ambition
a senior synthesis
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Preface

I graduated from Stanford at age 20 with a BA in Human Biology with Honors. To those who don't know me very well, it may have looked as if I waltzed in and out of undergrad, but, in truth, every single step of the way was a struggle. From the first day of freshman year I have been confronted by my own limitations and worked nonstop to overcome them. This is not to say that my entire time at Stanford was one long trial – on the contrary, I loved my time here and I wouldn't trade it for anything. The beauty of Stanford was that I had the supportive environment I needed to tackle my issues one at a time.

The purpose of this synthesis is to dissect one of those issues – my decision to pursue an honors thesis. What I learned about neuroscience is best left to thesis itself, but what I learned about achieving my goals is something important, something universal. Even though each person who goes through a thesis will walk that path as an individual, the growth that occurs follows familiar patterns as we discover what drives us to do research.

I may have walked that path by myself, but my supporters were on the sidelines every step of the way. Many days were spent in deep conversations with my advisors. These are the family members, mentors, friends, and educators who listened to me when I complained and then gave me a swift kick in the rear to get back on track. Thanks, guys.

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And of course, I thank God for all the opportunities that I have been given.
# Table of Contents

<table>
<thead>
<tr>
<th>Stories</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strike a pose</td>
<td>25</td>
</tr>
<tr>
<td>A day in the life</td>
<td>31</td>
</tr>
</tbody>
</table>
Stories
you’ll get nowhere without Ambition

The reason this synthesis is entitled “ambition” is because there is honestly nothing more critical to the success of your research project. No matter what your end goals is, you have to want it deeply, articulate it to yourself, and start planning how you’ll get to there. Sheer force of will is what will smooth over some of the rough patches and is the driving force for the other requirements of doing research, such as being patient and seeking advice. ❤️
time for a Reality Check

Before we go any further, I must be honest: there is nothing cute about working in a lab. You’re going to spend your days hunched over something, whether that is a computer screen, a petri dish, or dead rodents. During the summer you will work full time, and when you get home your back will ache and your feet will hurt. You will have a bowl of cereal for dinner because you will be too brain-tired to make anything else, and it will be a little bowl because you’re not even hungry. You’ll spend alternating nights reading papers, studying for the MCAT, and watching movies. (If you’re genuinely unlucky, delayed sleep phase disorder will have set in during the school year and you’ll be unable to sleep until 2 AM.) In the morning you will wake up and do it again. There are no weekends, only days when your critters don’t need you. Your idea of fun will be reduced to eating hot food that you didn’t have to make yourself, and you will finally understand why grad students swarm like vultures around department barbecues and seminars with free pizza.
It isn’t as miserable as it sounds – I’ve only picked out the worst bits. However, if you don’t think you can handle this, even for short stretches of time, in order to reap the rewards of a thesis, then full-time research may not be the path for you. (This doesn’t mean you can’t do research and be awesome and publish.) On the other hand, if this sounds awesome or even just bearable to you, congratulations, you’re exactly the kind of crazy that can make it through an honors program. You might even end up pursuing a PhD. ♥
When you matriculate into Stanford, you are assigned a premajor advisor, who you will meet once over coffee and then never see again. Okay, that’s not entirely true. I ended up having her as a professor, but it was a hundred person class so I don’t think she noticed.

When you declare a major, on the other hand, you must pick your own advisor. Choose wisely. I asked many people to be my Major Advisor, but the ones that were most closely related to my own concentration were busy. I ended up petitioning and being accepted by a very nice professor with whom I had very little in common and who I saw once or twice a year when I needed something signed.

but...
I have a large and mostly unofficial collection of mentors. I regularly sought council from many educators with whom I had formed a rapport over the years – chemistry professors, a psychiatrist, my Primary Investigator, older students and alumni, and department administrators. This network is the most important set of people you will get to know at Stanford. They will talk you through some of your critical decisions and provide moral support as you grow as a student and as a professional. So how do you convince a busy academic to spare time for you? Here are four easy steps for turning a teaching relationship into a mentor relationship.
Talk to them. You will never be able to work with them if they never see you. A good way to start the conversation is by taking advantage of office hours to have a one-on-one conversation. You might start with topics from lectures, but don’t be terribly surprised when it’s a full half hour later and you’re talking about Stanford’s football prospects.
Be yourself. Being honest and open with potential mentors is key, because if they form a connection with a fake version of you, your relationship won’t last very long. They also won’t be able to give you any useful counsel.
Don’t exploit them. If you only ever see them to beg for letters of recommendation, they won’t have anything nice to say about you because they don’t know you, so you should...
...get to know them as real people! Your advisors-to-be enjoy forming relationships with their students. This means that you should see them on a regular basis, even if it’s just swinging by their office for 5 minutes to say hi. There have been many times that I mentioned something in passing during a casual conversation that was immediately seized upon as either something to fix or something to develop.
step 4

When you do need something from them, be polite, upfront, and clear about your needs. If they can’t help you, don’t suddenly stop talking to them. A letter of recommendation is not the reason you initiated this relationship. If they say yes to your request, though, remember that your advisors are busy people – you should give them a reasonable amount of time to help you, but don’t be afraid to send casual reminders every once in a while as well. ❤️
try a little Patience

Somewhere around the 3\textsuperscript{rd} week of the exact same experiment repeated ad nauseum, you will gently rest your head against the blacktop – fully aware that only God knows what chemicals have been on it in the past thirty years – and ask yourself why you signed up for this. There are another 7 repetitions to go, each one a full week of strong alkali solutions, virulent mutagens, and sickly mutant animals. It’s gross and the animals are gross and you swear you got a drop of solution on that strip of skin between your glove and your sleeve and now you’re going to die, but not before you have Chernobyl-looking thalidomide babies.

These are all thoughts that ran through my head the summer before my senior year. The ecstasy of winning a Major Grant and getting to live like a real grown-up in a real apartment was quickly overshadowed by the reality of full-time research. The school year does not prepare you for the long grueling hours punctuated twice a day – and when you unpack your lunch and dinner, you’ll stare balefully at the dry roast beef
sandwich and yesterday’s leftover spaghetti wishing you’d been a little less lazy this morning when you packed them. The school year, filled with training, meetings with your PI and grad student/postdoc, and interrupted by your classes and your friends, doesn’t tell you that these are training wheels and that these wheels will come flying off as soon as you hit the ground.

So then, what do you do when you have dark rings around your eyes from the microscope objectives and the only thing you have to look forward to is that nasty old sandwich?

Well, you need to reevaluate yourself, that’s what. Nasty or not, that sandwich is not the only thing you have to look forward to. You are learning at every step of this internship, streamlining things that you have already learned, and amassing a wealth of experience that will be useful in the future, even if it doesn’t seem like much now. You are going to present your work at an poster fair! You’ll be able to engage with people,
explain patiently why [insert extremely specific research topic here] is actually the coolest thing ever, and show them all the work you’re doing to create new knowledge.

It doesn’t end there. In a few short months, you’ll begin writing a manuscript or a thesis or – if you’re really lucky – both! The writing process is awesome and intense and your readers will cherrypick you on things that will make you want to pull your hair out, but you’ll be fine.

I will admit, it takes a certain kind of crazy to look forward to poster fairs and writing and even just research for its own sake. I will also point out that this is the same kind of crazy that gets people Nobel prizes. However, good news! If you’re thinking about doing research you’re already the right kind of crazy, so just enjoy the ride and be patient – the final product will be here soon enough. ♥
give yourself some Downtime

I cannot stress enough how important it is to balance yourself when you engage in a project as time-consuming as a thesis. It is easy to become wrapped up in the next endpoint, spending your time crawling through PubMed results looking for inspiration for a new direction of research. Valuing your work and making a good effort are certainly good things, but if you don’t ever give yourself a break, you will eventually slow down. Your productivity will bottom out, your motivation will flop with it, and you might burn out.

What’s the solution? Pace yourself. Set reasonable goals, and break up long stretches of work with something that is still productive, but that will keep you in good form. When I had moments to myself in lab waiting for a PCR to finish, I would answer emails, work on homework, or call my parents. You can also just relax. ♥
you are never a Failure

It may have been a beautiful day in March, but I barely noticed. I stood on the curb between Herrin and the Oval after another disheartening day of trying and failing to extract useful data in the lab. My thoughts were dark and for a moment they consumed me.

You’ve failed. Your project has no significant results, and you’ve got a deadline coming up. There's no way to spin this as success, so it seems. Is this it? Is it over?

No. I had to stop feeling sorry for myself. I now believe that there are two kinds of failures – one that gives you drive and another that takes it away. Oddly enough, categorizing a failure as good or bad has almost nothing to do with the context of the failure and almost everything to do with your attitude as a researcher.

I spent the summer before my senior year working long hours on the bench and
even longer hours in the microscope room six days out of the week. Running a mutagenesis screen is a time-consuming, repetitive process that also requires regularly handling toxic DNA-methylating compounds. And what kind of payout did I get for the back pain and possible toxin exposure? Dozens of false positive results and two possible successes out of over 800 trials. In the end, even those successes came with so many problems that it was hard to draw any conclusions at all from their existence.

Three months of trials and another three of processing had produced almost no data, and I was devastated. What would I write my thesis on? At the last minute I assembled an entirely new project looking at gamma-tubulin, but even I knew that there was no way I could create the mating crosses I wanted, run the trials, collect data, and report the results within a quarter. Faced with a dead end, my first reader and I agreed it might be best to write on the original project.
How do I write over twenty pages on a project with no results? This is what I thought as I stared at the blank Word document that looked less and less like it would become a thesis. I considered titling the project “How I Did a Whole Lot of Something and Achieved Nothing” but I figured that my readers would have been less than impressed. In another window was a blank email to the Honors Director with the subject line “Withdrawing from Honors”.

This is the moment when you must be able to define a failure as good or bad and make the appropriate choice. For each scenario – how is it a failure? What are the benefits of acknowledging a failed effort? What do I lose by acknowledging that this is a failed effort?

(Has the word “failure” made you uncomfortable yet? Yes? Well, the real thing is a hundred times worse.)
If I had sent that email to the Director, it would have been a disappointment to her, to myself, my PI, my post-doc, my parents, my advisors, my friends – everyone who knew about and supported my honors work for so long. On the bright side, I would have escaped the drafting and editing process, but I would also have lost any esteem I had built for myself as a scientist.

But I didn’t hit send. I deleted the email draft, opened up Word, and grudgingly got back to work detailing my many exploits as an honors research student. The science may have been inconclusive, but I was going to write about it, people were going to like it, and I would be proud of myself for finishing with my head held high. A few weeks later I would run into the Student Services office clutching a 25-page wad of paper held together with a giant rubber butterfly clip, just restraining myself from hurling it through the door screaming

“Victory!”
And what a victory it was. It wasn’t even about the paper anymore – it was about setting goals for myself and nailing them. That is what you get for writing an honors thesis – discipline, hard work, and sacrifice will leave you with the truly priceless knowledge that you can do anything you set your mind to.

Anything. Even turn a failed experiment into a thoroughly researched paper you can be proud of.

Therefore, for those of you who choose to embark on an honors thesis: failure is never an option. Your mind is a sorcerer’s stone, capable of turning the lead of failure into the gold of success. ❤
Strike a balance
... and a pose.
Work hard.

Play hard.
It’s up to you to take something that might look like a failure and turn it into a success.
Get to know others who share the same passions as you.
Surrounding yourself with hardworking people helps you stay focused.
Healthy bodies help healthy minds!
A day in the life

because sometimes research is not all that exciting