

Sophie's PhD

In the beginning there was an idea...

There are many phases in being a PhD student, and these phases take you through the highest of highs, and the lowest of lows. (Much like raising children, I'm told.) But the end product was well worth the effort. I can say that now that it is all over.

My story may be slightly different than that of a young university or medical student; because I am a *mature* student. I was offered the chance to get my PhD, part-time, as part of the 'benefits' if I would join the academic department. However, in practice, I am actually a technical specialist and have been for over a decade. They needed my technical expertise, and the PhD was their marketing tool.

I decided to accept the challenge, or shall we say the 'benefit', because I saw it as a way to potentially advance my career. Unlike my other colleagues in the department though, I was not currently in medical school or a recent graduate. Therefore, it had been many years since I wrote papers or did homework. In addition for their PhD project, they had essentially been given areas of work in which the department was already interested, and wanted to have further work and analysis done. I naively did not realise this for over a year into my thesis, or the repercussions. Instead, I was blindly following the idealistic concept that a PhD was about thinking up an original idea, or an area not explored fully; coming up with a solution or at least some useful information (hopefully.) on the subject. For me, this would be worthwhile endeavour because my PhD work would be might be something new that I could pass onto others in my field. A significant contribution, I had hoped.

After I accepted the job in the department, I decided to write up my ideas for my thesis and show them to my supervisors. The first hint of trouble began when they informed me that they knew nothing about this 'stuff', and if I went that direction I would not be receiving much help from them. (Shall we say the bubble was burst?) They, in their own naivety, believed I would be like the others and would simply ask what they wanted me to do. However, since I was already fulfilling my role as a full-time technician for the department, I decided to blindly plough forward with my own ideas about my PhD.

This, of course, had some very real hazards. First, there was no funding for my PhD work, since it was going to be 'in my spare time' and 'on-the-side' type of idea. There was also a part of me that began to realise this might have been a hollow offer on the part of the department in the first place, but I still wanted to give it a go.

First hazard:

-I had an idea, but no money for equipment to make it happen.

Second hazard:

-No room in the department to perform the experiments (even if I had the equipment).

Third hazard:

-No one cared about my subject of interest, or had any intention of helping from the start.

Perhaps I was in a unique situation, or maybe not; but I still innocently believed that true research was about going down a *new path*. Although my supervisors had little knowledge about my field of interest; I thought they should have been more helpful and enthusiastic about someone striking out on their own. Isn't the foundation of research about striving for knowledge in whatever direction that might take you? Naïve, I know.

Hazard solutions:

I put together a list of all the equipment I thought I might need to do the work. Then I went on somewhat of a treasure hunt through the various departments in the hospital that I thought might have some used equipment lying about that no one wanted. It is amazing what you can find in the back closets. It took some negotiating but remarkably I came up with most everything I needed, albeit not state of the art versions, but acceptable.

The last hurdle was a particularly expensive piece of equipment. There would be no way I could find this piece lying about. I decided to target an equipment distributor that I knew had a new device he was looking to bring into the market. (Remember, I was basically looking for a piece of equipment for free to use for a few months.) We

finally came up with an agreement. I would get the equipment to use in my PhD work for a couple of months, and he would be able to say that someone in the local area was currently using his device. In addition, if he needed clinical expertise when talking with customers, I would arrange to go along and help out with the clinical questions. It was a symbiotic relationship that worked so well that, instead of getting the machine for a couple of months, I had the machine for almost a year in the end.

But of course the last hurdle was acquiring hospital or departmental space for a laboratory. This was the most frustrating. It was something out of my control, and no one cared to help. I teamed up with another of my colleagues who also needed some space to do some experiments. Hopefully it would give us more power when we asked for a room. An entire year was wasted, while looking for a place. Periodically, all of the research people would be asked to give an update on their work. Each time it came around to me I would say that I had acquired the equipment (no small feat), and had written a research plan, but had no place to do the actual experiments. It always fell on deaf ears. My supervisors did nothing to rectify the problem time after time.

Eventually, my colleague and I found an old storage room that was packed with decrepit equipment and other garbage. We finally persuaded people to remove or discard their belongings. Once the room was emptied, we realised that it was not a fit place to see volunteer subjects. We decided one weekend to clean and paint the room. When we were finished, our mutual supervisor kindly offered to pay for the paint (but never did). The room finally was ready for experiments, although we now had to fight off others in the department who decided it was so nice they wanted it for routine clinical work. Eventually, we had to share.

My PhD work could now officially start (nearly a year and half later). My plan was to do a largely clinically focused PhD, because I felt most comfortable with that. I had learned from my MSc project that it is best if you don't have to depend on anyone else to complete your work. This time I was ready when we had to give an update on how our research work was going. I actually had something positive to report. I not only had a room, but I had also convinced an engineering friend to hook up all the various bits of equipment into quite a nice system.

It was at this point, that the second of my three supervisors decided to stir the pot. He informed me during one meeting that we needed to do something much more complicated than what I had planned. We needed to write a program in MATLAB to handle the data in a special way. This would turn a large part of my project towards the engineering direction. I reiterated the fact that I was a technician and had no skills in MATLAB programming. He confidently told me that he would help, not to worry.

For a moment I felt confident; he was experienced at these types of things and was actually willing to help me. Weeks went by and I kept asking for his help. Nothing happened. I went to my third supervisor asking for help. He took over writing the MATLAB program and, although not an expert, he managed to get the first program going so I could look at the data. I should make it clear at this point, that I had three supervisors. I will call them Supervisor A (the 'I'll pay for the paint, but never did person), Supervisor B (MATLAB and statistics expert), and Supervisor S (I will call him 'S' since he ended up playing the part of the saviour in the end). Once Supervisor S had done the hard work, Supervisor B decided he would make some adjustments and wrote a few lines of code. These proved to be the only contributions he made in the 5 years it took to do my PhD.

I continued to collect some data, but did not know how good it actually was since the MATLAB program to analyse it was still not working properly. I tried to learn more about MATLAB but the college didn't provide any training at the time. The thought of programming was beyond me, especially with no guidance. It was getting more and more frustrating. (I didn't want a project where I had to depend on someone else for assistance. I was old enough to know this is often a recipe for disaster.) I spent weeks going to Supervisor S with ideas for the program, but needed to wait each time for his teaching schedule to lighten up so he could work on the program for me. It was a delicate balance. I didn't want to harass him, but needed to get going.

Finally, I got a break. Supervisor S called me one day to say there was a very bright student coming to do a three-month internship with him from a highly-recognised French technical university. This student needed a project to complete in the three months, and could he send him to me.

I wasn't sure how this might work since I was floundering myself. The student enthusiastically arrived and wanted to know about my project. As I went through the current technical problems, he mentioned that he was very good at MATLAB programming. (A big bell went off in my head.). We started looking at the program. I told him what I thought needed to be changed but that I didn't have the programming skills to fix it. The next day he came in with an update program for me to try. What had been taking weeks to change was now done overnight. Although he was an engineer, he was fascinated by the clinical work. I was delighted by the results of his work. For three months, we worked on the program like a true design team. I told him what I needed to measure, how the display should look, the way a clinician would want to look at the data, and what comparisons might be useful between subjects. In three months, we came up with 28 versions of the program until finally one day it was perfect (well as close as something like this gets). He wrote up his report about his internship and the work he had completed - ending up with a distinction at his university. I was delightfully left with a viable program, and a light at the end of the tunnel.

By now, about three years had passed since I registered as a staff candidate for my 'part-time' (in-your-spare-time) PhD. Unfortunately, the funding for my full-time technical post in the department had now dried up. I was told that in two months I would be out of a job, until more funding was acquired. I was frustrated, discouraged, and angry. I had worked so hard, and now how was I going to finish?

I still had two months, and a working program after all. I gathered 10 volunteers together and did my first *real* experiments. I analysed my data. It looked good, and for the first time I could now see some very intriguing data, perhaps worthy of a PhD. The initial experiments were going to be on 'normal' subjects, and my plan included 'pathology' patients next. However, trying to recruit the right type of pathology with no assistance from my supervisors was proving to be a big hurdle and time was quickly running out.

Glitch number one... With my contract running out, I decided to contact the College and ask what might happen with my PhD. They informed me that I would have to transfer to full-time status and, without British citizenship, need to pay full overseas tuition fees to the College. I couldn't have that. I didn't have that kind of money. As an alternative I decided to change to 'writing-up' status.

However, that raised another sticking point. To change to 'writing-up' status from where I was I would need to have completed my transfer report from MPhil to PhD.

I panicked at first. I had only done ten test subjects and had no idea how to write this report. Supervisor S took me aside and calmed me down saying that the transfer report was just an update on what I had been doing, and what my plans were in the future. He felt I had enough work for that. I spent two weeks madly analysing and writing this report, and did all the organising to get two examiners and found two of supervisor A's friends to listen to my power point report. It went well. They looked at my report, filled out a form and said 'OK'. So I passed. I made sure the proper paperwork had been submitted to the College before my contract ran out. It wasn't an easy task.

Glitch number two: I still had the problem of my PhD work not being complete as yet; and soon, as I would in theory be 'writing up', I would no longer have access to my laboratory. Meanwhile, the kind equipment distributor was asking for his machine back.

I had a good look at my 'normal' data. It was fascinating, but I could not make sense of it. How was I supposed to analyse pathology when I still didn't understand how the 'normal' subject was reacting? With time running out, I decided to simply recruit as many 'normal' volunteers as possible. It was a more realistic vision. The thesis could be about the development of a new method, and the testing on normal subjects. Supervisor S agreed.

For the final two weeks before my job ended, I begged everyone in my department to volunteer. I think I was a hated figure in the end. I did all the miscellaneous testing I could think of with my equipment that I might need, and even took photographs of it for the thesis. On the last day, I disassembled everything and returned it to the appropriate owners. Supervisors A and B didn't even ask about it, since they never cared in the first place. However, I felt it was a loss to the department. Although I had not yet analysed the majority of the data, I inherently knew there would be important results, if only to me. On the upside, I had a pocket full of data to go away with; hopefully enough to get my PhD.

The funding to return to the department at any time in the near future was not looking promising. Although a part of me wanted to continue my PhD work; I was finding it difficult to be at home and scientifically isolated. I was a new researcher after all, and needed some guidance or at least company. My one-time clinical thesis had now unfortunately acquired a big engineering slant; and I wasn't an engineer. I would have questions on the work, but there was no one to ask. Supervisor S got used to having weekly phone conversations with me. He encouraged me to come down to the College and see him whenever I could. But the hard reality set in, I needed a job. Instead of worrying about my PhD, I spent weeks writing cover letters and updating my CV. I wasn't helped by the fact that it was January and the weather was 17 shades of grey. Oh, and of course it was a bad time in the financial year to look for work.

The black hole was very deep by March. Still no work, and a part of me felt like it was completely frivolous to be working on my PhD when I needed money to survive. I finally put the idea of the thesis completely on the back burner, while I did some volunteer work for a big event hoping to make some job contacts. The volunteer work lifted my spirits and got me through until Spring. I hadn't touched my PhD work, and was subsequently feeling a big weight on my shoulders everyday when I woke up. I remembered that I had signed the papers for the College saying I was 'writing-up' and it would be completed in a year.

Eventually six months later, I was hired back at the department. There was no way my thesis would be done in the year though. Supervisor S told me that they always give students extensions and not to worry.

I called, and got an extension, but it didn't stop the unfinished homework pressure nagging at me everyday. Work was very busy in the department, and spending weekends analysing my work didn't seem a fun proposition. Time passed and I finally started to analyse my work again, and talk through the results with Supervisor S. By now, Supervisors A and B didn't even schedule meetings with me anymore. They did not care what happened, since I was not researching anything that was truly useful to them in their minds.

Five other colleagues who were doing PhD work in my office ended up leaving the department, and never completed their work. I can look back now and say that a part of this was because they were either given work above their head and offered no assistance; or truly mundane analysis for the department and so they eventually lost interest. It was common practice in my department to hire in people for 'research', and then pass on a load of clinical duties so they eventually ended up with no time to do the research. This was a major reason why no one seemed to complete their work and finally decided to seek other employment. Unfortunately, the College never recognised the problem, and one by one my fellow researchers left.

I finally started to get deeper into my analysis, and prepare some abstracts to submit to conferences. I started visiting Supervisor S more and more. One day he introduced me to another engineering student who had a PhD project with a link to mine. We had meetings and talked over his computer modelling ideas while I showed him the in-vivo work. It was a good liaison, and we ended up doing a small experiment between us that helped his model gain credibility, and proved my theoretical ideas about what might be happening in the in-vivo studies. Probably, the most important part of my visits was the chats with people who truly had an interest in the work (even if it was indirect interest). These people seemed like true researchers who enjoyed collaboration, and I was no longer alone.

I submitted an abstract to a meeting and got it accepted. First of course, it needed to be approved by Supervisor A and B, and Supervisor S; since their names would be on it. This was no easy task. Supervisor A and B argued with me over the statements I was making in the abstract. I could back them all up with the work, but they did not understand the work and by now had not participated in the work for at least 3 years. Supervisor S was his usual helpful self, and gave me a few scientific comments and left me to it. It wasn't until Supervisor S finally mentioned to them that the abstract was probably okay, and then they let me submit it.

One day a letter came in the mail. It was early September, I'll never forget it. It was a letter from the College saying that my PhD thesis was due in by December 31st.

What? That was only four months away? I had not really started to write seriously yet, and there was more analysis to do. I was still pondering abstract thoughts about what it all meant. I had finally gotten into 'scientific Zen thought' (I just made that up). It is a good place to be though. Everyday, I was waking up with new ideas about what my data might mean. Clever thoughts were constantly popping into my mind. New ideas were everywhere. I felt like a real scientist for a moment. I would talk about it on the weekends, and while out to dinner, and think about it in the grocery store. But now, 'harsh reality' (aka the College) had just set a deadline...

I came to work the next day and called up the College. Is this true? Unfortunately the answer was 'Yes'. Can I extend the deadline again please? 'No'. Well you can only if you want to go through massive paperwork, letters from your Supervisors, and add in a couple of acts from the 'On High'. I couldn't bear the thought. Depend on Supervisors A and B to help me? No, I was too angry with them to grovel.

I decided I would have to meet the College deadline. This was doing a PhD for real now. Besides by now, a part of me wanted it to be all over. I needed to reach the goal line. It was linking me to the department and I was no longer happy there. It was time to write up.

Every supervisor should encourage Scientific Zen thought. I don't know how many students actually achieve this; for instance I never knew it existed before. However, it was one of the happiest times during my thesis work; one of the true highlights over what had now become over four frustrating years. This was a special time, when previously fragmented ideas and results suddenly started linking up, like atoms forming a molecule. Only these were *my results* and *my abstract concepts* coming together and not only forming molecules but at times an entire set of Lego. These were real blocks I could build on and moreover, write about. I suppose people like Steven Hawking have this feeling everyday, but for me it was an exhilarating time. I could sit in engineering meetings and actually suggest something they had not thought about. I could read the clinical literature and wonder why researchers had not yet thought of some of my seemingly clever ideas. Now I knew I had something special in my thesis. I also knew there could be a lot of hostility. I was once at an academic conference dinner early in my career where the keynote speaker (obviously someone very highly regarded in the field) said in his address to the audience 'when I first came up with my idea, it was met with such vile and contempt by my colleagues; I knew I was onto a good thing.' After all these years, I finally understood what he meant. People only argued with me when I spouted my new and exciting concepts, very few were open. But I continued with my gut feeling that I was on the right track. Unfortunately for me my scientific Zen moments were about to come to end, and the endurance test of my thesis was about to begin.

After the initial shock of the letter from the College about the deadline, I called a meeting of all three of my supervisors to discuss the implications and my future plans.

It took well over a month (out of the only four months I had left) to make this meeting happen. I was low on the priority list. In the meantime, I had time to face what every PhD student must overcome, where do I start? I had analysed only some of the data but I knew what slant I was going to put on the thesis; how the story was going to be told. I was also confident that there was potentially enough material there. But I was still faced with the overwhelming task of writing a thesis. Where do you start?

I called on a friend of mine who had once been a philosophy lecturer at another university. He was not in my field but still delivered what turned out to be the key advice. He said 'don't try to make it perfect, because it never will be; instead each time you do something ask yourself – is this good enough?' From then on it was my motto. Even though I fancy myself a perfectionist you have to know when to give it up. This advice was similar in fact to what another friend told me when I was planning my wedding. He said 'if 80% of what you want to happen, actually does happen, then consider yourself a wedding over-achiever.' Again, this simple advice saved the day.

I began by searching my department for examples of what a PhD thesis was supposed to look like. There were only a few around but they mostly involved the results of questionnaires or methods of treatment; nothing very close to my type of work. I asked Supervisor S how a thesis should be done. What were the rules? Was there a special format I needed to follow? He handed me the rules book from the College, which seemed to contain only information like the size of paper, the margins required, and how many copies you needed in the end. Surely this isn't all the guidance? Every time I asked someone about it, I seemed to receive the same answer 'there are lots of ways you can do it'. This is not a very helpful answer if you are in complete confusion. What ways? What are the differences? Are some presentation formats better than others? Why couldn't the supervisors give me a little direction here, surely they knew something since they have been examiners themselves?

Eventually out of desperation, I went for the default position. I found a thesis by a friend of mine who had graduated a couple of years before. His thesis had a similar engineering slant to mine. I asked if he would mind if I used it as a template since he obviously passed. He agreed. Now I had something. I looked at the format, what came first, how the Title and Table of Contents were structured. I liked the short introduction he did at the start of each chapter. I had a small cornerstone now to build on. Still, there was all of the writing to do.

More deadline bad news.. It was mid September already and my deadline was December 31st. Correction, although technically the deadline was December 31st, the College was closing on December 22nd for the Christmas holidays. I called them up and said 'Surely you will give a couple of extra weeks because of your closure?' Again, the answer was 'No, you will need to get it in before we close for the holidays'. Just what I didn't need; a couple of weeks subtracted.

I thought about where to start the writing, but even with a template before me, it wasn't easy. Do you start with the Introduction? Do you write up the Results first? I tried to calm myself by starting with the things I knew about, and could do right off. I started with the Title Page and the Dedication, believe it or not. Perhaps this method would not appear in any text book, but it worked for me. In my mind, I had just done two real pages of my thesis. I looked back at my friend's thesis; the Abstract was next. I knew I couldn't write this for certain at the moment, and it would obviously need to be re-written at a much later time. However, I wrote the best abstract I could of what I thought my work and the results would be about (I hoped). I looked at his thesis again, it continued with the Table of Contents. I wrote the outline for the Table of Contents and what each chapter might include, and eventually finished with the Acknowledgements, no less.

In addition I started a page called Figures, one called Tables, and one titled References. Again, it was a few more pages towards the goal. Perhaps a silly way to start, but I needed to feel like I was making headway and this made me feel like I was creating the foundations for the house. The method seemed to be working for me. Next, I started on the introductory paragraph before each chapter, in similar style to what my friend had used. This was very helpful indeed, since it made me summarise in a paragraph or two what I had planned to include in each chapter and its overall purpose. With this framework done, it seemed like everything might be alright. But now I had to get into the meat of each chapter. I decided to continue with my strategy of 'do what you know first'. I started writing the System Hardware/Software chapter. I knew what equipment I used, and how the software was developed so hopefully this was going to be clear cut. No analysis or tricky statistics required.

I looked back at my friend's thesis again; he had described in detail each piece of his equipment and then how the system worked as a unit (of course, he was an engineer). I started to do a similar thing. Luckily I was a paperwork pack-rat, and had kept the model details of each piece of equipment, and had copied off the user manuals. Remember, none of the equipment existed in our department anymore because I had to give it all back, so there were no second looks. I had also saved all the data I had ever collected using various versions of the software, no matter how insignificant they were at the time. Thank goodness. It is difficult to imagine when you are doing the experiments, what you might need in the end for the write-up. In true pack-rat style, I had kept everything.

As I started to write my first real chapter, a big hurdle arose. It was starting to look like I might need to be a Microsoft Word genius in order to get all of my various images and diagrams to work in the text document. I had already spent a week trying to get just three images into the document, exhausted the Microsoft Word Help section and still not figured it out.

I wrote to my friend and asked how he got it all to work without either the text or the image going crazy. Eventually, he said that he would give me the instructions (something like finding the holy grail of Word apparently which had taken him a considerable amount of time). It took a little while to arrive in my email. It was as though he knew he was passing on the baton at the race, but not yet sure if I was worthy to receive it. Finally, I received an email with an entire page of step-by-step instructions on how to get it to work properly. He said 'now keep this safe, I don't give it to just anyone'.

At this point, I needed to have a serious re-think. His thesis only contained about 20 of these images, whereas mine looked like it was going to contain 80 or more. Could I, and did I want to, conjure this magic up every time I needed to insert something into the text? Was I expected to be a certified desktop publisher as well as a PhD? I went to Supervisor S to grumble over my plight. He suggested that in the 'good old days' all pictures, tables and graphs etc. were put at the back of each chapter since no one had the option of inserting these in the middle of the text. He said there weren't any rules on it, and as long as I was consistent for every chapter this should be acceptable. I was delighted. This was going to be a very big time saver for me. It was the end of September already, and I was still working on my first chapter.

The key meeting with all three of my supervisors wasn't until the first week in October. I really wanted to show them my first chapter and my Table of Contents in October at the meeting. The chapter was proving difficult though. For one thing, there were a large number of important figures and each needed to be transferred, re-sized, numbered, and referenced in the text. By now, I had decided to use PowerPoint for all of my images, graphs and tables. I was good at PowerPoint and it allowed the flexibility that Word could not. It was becoming clear though, that you needed to have supreme attention to the minutest detail to produce a PhD thesis. However, this was now the least of my worries. My biggest problem was I didn't know how to write in scientific language.

A few days before the big meeting in October, I gave Supervisor S my first chapter- System Hardware and Software. He returned it a couple of days later with some useful suggestions such as 'you don't need to *sell* us the equipment- just *tell* us about it'. Oops. As I mentioned before, it had been a long time since I did any homework and I never really considered myself a scientist in the first place. He also suggested some key changes on the graphs and diagrams which I knew were going to be time consuming but were necessary.

By now, I was starting to develop a very clear picture of how detailed and tedious this thesis was going to be. Supervisor S had thrown fear into my heart when he mentioned

one thing the examiners look for is the detail. If simple things like mis-spellings or mis-numberings occurred in your thesis, they also start to doubt the scientific validity of your work, he said. I shuddered. It wasn't only going to be about writing in a logical and understandable way, but it was also about every comma and semi-colon; every picture and page number. (Surely when a leading author writes a book, she doesn't have to concern himself with the page alignment, numbering, and font size, and book cover does she? I'll have to ask JK Rowling one day.) It was emerging that I was indeed going to become a Microsoft Word expert, PowerPoint expert, punctuation and grammar expert, and a scientist. (Little did I know, I would turn out to be much more than that.)

I started having sleepless nights worrying about how I was going to pull it off. Some days I felt as if I was on the edge of a panic attack, and yet I had never really had one in my entire life. I was continually anxious, and it wasn't helping the thesis. I just couldn't write because I was worrying so much. Before the meeting with my supervisors, I knew I had to get a grip on it. I decided to take a couple of hours to sit down and think about how I was going to make this happen. From Outlook, I printed off the monthly calendars for October, November, and December. I wrote 'hand in thesis on December 20th' (yes, two days before the absolute deadline of the 22nd). Someone suggested that I should aim to hand in the week before that, but the very concept was too daunting. I kept it at December 20th. From there, I worked backward. The week before the hand-in, would be designated for fine tuning and last minute corrections. (I guess that was enough. After all how would I know, I had never written a thesis before?) I kept working backwards giving more weeks to writing chapters which would require significant work, such as Results. Eventually I was back at October 1st. It looked tight but do-able I thought; a total of five chapters. I was feeling better already, and the uneasy feeling in my stomach had finally started to go away. If I simply kept to my weekly tasks, it would be completed in time. I started sleeping again, and now knew I was just going to have to work hard.

The final dilemma was going to be my supervisors. Supervisor S had been very good with his scientific suggestions and 'scientific speak' adjustments to my text. He also knew my work. He could turn the work around quickly, which was what I was going to need. Whereas, Supervisor's A and B had long history in the department of taking months to return a student's work. They also had shown me this side of themselves when I needed them to review an abstract. Supervisor A liked to keep writing each paragraph indefinitely. You would make his suggested corrections and return it to him for approval, and he would re-write himself over again. This characteristic could make my thesis a never-ending proposition. Whereas Supervisor B just couldn't be bothered to return anything.

I had to decide how I was going to deal with this behaviour and turn in a PhD thesis. I eventually decided to have a talk with Supervisor S just before the meeting in early October. I asked him if he would be the primary reader of the chapters, and after making his suggested corrections, I would then pass the chapters on to Supervisor A and B as secondary readers. He agreed (thank goodness). I had to be politically careful, since Supervisor A was my boss in the department.

I went into the big meeting with my supervisors in mid-October feeling pretty good, and at least I was sleeping now. I had one chapter (out of 5) completed and ready to be passed on to Supervisor A or B, a Table of Contents, an introductory paragraph for each chapter, a calendar mapped out on how it was all going to happen, on top of some interesting scientific theories. I started the meeting with the inevitable words 'Of course everyone here knows that the College has set a deadline of December 31st, correction now December 22nd, for my PhD thesis. I know it will be tight, but I have made a plan of action and I am going to do my very best. I believe I can make the deadline'. Supervisor S had been following along my progress. So he seemed pleased, but also mentioned that we could always ask for an extension if necessary.

I knew what getting an extension meant, so I was keen to avoid this one. However, I will never forget the looks that Supervisor A and B gave me. Disbelieving? More condescending actually? They say a look can convey a thousand words, and theirs did. Their most prized research physicians had not completed their theses, what made me think that I could? They say people are motivated by all sorts of subliminal messages, and I think this one did it for me. Rather than saying, 'good luck and let us know what you need', or 'if we can be of help let us know'; they completely blew me off. I struggled to pick up my heart from the floor, then took hold of the meeting and continued. I said what I had already accomplished, and that I would be passing chapters on for their review. Of course, I mentioned our deadline was tight.

I also tried to adopt a politically correct stance by saying that I realised that they were very, very busy and so Supervisor S had agreed to be the main reader of the chapters. After all of his corrections had been made, I would pass what should be a well-honed chapter onto them for their comments. I mentioned that all of the grammar and punctuation at that point should be in hand, so I was looking for an 'understand-ability' viewpoint. In fact because they were so busy, I would alternate chapters between them so they would have more time for review. I would also have all the other chapters at my desk in case they needed to back track to make sense of their particular chapter. At that point in the meeting, I passed the first chapter onto Supervisor A for his review. (For completeness sake, I will tell you that Supervisor A returned his first chapter, passed on in October, at the end of November. The second chapter I passed onto him I have never seen again, and the thesis has long since been handed in to the College. Supervisor B never returned the one and only chapter I passed onto him.) It was after this meeting, when I saw their 'vile and contempt' for my plans that I knew no matter what, I was going to turn that thesis in on time.

The next day I started Chapter 3- Methods and Reproducibility. I thought this would be easy since I had a clear recollection of what I had done and I was pretty good at writing step-by-step documents. I went to the literature to see what had already been done about reproducibility in this field that I could quote. To my horror, little work had been done except for some early experiments twenty years ago. It was barely comparable to the work today. It seemed that people had been more than happy to make a leap of faith, rather than conduct their own studies. I suppose that simply points to human laziness. I ended up with a long extensive chapter on the subject that took me a month to complete.

On the daily job front, I had been very lucky because there was trouble recruiting patients into one of the studies I was hired to do. This gave me extra time in the day for the thesis. Each day I would come into work in my noisy, open plan office, and try to write. It was difficult to block out the noise of people chatting and the phones ringing, but eventually I had to do it through sheer concentration skills. When I finally had the Methods and Reproducibility chapter done, I realised that I might have gone completely over the top with it. But then, how did I know what over-the-top really was or whether this is what they expected from a PhD?

In the chapter, I even chose to adopt some engineering terms not normally used for my type of work. When I showed it to Supervisor S, he questioned me (being a pure engineer himself how dare I use them like this?) I explained that the reproducibility work had never really been done properly in my area. So I had taken on the task to do it. I had used the terms for clarity's sake, and defined early in the chapter how I was about to use them. I was starting to adopt the 'this is my thesis and I need a little leeway' attitude. The reader would just have to make a little leap of faith with me on this. He agreed. After all, this was a thesis in between engineering and clinical work.

After my second chapter, I had another re-think about how best to streamline the process of the chapters. My style of writing revolved around thinking about the subject for days (and nights) forming the picture, and talking it over and over in my head, then I just sat down and started writing. I did very little re-writing. I would re-read each paragraph and make a few corrections, check the spelling and grammar etc. and go on. It was difficult to know though if it was clear and concise for someone not in the field.

At this point, my husband offered to read the chapter and give me his comments. He is probably wishing now, he had never suggested it. From then on, he was my second reader. He would read the chapter when I was done and give me his comments or suggest other adjectives when my brain had run out. He was also good at spotting spelling and punctuation errors. He would hand the chapter back and I would fix the miscellaneous errors, or re-word something he thought was confusing. This worked well. By the time the chapter made it to Supervisor S, it was basically complete including the images, graphs, numbering and references and hopefully no spelling or punctuation errors. He simply needed to review the scientific quality and logic of it. Supervisor S kept saying that most of his students would submit writing which was much more 'rough' than my chapters and that it was alright to do this. However, I could really see

no point. He was busy and the only one willing to help. I did not want to waste his time with punctuation errors.

It was now the beginning of November and my little plan on the Outlook calendar had been working for the most part. However, I could see it was all getting rather complex now. I needed to write, my husband to proof-read, back to me again for corrections, and then onto Supervisor S. After he was finished, it came back to me to make his corrections which sometimes required further re-writes and perhaps going back to him to confirm I had done it right. My head was spinning.

I decided it was worth a couple of hours to take another look at my plan. My original plan was lacking because it only had me in it, and now there were two other people to keep track of in the timeframe besides me. (My husband always likened this to trying to get all the sheep in the pen).

Pen or no pen, it had to be done. I sat down to do a more extensive management plan, in Excel this time. I had the dates across the top by week, and the names of the ...well 'sheep' I suppose, down the left hand side. The good news was every sheep had his own colour; I got to be the blue sheep because it was my thesis. I figured out again how long each chapter was going to take to write. As I said, due to a stroke of good luck at work, I was writing eight hours everyday at the moment. I colour-coded in the weeks I was writing each chapter. Then I juggled my husband's proof-reading (he could only do it on the weekends), and combined this with Supervisor S who had a 1-2 week review period to look at the chapter. I needed to fit in my re-writing times as well. I also had to work in the days that the chapters would come back to me for corrections. Perhaps it took me more than two hours to come up with a plan that ended exactly on December 20th. (It was a little like planning an invasion, I suppose.) Now, I had the rather delicate job of informing the other sheep of my plans. I showed my husband the Excel spreadsheet. Luckily he was kind about me booking out all of his weekends from November 1st until December 20th. I guess he figured that I wasn't going to be much fun to be around unless he pitched in and got it over with. He was now starting to understand the term 'thesis widow' that a couple of my friends had run past him.

Next, I made a trip to Supervisor S's office with my colour-coded management plan in hand. He laughed when he saw it. No student had ever tried this one. However, he soon learned the benefits of it. I could tell him exactly what dates I was going to deliver each chapter, and when I needed it back if I was going to meet my deadline. (He saw his schedule weeks in advance, which was more than the College sometimes did for him.) He was also kind and said we could give it a try. I had to be careful however, this plan had a domino quality to it. If I didn't deliver, it would throw everyone else off schedule. This turned out to be a good motivator in the end, when I was near collapse.

November 1st, time to write up my Results chapter; leaving the Conclusion and Introduction still to be finished. My management plan said I only had three weeks to complete it. There was no fudging this one either. Unfortunately however, months before the shocking letter from the College, I had booked four days away (long distance flights and everything) to be with my family at the end of November. It couldn't have come at a worse time; although I think my husband was grateful because it meant a free weekend for him. It was both a good time and bad time.

Starting the Results chapter finally was fun, and I was now in the swing of writing and had even learned some scientific jargon. But my results were complex with hundreds of numbers and multiple levels to them. I struggled to make a clear outline of the main blocks I could present them in. The Results chapter also demanded what I truly feared- Statistics. I had a visit to Supervisor S. I told him I was overwhelmed with the hundreds of numbers I had, and enquired how I was supposed to write this up. We finally decided that I would try to present them as tables, and leave any explanation of what they meant to the Conclusions section so as not to overwhelm the reader.

I divided my results into sections with different headings for simplification, 'actual results and derived results'. I was buried in Excel spreadsheets (which were not my favourite). Supervisor S then came up with the clever idea that we needed to 'non-dimensionalise' the data. I had no idea what this meant. He did his best at explaining, and as usual soon made it clear what he was talking about. I went home and started to re-analyse the data, yet again. I hoped he had a plan for this 'non-dimensionalised data' because it was all starting to feel a bit lofty for me. (As it turns out he didn't, but just thought it was a nice idea. I eventually came up with a way to use it, but it still confuses a lot people.)

Deep into the results section, it was time for the dragon to arise. Statistics. I wasn't very good at it, despite the numerous introductory courses and workshops I took in it. I was convinced that statisticians simply weren't very good at explaining the concepts behind the numbers. They only liked things if they were numerically lined up in columns. Worst of all, it was all starting to feel a bit like snorkelling class. I had the distinct honour of being the only person to fail snorkelling at a holiday resort. I tried, but my body simply refused to breathe when my face was under water. I was hoping that statistics was not going to be my academic version of snorkelling.

One day, I received a blanket email about the College's statistical advisory service. Eureka. I made an appointment. I went down and explained my work and all the numbers I had and asked for a suggestion on the appropriate statistics to perform.

After an hour, I left completely disheartened. The advisor simply could not understand simple physiology and how each individual was actually their own control. She told me to send her all the raw data and she would have a look at it. Why, I asked myself? I had already measured all the raw data. I just wanted to have an educated suggestion on the appropriate statistics to perform.

I went to see Supervisor S in dismay. I explained that I sought some help because it was my very weakest point. Statistics were not his specialty either, and he quietly told me he always tried to avoid them if at all possible. He suggested I make another appointment with the statistical advisory service and he would go with me to the appointment to help explain my work. A few days later, we sat in the office and showed her the work. Again, she struggled to understand. I said, 'I only needed simple statistics I think, but which ones?' By the end of the hour, she was trying to convince us that simple statistics were all wrong, and she needed to come up with a complex equation which would represent everyone in my study group. Supervisor S and I just looked at each other in complete disbelief. This was a ridiculous idea. It was like trying to define the universe in a single equation. Physiology was a horse of a different colour. In addition, her ideas were looking like a costly endeavour. The College offered the statistical advisory service to students, but charged £60 an hour. When I asked her how many hours her suggestion might take, she answered 'about a week'. Needless to say I had to think up a plan B.

Plan B... I came back to my department frustrated and worried. There were some statisticians in my very department so I decided to approach them for help. One by one I showed them my numbers and asked for advice to no avail. The standard answer seemed to be 'you might do it like this, although others do it like that, of course many do it a completely different way.' Eventually I decided I would have to try Supervisor B. He was well-known as the Statistics person in our department. I tried to make an appointment with him, but it seemed liked he was perennially out of the office. One day, I ran into him in the hallway by accident and said I truly needed some advice. His answer was 'just do some simple statistics'. If I heard those words one more time I would scream. What statistics exactly please, I wanted to say?

Time was short; I needed to get this part under control if I was going to finish my Results chapter by the end of November. I had some good concepts, and the results to back them up but I didn't have the statistical knowledge to know how to prove them, and end up with the almighty p value. And for once, not even Supervisor S could help. I looked on the Internet to see if the College might have anyone else who could help me. I found nothing, but interestingly found out that many other College and Universities do recognise the problems of PhD students and offer services to them. It may be a typing service, statistical help, or even editorial help (you can imagine how difficult it would be if it was your second language).

I took their hint. I searched for some other expert in Statistics to give me some advice at another university. I finally found someone who had recently received a PhD in Statistics. It was manna from heaven. I spoke to him on the phone and told him my dilemma. He had a scarily quick and accurate grasp of what I needed to do with the statistics (I guess that's why he was a PhD). He named off all the tests I needed to do to prove my ideas and why, but warned that I had a lot of numbers. I asked him if he knew any students that were good at SPSS and would run the numbers accurately for me if I prepared all of the Excel sheets. I was petrified that I would click the wrong box in SPSS or not understand a simple nuance which could render all of my statistical work wrong.

I had little experience with SPSS. He said he knew someone; so I decided to accept the offer. A week later, I had a handful of SPSS print outs to work from, but it was coupled with a lot of guilt. It was mostly ethical guilt. Was it okay to seek this kind of help? So far, I had done 95% of all of the work myself (the other 5% being was my engineering hook-up, and MATLAB programming in the beginning). I went to Supervisor S but this time on more of a philosophical level. He said the students were not expected to do everything; for example if you needed blood work results in your study, you were not expected to run these tests yourself, starting with the chemistry on how it was done. He even mentioned that when he turned in his thesis many years before, he couldn't type so he hired someone to type the whole thing for him. PhD's might even get students to do their data entry for them to speed things up. His point was well taken. As long as I knew what statistics we were doing and why, I should be alright. I would give up the guilt, and accept no man (or woman in this case) was an island.

The Results chapter was really taking shape now, but mostly because I was working non-stop. Evenings, weekends, any moment I could snatch at work to do it. Simple everyday things like going to the supermarket had become luxury activities, and could not be indulged in very often. I had never considered doing the laundry as a luxury item before. The day before I left on my holiday, I delivered the Results chapter to Supervisor S as planned. He had two weeks to review it. I knew this one was going to need some re-working when I returned. It was a crucial chapter to the thesis, and I simply wasn't sure how to present the work, especially my statistics.

To justify my trip and to decrease the guilt of such an over indulgent activity, I decided that a long haul plane flight really meant 7 hours of uninterrupted work time. Albeit, done in a confined area with poor food. I boarded the plane with a bag of papers and laptop. I can't say my husband was overjoyed by the idea of sitting next to me for 7 hours and not speaking. To his delight however, my laptop battery died less than an hour into the flight and that was that. He had a travelling companion back even though all I could talk about was what I needed to do next on the thesis. Once I reached my family's house, working on the thesis became a hopeless cause with dogs barking and people chatting constantly. Besides, it didn't seem appropriate. I had flown a long way to see them, and they didn't need my head buried in a laptop. I resigned myself to a few days off and told myself I would work even harder on my return. Luckily, my management plan had incorporated the realistic idea that no work would be done over these few days.

When I returned from my holiday, I went to Supervisor S's office to pick up my Results chapter. He explained that unlike the other chapters, this was going to need major revision especially in the statistical part. Ugh. I knew it might happen. We went through it bit by bit, and I made notes. What he was saying made sense. He also mentioned that he didn't like some of the terms I had decided to capitalise for clarity. He said it was getting to look like 'Marketing-speak' so I should not use capitals. I went away and started to re-work the Results chapter. It was now December 1st. I only had two and a half weeks left. I had the Conclusions to do, as well as the Introduction. In addition, I realised on the train home that day that his simple change of mind about the use of capitals now meant I had to go back through three entire chapters and all of the matching figures and tables to correct this. (I am sure he didn't realise the implications of his simple comment, but I went with his advice.)

It seemed time again to do another serious re-think of my situation. Going back into the foetal position, I set out to create an adjusted project management plan for the month of December. By now, my husband had voluntarily taken up the cooking and cleaning along with the chapter reading. I think he was worried that food might be scarce if he didn't. He was just as desperate as me now to get the project over. Now and then he would wander up to the computer where I was seated, and ask if he could have his wife back after the thesis. Mostly however, when he saw me getting anxious he would remind me that if I just kept taking baby steps I would eventually reach the finish line. Every night when I was desperate to stop work, he would ask me to look at the project plan that was pasted on the side of the computer cabinet. 'Have you checked everything off your list for today?'

'Baby steps, it is all in the baby steps to the finish line' I had to tell myself.

By the first week in December I was near to complete exhaustion. Supervisor A and B didn't even ask how I was doing, nor had they bothered to return my chapters. I decided it was no longer possible to work in an open plan office and have the type of concentration I needed. I wrote an email to Supervisor A, my boss, and said that on the days they didn't have patients for me to see, I planned to use my annual leave and work from home on my thesis since the deadline was very close now. At this point, I didn't care if he fired me or not because there was something much more important at hand. He never emailed back, so I assumed it was okay.

As each chapter was completed, I set it aside as 'done' and tried only to think about the next one. But one day, I picked up one of the 'completed' chapters. To my horror and dismay, I saw a typing error and a punctuation error. How could this be? It had gone through me 3 times, my husband once, and Supervisor S. I was worried. I was haunted about what had been said early on about the examiners distrusting your scientific work if they found spelling and punctuation errors. This was going to be the pinnacle of my scientific work. I knew I was completely incapable of re-reading the chapters again for errors with any success. I was too exhausted, and had a load of other tasks to complete. My perfectionism was starting to take over now, and this time I couldn't push it away.

I knew what the answer was going to have to be - I needed another sheep to help. It was the only answer. There no other logical way. I went to the Internet and started looking up 'thesis proof-reading'. Low and behold, someone came up that offered proof-reading services; exactly what I needed, a fresh pair of eyes to snag the final tiny errors. I called her up and told her what I was doing. Would she be able to help on a very tight deadline though? She accepted, and it may have been one of my smartest moves. Of course this now meant I had to further re-organise my management plan. She became the yellow sheep on the Excel spreadsheet, and I made sure she received the work on precise days and returned it as planned. She never failed me once. (My husband still thinks I was a Border Collie in my former life, but I always think of myself as one of the sheep since I have to fall in line with the rest of them.)

With two weeks to go, I thought the worst was over. Little did I know. The Introduction would be a breeze (so I thought). Supervisor S mentioned that because I had a lot of results, the Introduction could be short but needed to be succinct. I also needed to make sure it was a proper introduction to what I was going to present to the reader later in the thesis. What a blessing I thought; a short chapter to write.

When I sat down to write, I realised that I was dealing with a huge subject. It was as if someone said write an introduction to 'dogs'. Where do you start? Should you tell them about the different type of dogs, how a dog runs, what he likes to eat, or perhaps the origin of the species? Also, it was important to link it in to my 'dog study', in a sense. I sat down and made several different outlines of how it might go. I was running out of energy, and adjectives. Eventually I found something that worked without having to describe the origin of the species. I wrote it in a week and passed it onto Supervisor S for review (after begging my husband to do his first read through on the train on the way into work). By now he realised that his services may be required on demand and not just on the weekend. I often wondered whether he had a calendar at work with December 20th highlighted, as the day he was released from prison.

In the final two weeks, something else happened. My focus became so narrow, that I basically wouldn't do anything unless it was related to the thesis. I would get up early in the morning and sit at the computer. When my husband arrived back home 10 hours later, I hadn't moved. I was writing flat out. It had also become a bit scary. One day at the computer I realised I was very thirsty, but getting up to get a drink was secondary to the thesis. Several hours later, I still had not moved from the computer screen. Now I was feeling quite sick. I remembered an article I had read about kids who were addicted to computer games, and one had been found dead from kidney failure after not moving for three days. I saw how it could happen. Just then, my husband walked in from work. He came over and asked me what I had eaten today. I honestly couldn't remember. I thought I had a bowl of cereal in the morning with him, but I couldn't be sure. He dragged me away and made me dinner. I didn't do that again.

The final week I was working on the Conclusions, while Supervisor S was reading the Introduction, and the proof-reader was working on all the other chapters. I got to a point in the Conclusions that I knew the work so well, and had such strong ideas what it meant that Supervisor S could no longer help. For a moment in time, I knew more than he did about it and I knew I was on my own. It felt like the training wheels had been taken off my bike, and I just had to pedal like crazy to stay upright. I had also reached a point which felt like true ownership. This was my thesis, my work, and I was going to stick my neck out and suggest some new, and what might appear radical, concepts. Otherwise, what was the point of it? I knew I had the data to back them up. It was going to be the only time in academia I could say what I wanted. I had finally become 'the expert' in one tiny, precise area of a very large field. It felt good. I finished the Conclusions, and this time Supervisor S had only a quick glance over them and said 'go with it'. (He was probably exhausted as well.)

It was Saturday morning and the final weekend to work on my thesis. December 20th was Wednesday morning. I could see real light pouring into my tunnel, but was afraid to let my guard down. I needed to take my thesis into the printers on the morning of December 19th in order to deliver the bound copies to the College on the 20th. The sheep had all performed brilliantly, and I hoped none of them hated me. There were two sheep still working diligently however, me and the proof-reader. I had 18 separate documents which made up the thesis, since I had both word and PowerPoint files for each chapter. I wanted to print off the final copy so I could see what it looked like altogether. I had only dealt with individual files before, so the assembly was quite exciting.

Unfortunately our home printer was causing a big fuss about having to print out 356 pages. I tried to keep my cool as the printer jammed over and over. Needless to say, it took me all of Saturday and a couple of new printer cartridges just to get it printed. On Sunday, I had a chance to look at it. The proof reader was still working on my Conclusions chapter. I double checked all the Figures and Tables numbers against those in the text. This part went fine. Then I began checking all of the references. Some of my references from the Introduction were missing in the Reference section. How could this be? I was meticulous about adding references. Then I remembered. It was the only time that I had been working on two chapters at once. (Never do this no matter what.) I had been working on the Introduction, when Supervisor S had told me to re-write the Results section. Stopping and starting again was not good. Besides, doing the mind shift between the global aspirations of the Introduction, and the minute details of the Results section felt like it was going to cause me a stroke. It took several hours that day to find all the missing references again so everything matched up.

I had planned to take the thesis in for printing on Tuesday, December 19th and deliver it to the College on December 20st. On Monday, I still had something left to do. The printing company had recommended that I have all my documents in PDF format, so nothing could go wrong. I agreed. I knew I had thousands of little details on PowerPoint slides and it would be devastating if the arrows all shifted. The problem was I didn't have a PDF writer on my home computer. When the proof-reader returned the final chapter, I asked her if she had a PDF writer. She did and agreed to help. For the rest of the Monday, I would send her a couple of documents and she would turn them into PDF's and send them back. This of course caused her email box to crash. We eventually found a slow, but workable way to do it. The 18 documents took us until nearly midnight to complete. Finally, I loaded it all onto my memory stick and prepared myself to go to the printer early the next morning.

At that point, something snapped. I didn't want to look at it again. I cleaned up all the papers strewn across the living room and everything around the computer. I put all the books away. There was no evidence of the thesis anywhere in our house. I was done, but I knew I still hadn't quite reached the goal line.

The next morning, I begged my husband to go to the printers with me before work. I had loads of paper to carry since I wanted my images, tables and figures to be printed on special paper for visual clarity. (Again, silly perfectionism raising its ugly head.) What he didn't know, is I also wanted him there in case I was hit by a bus. At that point, I knew he would have the common sense to finish the trip to the printer and turn in the thesis for me. Once I left it in the hands of the printer, it became one of the happiest moments of my life and the entire day felt surreal. I spoke to another PhD, and she said that she could still remember the exact way the sky looked on the day she turned her thesis in. I was now just a single baby step from the goal line. I just needed to pick up the thesis the next day from the printer, and deliver it to the College on December 20th like I had planned. I had never worked so hard in my entire life.

I was about to break the tape. I woke up on Tuesday, December 20th and made my joyous way to the printers. When they handed over the copies, I thought they were beautiful. In fact I couldn't believe how beautifully they had turned out. I was a real scientist, a bit like Pinocchio turning into a real human. They were so heavy I had to take a cab to the College to drop them off. I found the post-graduate office and opened the door with pride. The last hurdle had been crossed, and I was ready to hit the tape. The marathon was over. I put the theses on their counter and proudly told them my name. Remarkably, they even found my paperwork. I looked behind the counter; there were five large stacks of theses about six feet high. I guess I wasn't the only one to do a PhD. Still, it took none of the sheer glory out of it. I looked on their shelves. They had a thesis there three times as thick as mine. I commented 'wow, is that even legal?' I remembered the College's limit on words but was also experiencing a momentary feeling of inadequacy. 'Look at the name on it', the secretary said 'Q. Street'. 'Get it?' she said. 'Quality Street. Cadbury sent us a huge box of chocolates for Christmas one year in a box resembling a thesis. I just leave it there on the shelf now to scare students.'

Whew. I felt better. She took my theses, attached my paperwork and added it to the giant stack behind her. 'Excuse me; don't I even get a receipt for that?' I said. 'No' she said. 'We'll send you out a letter as confirmation'. Yikes, I thought. What if they lose it or the building burns down? Still I was feeling exhilarated and tried to cast those fears well behind me.

I called up my friend whose thesis I had used as a template and told him my nightmare was over. He congratulated me. (We were the only two people in six years to complete our thesis in the department) I mentioned that my thesis looks uncannily like his now in format. He said not to worry; he had copied the idea from someone else.

The next day I took a giant tin of biscuits into Supervisor S. It was my way of celebrating and also thanking him for standing by me the entire time and not once complaining about my tight time schedule. It was then that he told me I was the first student ever in his department to turn their thesis in on time (and he had been around for a very long time). I was thrilled and proud to have this accolade attached to my name, since I knew I would never be recognised as a brilliant engineer. This title was good enough in my book. My husband later asked him why he was kind enough to follow my sheep time-line (although we didn't call it that at the time). He said that he had never had a student who actually told him months ahead when he was going to be asked to review a chapter, and on that simple basis he felt he couldn't let me down if I delivered.

Next, I went to the Chocolate shop and purchased the largest box of chocolates they had and sent them special delivery to the proof reader who had worked with me on some of the tightest deadlines in history, and never for a second looked like she was going to let me down.

My husband was simply ecstatic to be free now, have a wife back, and even the possibility of Christmas. I spent the next two days standing in the queues on Oxford Street making sure he had some really nice Christmas presents.

I had already had my Christmas.

Just before the holidays started, I went into work with a copy of my thesis in hand. I saw Supervisor A at the coffee machine. I went up to him and said 'I've handed it in'. He took the copy from my hands and returned to his office without saying anything. He still hasn't spoken to me about it. (Supervisor B had the audacity to come to my desk a few weeks later and ask for an electronic copy of it.)

I learned many things by writing my PhD. Along with developing my writing and analysis skills, I learned that a big journey is always composed of hundreds of little tiny baby steps. This will stay with me for life. It is no different from a piece of art, and if you keep making the brush strokes one day it becomes a beautiful painting (even if only in your eyes).

I also learned that it is okay to ask for help. A PhD is not about being a one man band, but finding out where both your strengths and your weaknesses are. In fact, often you find many more strengths than you ever realised you had. I only wished I had had proper mentoring in Statistics and MATLAB. I missed out there, especially in a department where experts abound.

I also laugh now when people ask me if I have any transferable skills from my PhD. It is like asking someone who just climbed Everest whether they have any talent for hill walking. But in a sense, you need to have done a PhD to understand this concept, so I forgive them.

The first week in January, I was relieved to receive a letter from the College saying my theses had been passed onto the examiners. I was relieved, and excitedly called Supervisor S and said 'what now?' He said that we needed to give them at least a month or more to read it before contacting them to set up the viva. I received no further information from the College. In early February, I called up Supervisor S to see whether he had contacted the examiners yet since he was going to be setting up the viva. He had lost their email addresses by now so I retrieved all the necessary information for him. He was left to contact them.

In the meantime, I called up my family and told them to make plans to come for Graduation; I thought it was in May. I decided I should call up the College just to confirm the date and see what else I needed to do. That is when the College dropped the last bomb on me. I had to appear on the 'pass list' by the end of February to attend the May Graduation. This meant my viva needed to be completed, any corrections made, and the paperwork turned in. 'What?' I said. Why hadn't I received any information from the College about this deadline? I contacted Supervisor S, and he said one examiner had proposed February 28th for the viva but he was waiting to hear from the other. This was going to be tight, and I might have to do a bit of running around to keep the College happy with the paperwork. Still there was a chance. I asked Supervisor S if there was something we could do about it, since I was keen to graduate in May. He said 'The examiners are like God in this situation, you have to do whatever they want'. Then he rambled into some story about how he never attended his PhD graduation anyway because he decided to leave the country to take up a Post Doc. Perhaps Graduation meant nothing to him, but it meant a lot to me. I waited to hear about my February 28th viva, or not.

Finally an email came though from the examiners saying that February 28th didn't suit one of them and they were now looking at the middle of March. I felt let down. This was going to be a very tricky task to get the College to allow me graduate now. At that point, I felt like Supervisor S should have stepped in with a simple phone call to both examiners explaining this was going to make me ineligible for Graduation. Could we possibly look at an earlier date? But it didn't happen. I felt powerless. I told Supervisor S that there was something in the College rules that said the viva had to be done within two months. His answer surprised me. He said 'The examiners can do what they want. They are busy Professors you know, and they have important schedules. Getting a PhD means we are allowing you in a club where there aren't a lot of other people. Sometimes you just have to wait for us to let you in the club'. I was shocked, and academia was truly leaving a bad taste in my mouth now. I didn't do a PhD to be in a club. I did it to advance my field just one tiny little step further into the future. I guess I am as naïve as I ever was.

A week later, the final email came through saying that the only date they could agree on was now going to be April 25th, very clearly out of the range of Graduation. I will have to wait more than a year now to have my family see the pinnacle of my hard work. Will it be the same? I doubt it. My life will have substantially moved on by then.

I have decided to leave academia and transfer to the business world. They have rules there, and they generally follow them (the regulators make them). I have good transferable skills like writing, analysis, and sheep management (normally termed project management). I'm sure someone will hire me. I just have to convince them that climbing Everest does indeed give you the credentials for hill walking.

From February, when I found out that I would miss the Graduation deadline, to April 25th when the Viva was scheduled was feeling like a long and tedious wait. I couldn't relax and say 'I've done it', because the ordeal wasn't quite over. There was no letting go finally or putting my guard down. It was in this interim that I received notice that both of my abstracts had been accepted as oral presentations at a large international meeting. I was thrilled. I was an opportunity to present my thesis work to my peers and they were also requesting two accompanying manuscripts. It couldn't get much better. My hard work would finally be seen and it certainly would give me credibility in the Viva. I called a meeting with Supervisor A and B to tell them the good news. However, I was shocked by the reply. I was told point blank that 'No one in this department is interested in you attending this meeting. Meetings are expensive. You should stay back here and write some papers.'

I mentioned that attending this meeting would allow me a good chance of getting both manuscripts published, but they didn't care. I was angry and thought their non-negotiable attitude was rather cruel. After all, I was the only the second one in six years to complete their thesis in the department. It was at this point I decided that I needed to stand up for myself. 'This was good work and I deserved to present it to my peers', I said. 'This was a very important meeting and my material is new and innovative.' I told them I was still planning on attending even if I had to pay for the entire meeting myself. They still tried to convince me that it was not worth doing.

I left the meeting and went to the conference website. They had just listed some information about winning a \$1000 scholarship to attend. You needed to write an essay about why you needed the money and why they should give it to you. I sat down and immediately wrote the essay. It wasn't hard, and my passion must have come through because a month later they called me to say I had won it. For me, this was monumental. Someone outside my department had recognised my hard work and trying to enable me an opportunity. Unfortunately, this wasn't the group who were supposed to academically supporting me. Still I'll take it. I went to work on writing my two manuscripts. It was a good thing because it kept me in touch with my material while waiting for the elusive Viva. I submitted the finished papers to all three Supervisors for their comments. This time no one replied, not even Supervisor S. I eventually sent them off.

There was a month left before the Viva in April. I was feeling good because I had two oral presentations to look forward to in June; I had submitted two manuscripts, and even won a \$1000 scholarship to the meeting. Still there was the pivotal moment of the Viva yet to come. I phoned up Supervisor S and asked if he could possibly give me a mock Viva since he was the only one who knew my work. He laughed. He said that you really can't prepare for the Viva since there are no standard questions, and every examiner is different. He said just re-read your thesis and you'll be fine. That didn't seem enough information for me. Although I knew my work inside and out, I needed some basic information; simple things like how long does the Viva normally last, where is it held, who is there, do I get to take in notes, and what happens after that? His answers were vague and I was finding it frustrating. It was at that point, a contact of mine suggested I read a book written about taking the Viva. I had no idea books like this even existed. I went out and bought it that evening. It was helpful and although generic, it offered some useful advice and gave some structure to the upcoming event. I found out that even within our department there seems to be a considerable amount of variability to what is normally done. For instance I asked Supervisor S if I should prepare brief presentation to give at the beginning. He said, 'oh no, in fact I have booked you into a room with no audio visual capability, not even a blackboard'. I went away thinking 'fine'. Then I spoke to a student who had recently passed his Viva. He mentioned that he did a ten minute PowerPoint presentation at the start of the Viva. He was also a student of Supervisor S'. It was all getting a bit confusing. I decided that I would have a ten minute oral presentation stored in my head just in case, since others warned me that I would need this. One week before I again asked Supervisor S for a mock Viva, but he didn't seem interested. Instead he told me about the last student he examined and how the student had put notes in the margin of his thesis to remind him of important points. I thought this might be a good plan too. So when I read through my thesis page by page again, I put notes in the margins and even added coloured tabs to highlight the most important parts. I imagined that even if I was very nervous, when they asked me about Chapter 2, for example, I could look down and grab a hold of the yellow tabs and do pretty well. The day before the Viva I couldn't wait for it to be over. Supervisor A suddenly decided to call an impromptu meeting of all my Supervisors and me. He asked how I had prepared for the Viva and to let him know if there was anything he could do. I was speechless. It was a nice thought but about 5 years too late.

Viva Day. I gave myself plenty of time to get the location. I spent an hour sitting in the College canteen having coffee and looking through the highlights of my thesis. I finally meet Supervisor S who took me to the room my Viva would be in. He told me where to sit. I had thesis in front of me and a bottle of water (recommendation from the book). Eventually the examiners arrived. They were pleasant and there was some chat about their train journeys. Supervisor S now left me on my own. This was it. I kept running through my ten minute presentation in my head, since I was warned this might be the first task. At that point, one of the examiners said 'now we would like you to relax, this is simply going to be a scientific discussion about your work'. Nice start, but it didn't do much to relax me because they each had a notebook in front of them with a huge list of questions listed.

First question: 'all through your thesis you mention 'we' did this and 'we' did that. Is that what you meant to say? I had no idea what he meant. I finally said 'are you asking whether I did all the work myself or not? Indeed I did 99% of this work myself, and where I needed others I have acknowledged their work.' Then I mentioned I was instructed by my Supervisor that you should never use 'I' in scientific work, it is always 'we'. At that point the examiner said 'It is my belief that if you are ever going to say the word (I), it should be in your thesis.' I certainly agreed with him in principle, but was told this wasn't an option. Luckily he didn't make me change it all.

Next question, 'tell us about your abstract?' What? I struggled to decipher what aspect of the abstract he wanted to discuss. After a bit of going back and forth, I finally figured out that they thought it wasn't comprehensive enough. It hinted at, but didn't include enough detailed findings. A point well taken. Then it was 'okay on to page 72, line 3'. I scrambled to reach page 72, and find line 3. 'Could you describe what you mean by that statement?' Goodness, quick thinking needed here; I looked at the page heading and tried to figure out where the thesis had built to by that point, and what the question really was. Then, 'onto page 90 now'. They weren't pointing out typographical errors, it was simply questions that had at that point in the work. This went on for at least an hour. I found it very tiring because I couldn't see a clear path of questioning, and we were skipping great swaths of pages. As kind as they were, I had difficulty in understanding their questions because they were indirect. Perhaps this is the art of scientific discussions, who knows? I was nervous though, and felt very clear questions rather than vague ones would have been more to my liking. At one point, we got stuck into line of questioning (oops scientific discussion) which was completely out of my field, and only vaguely relevant to the thesis. They asked me a question on chemistry (my thesis had no chemistry in it). I thought 'there is no way I can answer this, I just don't know the answer.' I looked at them and had to say 'I do know the answer, I'm sorry'. In fact, I ended up saying those words a few times, but luckily they were always in reference to topics not related to the work in my thesis. Funnily, at the end of the Viva they congratulated me for having the courage to say I didn't know some of the answers rather than trying to blag my way around the questions.

Two and a half hours into it, we really had only covered the first two of the five Chapters. At that point they realised they were running out of time (some magical time they had set for themselves). So we skipped directly to the Conclusions, completely bypassing a couple of important chapters (in my mind at least). They were interested in what I thought my scientific contribution was. I liked this question, finally it was simple and I knew what I was going to say. For the next 30 minutes we had that scientific discussion. It felt good when they said that my most radical concept was the one they liked the most. The validation was fantastic. Finally it was over. They asked if I would leave the room, and they would call me back.

I sat in the nearby tea room for the longest 15 minutes of my life. I couldn't help but review all the things I should have said, but also to experience a glimmer of sadness for all those I wasn't given the opportunity to speak about. I think it is important for the student to give that 10 minute presentation. It allows them the opportunity to say what they think is the most important aspects of their work over the past 4 or 5 years. It gives you a sense of satisfaction that it has been said, and someone has listened.

Eventually Supervisor S showed up, and the examiners called us back into the room. Thank goodness the first words from their mouths were 'you passed'. Simple and clear. I think I started breathing shortly thereafter. I was pleasantly surprised when they said that the only change they wanted me to make was to extend my abstract. They felt I hadn't done myself justice by keeping it short. They wanted to make sure there was a small discussion in it about my main points, especially my 'radical new concept'. I was overjoyed. This was going to be a simple fix. Supervisor S seemed pleased.

As they were packing up to leave the room, they said we would like to tell you one more thing 'We think this is one of the most beautifully presented theses we have seen. The diagrams are very clear, and some of your images are so nice you should submit them to an Art in Medicine competition.' I couldn't have been happier. All of that meticulous work had really paid off. Like Pinocchio, on that day I became a real boy.

In retrospect, a note to future examiners

- 1) Allow the student a time to speak freely about what they consider to be the most important aspects of their work. They (and you) will regret it if some aspect they worked particularly hard on goes unmentioned.
- 2) Keep the questions clear. Starting your sentence with 'tell us about...', can be confusing for the student (especially if you're nervous). It also leaves the student wondering what aspect of this topic are they *really* asking about. What part should I address first? In fact, this is why most students will pause and look blankly at you at the start.
- 3) Try to stay on the thesis. (Although I did miss a question that I should have known from A level chemistry, it wasn't the least bit relevant. Lucky for me however 'I don't know' can also be an acceptable answer sometimes.

A note to future supervisors

Although you may think your responsibility is only to check up on the scientific aspects of a student's work, it goes far beyond and you should be ready for the long term commitment. It is a little like having children, if you don't want to raise them, don't have them.

Spend more time on general encouragement and a 'can do' attitude; help the student understand you are a partner in this endeavour.

Show the student other theses, and discuss the good and bad points about the lay out of the work. This will provide some framework for the student to work from.

Pay attention to obstacles which may leave the student feeling helpless, discouraged, and ready to throw in the towel. (My moment came when I spent the first year looking for a room to do the experiments.)

You are not a true supervisor if you only see the student every few months, and the student has to continually remind you about what their PhD is on. In fact, at that point you are nothing more than another obstacle.

A PhD student cannot be an expert at everything, and you should not expect this of them. You should encourage them to let you know when they reach an aspect of their work they are uncomfortable with. It might be statistics, PowerPoint, Word formatting, or even accepted scientific language. It is your job to help them find the

resources to shore up their weakness. A student going around asking for help will often be turned down, but a supervisor asking on their behalf will usually get a quick response.

When reviewing chapters, remember the saying 'Is it good enough?' Boggling a student down with constant re-writes of his work (until it is in *your* exact words) can put a damper on the most buoyant of scientists.

Be responsible. If a student turns in work for review, return it in a reasonable time frame. Sitting on a piece of work for months is not going to get any of your students to graduate. Again, it will only make you one of the obstacles to be avoided.

There is no other degree that is more about being an individual than doing a PhD. Allow ownership, and creativity.

A note to PhD students

On the practical side- writing up

Don't know where to start? Start with what you know at the time. How about the title? Table of Contents? List of Abbreviations? Sounds silly but it works. Get someone else's thesis you like the format of, and start writing yours match to match their format (apparently, it is an age old art). You can always make adjustments later but everyone needs a framework in the beginning.

Be organised. Save everything (old data can be useful at some later point which you can't imagine at this moment).

Start with the easiest Chapter. This is not necessarily the Introduction, which can be an overwhelming place to start. Try the Methods. It is straightforward and you know what you did. This will also provide writing practice. Remember your writing will get faster as you progress through the Chapters.

Move through the Chapters one by one. Complete one Chapter before moving on. This not only gives you a sense of achievement, but keeps you focused on the task at hand and eliminates errors; besides each chapter is actually a different mind set.

Try not to get stuck in the trap of analysing the results from too many different directions. This is an endless task and should be avoided. At some point you need to realise that you will not save the world with your thesis, and you just need to get one perspective of the work written down on paper.

Remember to check the rules of the College or University for submission. Get the formatting right from the beginning, if possible. You don't want it rejected for some silly reason.

If the desktop publishing part is getting you down, just get the work on paper and then worry about it if necessary. Try to make things as simple as possible for yourself. Complex insertion of figures and graphs into the word document might look great, but is it worth the time if you are not a whiz at it? Assess your true abilities. There are other options. I put all of mine at the back of each Chapter and it saved hours of work. You just need to be consistent about whatever you chose.

The Management Plan

Decide on your deadline (actually the College might do this for you). Realistically it takes 4-6 months to write up your thesis. Make a timeline. Start with a calendar showing the 'turn it in' day. Now look at each Chapter listed in your Table of Contents. Think about how long each one might take you to do. (I know it is a guess at this point.) 1 week? 4 weeks? Add up all of the weeks, and see if that puts you in a realistic spot for the 'turn it in' day. Make sure to allow 1-2 weeks minimum for the final tidy-up work. The Results chapter normally takes the longest. Write down on the calendar when you need to start and finish each chapter in order to finish by the 'turn it in' day. (By the way, make sure you fix this day at least 2 days before the **real** 'turn it in day'. I call this my emergency time. For the plan to work, you **MUST** keep to the timeline. Show it to your supervisor. Let him know that this is the plan and in order for it to work you will need to work as a team. (He will laugh, but never mind.) The timeline will let him know months in advance when you will give him a chapter to review, and when you will need it back (add him into your timeline as well). If you truly want this system to work, you have to give him quality work. Don't expect him to correct spelling or grammar. At this point, your supervisor should be there to assess the scientific soundness of your work and let you know if you are presenting it in a clear manner. (Find another person who is kind enough to double check your grammar and spelling first. Correct the errors they find, and then pass it onto your supervisor so it is as clean as possible). Put this person on your timeline as well. (Remember, unfortunately it can't be you. You will simply be blind to these types of errors past a certain point). As you can see, it is already becoming a tag-team event. Remember though, if you want the help of others you need to keep up your end as well since there can be a domino effect. If you get someone else helping you with the statistics etc, add them into your timeline too. The timeline serves as a motivator, mostly for you when the times get tough. However, people are more likely to help you if you're holding up your end of the deal. Remember toward the end, you need to calculate in time for the printing and binding. Most printers have overnight service for desperate students, but you will pay more. You may need to re-adjust the timeline if something changes or your supervisor goes on holiday etc. When it all gets too much, I used my timeline to remind myself that I only had to get one thing done for the day (not the whole thesis). If I did that one thing every day on my calendar, it would be finished on time, and it was!

On the inspirational side

Think of a PhD like climbing a mountain. It is a large, and time consuming project (although you will only fully realise what I mean when you've reach the top).

It may start off slow, and finding the right trails can be confusing. You might turn the wrong way, but it doesn't mean you won't go on to reach the top.

Always try to keep looking up and remembering where and what the goal is. Be organised, but also remember that re-organising along the way is a part of the game plan.

You can count on obstacles along the way. When you find one, remember to step over it. No rock is too big to climb. You might need to find a rope, and ask for help, but then you're over it. Every step, takes you closer to the top.

Know that there will also be times along the path where the road is clear and beautiful and you will be able to realise that you are headed in the right direction. Take a few moments to congratulate yourself when you have finished an aspect of the project, or had a brilliant scientific thought. These are the well deserved exhilaration points along the way.

A mountain always gets steeper near the very top. When you get exhausted near the end, remember that it is far simpler to progress forward with tiny baby steps to the top, than to turn around and walk back down.

This project is yours. It may be the only time in your life you take a project from inception through to fruition mostly by yourself. You are allowed to put your stamp on it and take ownership.

When you reach the top, it is a clear-cut victory. People need clear-cut victories in their lives. You will never, ever forget this one.