needed to keep repeating my goal to myself: “*Do not get off the bike.*” It was a constant battle with myself. I saw so many people passing me: fast professional bikers, kids, even seniors! I told myself that it did not matter; this was not a competition against anyone but myself. I found someone who was climbing slowly, really slowly, and I decided to just tag along and follow their pace. My mind kept on jumping: the pain, then my life, then the pain, then my work, and so on. Finally, I got to the three-kilometer mark. I was feeling confident. My slow pace felt completely tamed, and I was convinced I could make it. So I decided to push even harder. I saw a fast biker and decided to follow them. I pushed hard for half a kilometer, and then it hit me. Pushing this hard was a bad idea. I wanted to vomit my lungs out; my heart was beating at 190 bpm. I went back to the slow pace, and slowly, but surely, I recovered. Then, at some point I forgot about the pain, I forgot about my bike, I forgot about the mountain; my mind was randomly drifting between thoughts, and I was just enjoying the ride. Before I knew it, I got to the top. I remember the adrenaline rush, the uncontrollable happiness. The first thing I did was call my then-girlfriend-now-wife to tell her all about it (she was still in bed, so she was not as excited).

Failure as a fundamental part of success. I did not realize it that day, but this experience would become a useful reflection of my life as a researcher. I have failed so many times, I have lost count. Let me list some of these failures here. There is a long list of research problems that I have attempted to solve and failed. Years of work that have led nowhere. When I applied to grad school I was rejected by 80% of the schools. Indeed, the first news I got while applying was that I was rejected by a top school. My experience with finding a postdoc and a job was similar, if not worse. I have a handful of awards, but for each one of them, I applied for ten more awards. Before, when I was just starting, all of these failures felt devastating: “*I am not good enough, why the heck do I keep on trying?*” Some of these negative thoughts led me to very dark and depressive periods. Fortunately, with time I came to realize that all of these failures were a necessary part of the path that brought me where I am. There are many researchers like myself trying to make it, trying to get that fellowship, trying to publish in that journal, trying to get that internship, trying to get a job at a prestigious school. Nobody can get it all. We can merely control what we feel, make the best of the cards we are given, and keep on pedaling.

The pursuit of greatness. In a recent acceptance speech, Timothée Chalamet said

The truth is, I am really in pursuit of greatness. I know people don't usually talk like that, but I want to be one of the greats.

This attitude goes against the standard politeness and humbleness that modern society has adopted. I myself felt an internal itch when I first heard him. Nonetheless, I find his attitude somewhat refreshing. There is nothing wrong with the pursuit of greatness. Further, pretty much everyone I have met in the business of doing research is, in one sense or another, pursuing greatness. As a young biker climbing a mountain, I was also pursuing greatness. I tried for a year to reduce the time it took me to get to the top. When you bike and see people passing you by, there is this urge to speed up. Yet, I could almost never maintain the pace of whoever passed me. As a biker, one tends to associate greatness with being first, being the fastest. But is that the right model of greatness for most of us? Sure, there are a few who will be the fastest in the world. But those are only a handful of people, and I would argue most of us should not aim to be that fast. This raises a very personal question.

What is greatness? I suffered greatly with this question as a PhD student. At some point, my advisor told me to read ArXiv every day—that is, the website where most preprints in my field get uploaded. The idea was to be on top of recent trends and find inspiration. This system worked wonders for my advisor—and for many people I know. But when I tried it, it was counterproductive. I saw hundreds of papers coming out every day—all of these people were passing me! I could not even keep up with the sheer volume of work. This reinforced the idea in my brain that greatness was measured by the number of papers, and, of course, by the number of citations. At the start of my PhD, I wanted to push the boundaries of knowledge and understand mathematics better, yet when I finished it this romanticism had faded. I wanted to publish as much as I could, and get recognition for it. When I started my postdoc, I was pressuring myself even more. I needed to produce, produce, produce! Funny enough, this desire made me incredibly unproductive and I spiraled into a hardcore depression. The worry about productivity blocked my creativity. After what felt like years of sadness, a therapist asked me “*What if you fail? What if you do not get tenure?*” I kept on thinking about this question for a few weeks and I concluded that failing was not the end of the world. Moreover, it made me think about the reason why I was pursuing research in the first place: I wanted to understand. This lifted such a huge weight off my shoulders. Instead of worrying about publishing, I started worrying about asking questions that kept me up at night, and about how to solve them. I went back to being a romantic scholar. Now, to me, greatness is measured by whether or not I create something that will help me (and my peers) understand things better. I am inspired by the greats like Shannon, Nesterov, Fisher, among many others. Even though decades have passed, I keep on going back to their papers and ideas.

Stay in your lane and aim to beat yourself. I wish more people were more concerned with actual understanding rather than citations. I have seen the same worries that I used to have, but now in my students; many of them have told me “*I want to submit papers to every major conference in*

machine learning.” This is not particular to any single student. It feels more like an issue of the toxic environment in modern academia. I here want to vouch for a pursuit of greatness, but not greatness in terms of the fastest speed to the top. Rather, greatness in terms of the quality of your ride. If your ride helps you understand better, it is worth pursuing. Stop worrying about how fast others are. There will always be Michael Jordans (pun intended). Let them achieve their version of greatness, and do not worry about it. Instead, try to pursue your own greatness, on your own terms. When the goal is not recognition, but simply to do the best work you can, you start to enjoy what you do.

Lift others. I have tried many times to take my wife biking; it is one of my greatest failures. She simply does not like it. Nonetheless, I have convinced other noncyclists to join me for a ride. I do not know all that much about cycling (one could say the same about mathematics), but I know a couple of tricks that have allowed me to bike for a long time and enjoy it. Whenever I see “my mentees” using those tricks and enjoying the ride, it feels good. With time, the success of others starts to feel like one’s own. I have felt similarly with my students. It is beautiful to see a student grow and blossom, to see them come up with their own ideas and their own solutions. This is likely the most biased bit of this essay: whenever you get a chance, lift others, their ideas, and their work. Generosity comes back to you, if only through a friendlier environment and the serotonin of seeing your mentees succeed.

Work hard, play harder. It is hard to describe the satisfaction of reaching the top of a mountain using nothing but your own body. The first time, it feels absolutely surreal. But the rush is not in the altitude itself; it is in knowing that every meter was earned. If someone drove me to the top, I might enjoy the view, but I would not feel the same joy. The suffering is not a bug in the experience. Somehow, mysteriously, it becomes part of the reward. I have felt this same sentiment in research. Solving a problem after months of confusion, finishing a paper that fought back, giving a talk and seeing someone I admire smile in the audience (I choose to believe it was not out of pity!), or reading kind teaching reviews after a semester spent redesigning a class—all of these feel good because they cost something. The work leaves a trace in the achievement. Do not pursue rewards that bypass the climb; pursue the kind that make the climb meaningful. Once you switch to this mindset, effort stops feeling like punishment. It starts feeling like play.

Keep on playing outside of work. I started this essay with an anecdote that ended with me calling my now-wife. This personal detail was a deliberate choice. Getting to the top felt wonderful, but the first thing I wanted to do was share it with someone. Life feels dull when you do not have people to share it with. I am grateful for my family, my friends, and my wife, who take my mind away from research, show me other parts of life, and explore them with me. Research is a beautiful game, but it should not be the only one you play.