The mid PhD Crisis

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I still remember how, in the middle of my PhD, I suddenly experienced a complete loss of faith in myself. It felt as if all the steam that had been propelling me forward since the beginning of my PhD had disappeared, leaving me frustrated and disappointed in its wake. I was sure nothing was ever going to come out of my scientific career, that all the time and effort that I had invested in my work was worthless and that I should just quit, now, quickly, before I wasted anymore of my own or my Principal Investigator (PI)'s time. It was a difficult period, full of self-doubt. But, most importantly, it did pass. I know now that it would have been really unfortunate to follow that urge, cutting short a career which I am so passionate about. Looking back with the emotional detachment that can only come with time, I've realized that this period, often referred to as "the mid PhD crisis", had nothing to do with me personally, the skills that I had or even how other people viewed my progress. In fact, the mid-PhD crisis is actually a very common, nearly stereotypical, and extremely important reaction of PhD students to the middle of their studies.

Most people who start their PhD are extremely intelligent, motivated, enthusiastic and focused. Naturally, they cut themselves some slack initially - they know that the beginning of the PhD is when you endlessly soak in new information, learning about past research, cutting edge findings and the techniques they need to master in their field. But then, as the clock of their PhD shows that time is nearly half up, something changes. The mid PhD crisis creeps in. Realizing that half of their PhD has passed, students suddenly feel, often for the first time in their lives, like a failure. Students grasp that the time that they have left isn't as endless as it seemed before, they feel like they might never discover something meaningful, may not be able to publish. For most, doing science is their long-lasting dream and so this feeling touches their very core – who am I if I cannot do the only thing I ever wanted to do? Of course, there is also the pragmatic worry that having a failing project/PhD will end their "scientific career" and prevent them from pursuing their desired career path. Once the mid PhD starts, a vicious cycle of self-criticism and despair ensues and, if not resolved, may end in the student failing to finish the PhD to their satisfaction and abilities. More importantly, the mid PhD crisis can dramatically lower people's self-esteem, making them feel like they were not cut out to be good scientists, declaring their PhD as a failure without giving it a real chance. Sadly, quite frequently students then translate this into feeling that they themselves are a failure in other aspects of their lives.

How can it be that the most talented people are brought to the point where they have such a despairing and self-destructive perception of themselves? How can it be that something so typical that happens to so many students is almost never outwardly spoken off? What can you do in order to deal with your very own mid PhD crisis? – Although I don't have a "quick-fix" answer, I've outlined some key points below.

Why does it happen?

The "problem" with most PhD students is that they are indeed extremely talented. Why is this a problem? – Well, it often means that their life until starting a PhD was characterized by success. Often, it was rather easy, and didn't require a lot of effort to be the best within their

peer group. Also, success was linear - the more you studied for your test the more you succeeded. This route generates a situation where measurements of achievements and public accolades are readily given at short intervals and intimately associated with the degree of time investment.

The PhD marks a point that really changes this map – first, being among other very talented individuals makes one suddenly lose this nearly lifelong reassurance that comes from being one of the top performers in their peer-group. This hurts very much because society has taught us to gauge our own success as a relative measure – how did we do relative to others (for example, did I get as good a paper as the PhD student down the hall?) – instead of an objective measure or an intrinsic measure – how did we do irrespective of our surroundings (did we achieve our own goals for our own PhD?). Second, the PhD is extensive, with no pre-defined "checkpoints", while the PhD student has mostly been used to smaller, more digestible, "bursts" of achievements, such as taking a test at the end of a semester or completing a small lab project. This difference in time frame can seem as if nothing measureable has happened. Finally, and what is most important, is that productivity in science is not always directly proportional to time investment. Moreover, the progress of the PhD is not linear but exponential. Most of the productive work is done in the last half - once the PhD student has perfected their scientific skills, both at the bench and when proposing and analyzing their experiments. This also means that the fraction of time that students face failure is much higher in the first half of the PhD than in the second half.

By not being aware of these three confounding factors, the PhD student erroneously extrapolates that their PhD has been a failure when they are only in the middle of it. Consequently, this results in ever-increasing self-doubt and as bad thoughts start to set in, people tend to react in two different ways – each only accelerating the crisis:

1. Giving up: As the crisis sets in, students often work less, are more distracted and come to work feeling "why do I even bother? It's obviously not going to work anyway" – being dragged into this spiral of negative thought affects the quality of the work and, naturally, reduces the chances of success. Thus, this self-fulfilling prophecy only ends up exacerbating the crisis.
2. Pushing too hard: Inversely, some people seeing that they are not progressing as they had expected, start pushing themselves too hard. Overworked and frustrated, their work becomes unfocused and often inefficient. More importantly, during such times students do not take enough time off and give up on things in their life that gave them perspective (like sport, hobbies, friends, family and sleep) – and their performance at work suffers as a result. This leads to increasing frustration – "no matter how hard I try or what I do, I'm not able to succeed – this obviously means I'm not good enough at this".

Whether it's the first or the latter (or periods of both), these outcomes most likely mean that people will not make the most out of their PhD, and rather end up feeling like failures. How unfair is this to someone who is most likely very talented and up until now had no reason to think otherwise?

Why does no one talk about it?

I have, in my own scientific career suffered from mid PhD crisis, mid Post-doc crisis (which may have been even harder as the stakes were higher and I had not expected the crisis to hit

again) and mid tenure crisis… Even though I went through these crises multiple times, since I dared not talk about it with anyone, I had not realized that this was a pattern and is felt by many and hence might mean that such critical turning points are ubiquitous to anyone starting something new and challenging. So why did I not talk about it?

I think that the fear of speaking up stems from a false narrative in our scientific society. This narrative is that the "ideal scientist" knows that this is the path for them and never doubts themselves. This "ideal" individual always stubbornly and single-mindedly goes after their goal, spending long days and nights in lab, living only for science and, most importantly, not failing. In fact, being drilled (consciously and subconsciously) with this ideal is destructive as that person is the rarest of exceptions. In real life, most great scientists that I know have bouts of self-doubt, both in themselves and in their science. This makes them great scientists; this makes them human. This is not something to be ashamed of.

This wrong perception of science when you are young may explain why students rarely speak up about their mid PhD crisis. But why do the PIs, that have most probably experienced similar feelings themselves, not raise this issue? There are probably many reasons. Some PIs don't feel that it is their role to emotionally support their students, some do not know how to best do it or are not sure what to say. But, often PIs care very much about their students but shy away from this conversation as students seem "on edge" and they don't want to make them feel like they are being judged.

When I was a young student I felt that speaking out about my crisis would expose me as weak and inappropriate. I was sure no one else felt like me and hence this was proof that I was not cut out to be a scientist, that I am an imposter. I hoped that if I didn't talk about it, maybe no one would notice my slump. Only when I was in my mid tenure crisis did I find the guts to talk about what was happening to me with other people. First, as a mentor I suddenly could see this happening to many of my students – making me realize how general a phenomenon this was. Also, during my tenure run I gained a lot of great friends that were at a similar career stage. Discussing this with them made me realize that everybody has a "mid-stage" crisis at some point, wondering how really fitting they are to do this work. By breaking this silence and hearing other people voice similar doubts and problems, when I knew that they were first-rate scientists, I learnt that feeling like I don't belong does not mean that I am in the wrong place, it just makes me normal. This realization has been for me a big help when dealing with these feelings. What else can be done?

Ideas and thoughts for possible solutions:

1. Talk about it – As I wrote above, nearly everyone goes through a mid PhD crisis – knowing that other talented people around you are going through the same thing makes it "normal", and consequently more bearable. Word of caution - not all people go through these feelings at the same time, or experience them in the same manner. So, if someone that you've confided in can't relate to what you're going through - don't let it drag you down. Just keep on communicating what you're going through.
2. Think of talking with your PI about how you are feeling. Often, when you feel like you're failing, the last person you want to expose yourself to is your PI. However, in many cases your PI really cares about your well-being, can provide a good perspective, and think with you of ways to help you succeed. Even if they cannot provide real solutions,

just talking to them will take away the fear of exposure and make your relationship with them closer and more open. Try it – you might be surprised at what happens!

3. Find things outside of the lab that help you maintain your mental health – exercise, sleep well, eat well, don't give up on your hobbies, friends and family. Remember to have something fun to do. People that have a life after the lab are more resilient to emotional turbulence and can endure these periods of hardship that will always come at some point in science.
4. Take vacations – sometimes a week away from the lab gives you perspective, fresh thoughts and new vigor. Students (and mentors) often think vacations are a "Waste of time" but if taken at good intervals, such times usually gain you time in that you then have the energy to push forward. Think of them as "pit stops" required for the long marathon ahead of you.
5. Find a good support system – Parents, good friends, spouses, coach, support group or a psychologist, can all be of great help in assisting you to think through your situation and the narrative that you're telling yourself about it, and deal with it better. Such times of self-doubt are often a great place to start dealing with unresolved issues and coming out the other side stronger, more resilient and…happy!
6. Start consciously forming your own measures of success and make them internal or objective. Make sure that they are attainable and concrete, not just "I want to publish in a top tier journal in a year". Write your goals down so that you're not working with a moving target. Take a second after you've made these goals to reflect on why you've picked them.
7. Try to avoid comparing yourself to others – This is really difficult as it has been engrained in us from the moment we were born. But comparisons will always be destructive and it will distract you from your own strengths. Even though science is competitive and in order to succeed you have to be accomplished, you are not competing with any *single* individual – science is not a 100m race – it's a marathon – and the only way to succeed is if you find your own inner powers and stick with it.
8. Remember that a PhD is not linear in its accomplishment – there is a "lag" phase during this first period where you are mostly learning the field and the types of experimental/computational/theoretical approaches used in the lab. Usually the last year of the PhD is by far the most productive.
9. Realize that as scientists we are trained to think critically and so, naturally also apply this to ourselves. We tend to be our own strongest and harshest critics, and the loudest voice is always the constant feedback that you're giving yourself. If we learn to forgive ourselves, rejoice in the process and not constantly worry about the outcome, this will make our lives easier. This sense of optimism, often, will itself bring more success.
10. Find out what it is about science that makes you curious and engaged and do more of it – find out what makes you depressed and do less of it. For example, if chatting with your friends about science makes you happy than try to schedule an hour over lunch or coffee each day to do it.
11. Enjoy small and big successes. We want to succeed so much but when success is achieved, we take it for granted and keep running. Learn how to reward yourself for success. Celebrate your achievements. For example, if you managed to solve a technical issue after several months of work - go out for a drink!
12. Find your own scientific voice – how do you like to do experiments? What kind of approaches do you prefer? What kind of questions excite you? Don't be afraid to go a bit away from your safe zone or from the lab's safe zone - when you do science your

own way it tends to be more rewarding and leaves you feeling like you have contributed something to the world.

13. Maintain course. Students often ask me how will they know if they are indeed not cut out for this or just having a mid-PhD crisis. My personal answer is that there is no way to tell at this point. So give yourself until the end of your PhD for engaging in the science, finding your supports and leaning on them, continuing to live and create. As your scientific capabilities grow - you'll know the answer. Even in the rarer scenario that ultimately the answer is that you'd better take a different path in life and career, it will have been a year well spent finding your ground, learning how to deal with your hardships, and coming out stronger in the end. Remember – while an academic position may be a good way for some, there are many additional fantastic options for employment with a PhD in science. Be open minded and find one that will make you happy and will enable your talents to shine out.

Thoughts for ending

In the end – one of the most important aspects about a PhD in my eyes, is to be able to overcome the mid PhD crisis. The mid PhD crisis is a transition from being a 'good student' that knew how to learn new material and get tested on it, into a whole new dimension of becoming a scientist, a creator, a scientific artist that walks through no man lands with courage and curiosity. In order to do this inherently it seems that one has to go through a process that tests your ability to destroy the safe grounds that you have known so far. This is not taught in any book, you have to discover it within you and to find the strategies that bring you self-confidence. People that successfully pass the mid PhD crisis will move from a world of rules that was simple, to seeing the complexity of the real world. They come out stronger and better for it. Hence, overcoming the mid PhD crisis is one of the important makings of a scientist.

It takes many types of scientists to play the game of science – each of us contributing something very different to this complicated, multi-layered orchestra. This is not a one-man show, reserved only for the best of the best. Find how you can be part of this great ensemble, and make sure to enjoy the ride.

And if you succeed, and have a tip to share - please tell me how you did so!

Good luck!

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