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The Art of PhD Supervision

Prologue

When I started to make my own first steps on the treacherous path of PhD supervision, it appeared to me to be a skill I would never be able to master. But I was lucky: for 11 years (the time between the completion of my own PhD and my move to the VU) Bob was my mentor and showed me the way. The meticulous fashion in which he supervises his students is a pleasure to watch and frightening at the same time, as he sets such high standards. Any person who has been involved in supervision by Bob will know exactly what I'm talking about.

In the text below I've tried to summarize the lessons I learned from Bob. It is not an analysis of past performances; I've tried to do it the synthetic way by presenting these lessons as a set of guidelines. The guidelines are discussed in chronological order, starting with the student-selection process and ending with the PhD party.

Disclaimer: any failures resulting from the application of these guidelines should not reflect in any way on the quality of Bob's lessons, but should simply be attributed to the poor skills of the author to capture these lessons correctly.

Selection process

Stubbornness paired with self reflection Selecting a PhD student is quite different from the selection process for "regular" jobs. Researchers need to have a certain level of stubbornness to pursue a line of research. The main success criterion is whether the student is able to balance this with an adequate level of self reflection. Is the student able to accept another viewpoint (even if just grudgingly) when others put forward sufficient arguments for it? Is the student able to participate in a dialectic debate without getting upset? Good students are able to step away from

their own work and take a broader view. Of course, this is a skill you can learn, but the seeds have to be there.

Look for creativity We tend to prefer a standard CV: high marks, no delays during bachelor and master phase. But look also for some twists in the CV: time spent abroad for whatever reason, unusual side activities. Very clever students are often not “run-of-the-mill” people. They want to use their talents in different ways. They are often creative, in the broad sense of the word. And signs of this in the CV may thus work in favor of a student, and not against.

Look for endurance rather than self-proclaimed academic ambition Some prospective students have a romantic notion of doing a PhD. They like the idea of being one, and talking to others of being one, without realizing what it really entails, until they wake up to the harsh reality. The rule of thumb “10% inspiration, 90% transpiration” is a good one to keep in mind. Make sure the student has a realistic expectation; if not, he is probably not as clever as he thinks himself to be¹. Candidates with less candid ambition but who have shown some form of tenacity are usually a better choice.

First Year

Meet frequently It is an error to think that one should give the student a few months to get used to the new situation. The first year is a critical period, where the student has to get a clear grasp of the subject. And this year is over before you know it. As a general rule, meet once a week right from the start. If possible, involve a co-supervisor, but don’t leave all the supervising to this colleague, unless she has ample experience. Meeting frequently is important because you cannot expect the student yet to steer the research activities. However, the meeting agenda should be mainly dictated by the student (who has to accept this as a responsibility).

Stimulate development of a research context Make sure the student reads a fair amount of literature. The student should write summaries

¹I use the “he” form here on purpose, as the male sex is in particular prone to this pitfall.

as input for discussions in the weekly meetings. The student should feel the responsibility to develop a “frame of reference” for his research subject. Planning to follow a course on scientific writing is a good idea, but not before the student starts working on the first research paper (it is best to work on “real stuff” during the course). It is also a good idea to take from time to time one page of text written by the student and give extensive language-level feedback on it. It can also be insightful to write a short text sitting jointly behind the screen.

Finish with a research plan By the end of the year the student should show that she has taken control of her project. This should take concrete form in the research plan, which is best seen as a draft introductory chapter of the thesis, with all the usual elements: project context, related work, problem statement, research questions, approach, and resulting plan. The student is likely to feel insecure about parts of it, but explain it does not mean everything is cast in stone. It’s just the first stab at it.

The research plan should be the main input for the decision (usually required by the end of Year 1) whether the contract of the student is extended. Don’t feel forced to say “ok” to a student just because you like the person (usually you do). Not doing a thesis is not the end of the world; not everyone is cut out to do this kind of work. Both sides will suffer equally if you continue an enterprise that has no future.

If possible, stimulate the student to submit the research plan to the Doctoral Consortium of a major conference in her field.

The Real Work

Make sure the student takes control It is time for the student to call the shots. You don’t have to agree with all the decisions taken by the student; your role is to suggest, provide constructive feedback and play devil’s advocate. Increasingly, the student will know more about the subject than you do. If the student keeps depending on you and keeps talking in the “we” form you should view this as a bad sign.

Focus on consolidated publications A rule of thumb used by many is: four good publications constitutes a thesis. But this does not work well with conference papers, even if the conference is top-class. The typical paper size is not large enough to document the underlying data

at the detailed level required for a thesis. Therefore, plan for at least two journal publications, as journals provide more space. The student should always consider making the detailed data available via a Web link, adding these possibly later as appendices or chapter additions to the thesis.

Publications have extra importance in the context of the Dutch PhD system of “pass/fail”. When the thesis contains several peer-reviewed publications the supervisor feels more confident submitting the thesis to the committee, without the risk of a “fail” (which is mainly embarrassing for the supervisor).

Make the student aware of authorship rules Students, focused as they are (and should be) on their own work, often have difficulties grasping the rules for authorship. Especially if the work in a project with a team of post-docs and programmers it is essential for the supervisor to prevent any problems. Discuss authorship at the earliest possible stage of a new publication. Students tend to think just of writing as the ticket to authorship. However, anyone who provided significant input through “Instruments” (in computer science typically software) or conceptual ideas should be included in the author list. Once this landscape is clear, it is usually easy to resolve any potential problems. The student will be first author; others can be listed alphabetically. The real difficult cases are when two students are involved. In that case it is wise to plan two different publications in such a way that each student is the prime author for one of them.

Spending a few months at another university is a good idea Broadening your horizon is always a good idea. Stimulate the student early on to think of good places to go for a visit of a few months. The weather at the prospective venue should not be the deciding factor, although it can help. Places to stay are usually easy to find; many colleagues will like the idea of one of your students spending some time at their institute. Make sure the visit is planned carefully. The goal should simply be that the visit results in a publication and thus in a chapter in the thesis. It helps to organize regular Skype session during the visit, or even a trip over there, to ensure that this goal is reached. Do everything to make sure that student is not only having a good time.

Finishing the Thesis

Explicate the “red thread” Although a thesis based on published articles is routine in other scientific disciplines, it is still frowned upon in certain circles of computer science. Make sure that the student explicates how the chapters fit together. A simple approach is to add a meta-section at the start of each chapter to explain the causal connections with other chapters. The introductory chapter also plays a key role in laying out how the thesis fits together. Feel free to suggest (minor) editing of the articles to provide explicit tightening. Also, consider adding details (experimental data, algorithms, code) to the published material, possibly as appendices.

Specify in detail the contribution of the student Nowadays, PhD work is usually done in a project context. The articles constituting the chapters are therefore likely to have multiple authors. Committee member will want to know what the student’s contribution has been. Ask the student to include a section in the introduction in which she lays out in detail what the contributions have been.

Reserve ample time for the concluding chapter For the student the last chapter is low on the priority list. Tiredness will have set in at this stage. But writing a good conclusion and discussion chapter is both essential and challenging. It requires the student to reflect about the work done. Make sure to plan a couple of sessions to discuss these topics. The student should reserve sufficient time to complete this, as it needs time to sink in. Several iterations over drafts are typically required.

The PhD Ceremony

Solicit feedback on your own performance from the committee The committee meeting after the defense and before the laudatio is the ideal opportunity to get feedback from your peers on the quality of the work, and therefore also on your performance. Be open to points of criticism. You can view it as a quality assurance session, where you discuss, and sometimes reassess, your quality criteria for PhD theses. In the Dutch system of “pass/fail” judgements there are few other opportunities for this kind of discussion.

Be honest in your laudatio The laudatio is something that the student, family and friends will remember and talk about. Feel free to praise the student, but make sure you don't overdo it. You know the student well enough to point out a few points in time when things were not going optimal. As long as you do this in a constructive and gentle way, you will notice that these comments are sometimes appreciated even more than the positive ones, especially by the inner circle of the student.

And, finally, it is time to relax It is now time for a well-deserved drink, or two. But be aware: a drunk supervisor does not make a good impression at a PhD party.

Epilogue

It is a privilege for me to work with Bob and I feel a deep sense of gratitude for the fact that he has taken the time to bestow his lessons on me. The time at SWI changed my life: Bob, together with the people in the environment he created, helped me to transform from an ignorant medical student into a person with academic ambition. Bob, thanks for all that, and more.