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# HOW TO SUPERVISE (AND BE SUPERVISED) ON A RESEARCH DEGREE

*Tips and tools for supervisors and students*

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# Chapter 6:
# Starting to get results

## Building the picture

Take a step backwards. Perhaps the most confusing part of any research project is when some results start to emerge – but this is also one of the most exciting stages. There are three main reactions to the early arrival of research data; firstly, delight that results are finally coming through, as evidence that progress is being made; secondly anxiety that the 'correct' information is emerging; thirdly trepidation, if not outright confusion, in attempting to make some sense of the results. All of this happens in quick succession, perhaps even all at once! Hopefully, the cautionary approach to the main data-gathering phase, by way of a short pilot study, should at least give the research student some confidence that the right research questions were being asked. There may remain doubts that enough data has been gathered – enough interviews generated, enough experiments conducted, enough field investigations made –

but the answer to this question will only appear when the research study runs its full course. Despite the temptation to gather AS MUCH data as possible, the experienced supervisor will caution the research student about two hidden dangers that lie in the shallows. One is to remember that gathering the data is only the first part of the story, and the more data that is gathered the more there is to be recorded, collated, analysed, interpreted, archived, and all the other ancillary tasks that need to be accomplished in order to secure a robust research project. Secondly, is to recognise the obvious, but often neglected, reality that the quality of the data collected is much more important than the quantity. Gathering a huge mass of data is not much good if the wrong questions have been asked, if important considerations have been missed, or mistaken assumptions have been made at the earlier stages.

Assuming that the methodology is appropriate, and that the data-gathering methods were systematic, robust, and effective, then every researcher – whether engaged on a small project or a mammoth one – is faced with the same question. ‘So what does it all mean?’ There often comes a

natural limit when collecting research data – a point at which it becomes apparent that simply collecting more and more data is not going to substantially change the conclusions. A point is reached of diminishing returns on effort expended. At this point, the ‘So what?’ factor kicks in. It might be necessary to back-track and do some fine-tuning, perhaps to look at some small specific areas in greater detail, or to conduct some follow-up research to fill in some gaps. Perhaps there is a need to explore some ancillary research questions which are tangential to the main research question, but will hopefully provide a better context in which to consider it. Sometimes it helps to simply present the raw results, devoid of attempts at interpretation, to a few trusted colleagues such as supervisors, to obtain some feedback and get some reassurance on the question, ‘Do these findings make any sense?’ Or perhaps it is time to draw the data-gathering to a halt – even temporarily – and begin to re-assemble the results to piece together what pictures emerge. This is the time when simply getting all the research results down in a systematic, logical, readable form is the main task, and hopefully this will provide a new platform to analyse what the results actually mean.

## Reportage or commentary?

When the time comes to record the research results in writing, there are two basic choices, and the writer needs to decide upon one of them. Either the raw results are presented without embellishment, followed by a separate chapter on their analysis, or else the results can be presented alongside a running commentary or analysis. Both styles have merits and demerits and each academic discipline will have its own preferences and standards, so an important role of the supervisor is to coach the research student in the form that is conventional for that academic subject.

The straight presentation of results is a simple, clear, relatively uncomplicated option, which is subsequently followed by a chapter devoted to the analysis and interpretation of those results. Benefits of this style are that systematic links can be made with the research methodology, connecting the chronology of the data-gathering activities with the presentation of data that was gathered. This allows the reader to experience the research

process in a similar manner to the researcher, stepping from one ‘result’ to another and enabling the readers to form their own opinions and judgements as more and more information is presented. In the next chapter, the research student can then present an in-depth analysis of the results, drawing attention to key features, analysing the contrasts and connections, and finally presenting interpretations and conclusions of the research project. Separating the presentation of the results from the analysis section allows a clean break in the narrative and gives the researcher a good opportunity to expound in detail in the analysis and interpretation chapter to convincingly present their own, original ideas. This is the chapter where the student can really shine and unload all those brilliant insights and personal observations that have been suppressed during the earlier phases of the research.

The other format of presentation, the running commentary, is a different style altogether. This form will also reveal the results of the research activities stage-by-stage, but with each revelation there is an accompanying narrative which explains and contextualises those results. The text

commentary is used to build-up the research data and an accompanying analysis of its relevance to the research question. This is then developed in a step-by-step process to bring the research project to a conclusion. This format requires clear thinking, because it is easy to stumble around from one idea to another and produce a disorganised story which is neither sufficiently analytical nor convincing. When it is done well, it can read like a good detective story, gripping the readers and leading them onwards through the research discoveries to the final exposé of ‘the solution’ or ‘the answer’, but it does not suit every style of academic research. It can be a useful style when the writer wants to discuss and elaborate on the data as it is presented, perhaps to emphasise social nuances, or to consider the wider possibilities of experimental assumptions, or in situations where the interpretation of the results is not a straight black-or-white option.

Either style is acceptable, but they cannot really be effectively combined: the researcher needs to think carefully about the story that they want to leave with the

readers, and then present this version as clearly and unambiguously as possible.

## Timing and deadlines

As the student gets towards the end stages of creating the dissertation, it might seem odd to return to the issues of timing and deadlines, but this is a crucial period to study the demands of time. Many students go right to the wire with the time taken to produce a completed thesis for submission, indeed a great number of students go beyond their deadlines and end up trying to juggle the completion of their research with the demands of a new job and other important new responsibilities. That can be a very difficult situation and it is to be avoided if at all possible. In some cases the deadlines will be self-determined, so there may be no harm done if they slip a little. In many situations, however, there is a formal limit to the student's registration, so missing this deadline could prove disastrous. Normally, the students and the main supervisor need to indicate to the Graduate School of the university about three months in advance, that the student is preparing to submit the

dissertation manuscript on a certain date. This is to enable the university to set the wheels in motion to select internal and external examiners, to check their suitability to examine at this level of study, and to arrange the administrative details for the viva event. Up until this point, most work 'deadlines' were convenient milestones which were self-imposed to provide guidance and structure. The final submission date is a real deadline and needs to be treated seriously. It makes sense to work back from this agreed date-of-submission and plan the last few months of the PhD research like a military campaign.

Firstly, although getting the dissertation printed and loosely bound should only take a few hours, do not leave it to the last minute, because if anything unexpectedly goes wrong (e.g. the printer breaks) then the carefully choreographed timetable is shattered. Similarly, do not underestimate how long it will ***really*** take to get the ***exact*** wording for the final analytical chapter and conclusions, or for the inevitable few weeks that will need to be spent 'snagging' the final text. Apart from a final double-check on spelling and grammar, the captions of any illustrations will need to be cross-

checked, as well as making sure that the page numbering corresponds to details on the contents pages and that every reference cited in the text has been itemised correctly in the reference list at the end of the dissertation. Insufficient attention to the details of spelling and referencing is often what makes the difference between a clear pass and getting a condition of ‘minor revisions required’. All this will take more time than an optimistic student expects! It is critical that some extra time is built-in to any work plan in order to provide some slack for the likelihood of delays, deliberations, and minor disasters. The student will have spent so long in direct contact with the text that sometimes even the most obvious errors and omissions are not picked up until the very last moment. Five or six months before the anticipated submission date, sit down with the whole supervisory team and set a schedule of ‘soft’ (desirable) and ‘hard’ (i.e. not moveable) deadlines to punctuate a work-plan leading to the final submission of the manuscript. Be realistic, then stick to the plan and do not get side-tracked with interesting but fruitless tangents which distract from the main goals.

## Using statistics in research

A golden, unbreakable rule is, never use any statistics if you do not really understand what they mean! This might seem obvious, but it is surprising how frequently statistics get misused or misinterpreted to support an argument that actually has no real basis in fact. The famous saying that there are three types of lies – 'lies, damned lies, and statistics' is attributed to Prime Minister Disraeli, but when properly used, statistics can be clear, unequivocal, and very supportive in communicating complex data simply. The main problem(s) are often started by people deliberately selecting the information that they want to hear and then seeking statistical back-up which looks impressive and difficult to challenge. Secondary problems occur when people either do not properly understand what the real statistics are saying, or thirdly, when people choose to deliberately select or twist the statistical information which seems to support their preferred point of view. Ultimately, all three problem areas both devalue the use of statistics and also take us even further away from a clearer

understanding of the situation that we are trying to accurately interpret and communicate.

A good ‘rule of thumb’ is to stick to the simplest means of statistically expressing the results that you want to communicate. Percentages, pie-charts, and histograms might look fairly unadventurous if you are trying to impress an examiner, but they have the advantage that they are quick to produce, clear to interpret, and easy to understand. Fancy calculations may look more impressive, but they are frequently harder to produce, more difficult to fully understand, and have a greater chance of either the creator or the reader making errors of interpretation. A common error is to quote percentages rather than give simple numerical values for small population samples. If 7 out of 12 of your interviewees agree, say ‘7 out of 12 agree that…’ rather than ‘58.33%...’ A difference of 1 person immediately gives an 8% error and is clumsier. Keeping it simple gives both a truer impression of the data and an easier comparison with other results. Similarly, we have seen some very impressive and complex diagrams, complete with 3-D shading and vector trends, which actually do not

tell us very much at all because the detail is lost in the artistic flamboyance. They look fancy but add nothing to the discussion.

Quite often, certain disciplinary areas will have their own conventions as to which statistical procedures are common, or preferred, and how they are presented. The supervisors should be able to advise on these common standards, and the benefit is usually that the new research data can both make use of earlier research results and can be easily contrasted or compared with already published data in the discipline. Some statistical procedures can look complicated to calculate but are actually quite straightforward to use. All universities will have opportunities for research students to attend courses on statistical methods which are appropriate for different subject areas of research, so students should get their training early to avoid any subsequent false starts. There are lots of self-guided short courses on the web, and of course in text-books, but self-tuition is also open to misunderstanding, so it is always best, in the first exploration at least, to work through the procedure(s)

alongside someone who is already very familiar with the statistical technique(s). Bear in mind, contrary to some current political rhetoric, there are no ‘alternative facts’ simply facts that you acknowledge and facts that you might prefer to ignore. Research is about improving knowledge, not picking just the bits that you like.

## How to illustrate your results

When one of us was writing up his own PhD (in the antediluvian days before personal computers, desktop publishing software, or graphics packages!) he was given a very useful lesson by the professor who was supervising. In agonising about how good the hand-drawn graphs and maps needed to be, how precise the individual, hand-printed, stencil lettering needed to look, the supervisor said, rather drily, for that was his preferred style, that the PhD was ‘… training to be a geologist, not a draughtsman!’

From that response it was understood, correctly, that if the diagrams are clear and accurate enough to convey the key point(s) then a point of diminishing returns is quickly reached on the time spent labouring over them. There is no

need to produce a ‘work of art’ – it is about ‘communication’. The situation is slightly different now, for there are lots of clever software packages, in Excel and elsewhere, which can quickly produce lots of impressive diagrams that can be ‘cut-and-pasted’ into the text with minimal effort – but the two fundamental points remain the same. Firstly, if the initial data is weak and/or disorganised, then any resulting illustration is hardly worth the effort of trying to interpret with any degree of real meaning. As computer programmers are taught early – GIGO – (Garbage in, garbage out)! Secondly, a diagram (or a map, or a graph) needs to convey something meaningful. It is a visual expression of something that the author is trying to convey to the reader, so if this can be communicated clearly and simply, that is sufficient. There are far too many elaborate diagrams that are over-designed, and the result can appear so complicated that it is the diagram, rather than the results, that needs to be explained to the reader.

In some subjects, there are more-or-less standard conventions for diagrammatic representations, such as histograms, bar-charts, tolerance diagrams, or pie-charts. It

usually makes sense to abide by these conventions because it can help comparison with similar studies elsewhere. Usually, simple is best. Let the eloquence of the diagram communicate the data for you. Sometimes, particularly due to the speed and ease with which computer-generated diagrams can be generated, there can be a tendency to ‘graph every variable against every other variable’ in the hope that a stunning correlation is unexpectedly revealed. While this can happen, it is more likely that a blinding flash of the obvious is revealed, without contributing anything more than confusion to the current understanding of the topic. As with the use of statistics, it is always better if the author actually understands what they are trying to do before attempting the activity. It is too easy to drop into the text a ‘pretty photograph’ or a diagram of a rather obvious feature, without actually conveying much real information (e.g. a pie-chart of the male/female split of respondents; it is probably better just to give the numbers or the percentage figures).

In some cases, the use of a few clever diagrams, such as fishnet images of topography, or bar-chart information

superimposed on a map to show geographical abundance, can produce a stunningly visual interpretation, but these should be used sparingly. There are a few great infographic programs on the internet, but care needs to be taken in their use (not least because the manufacturers may reserve the rights to retain and re-use your raw data). While it is true that a (good) picture can say a thousand words, the tokenistic use of photographs, diagrams, or graphs can simply clutter up the main text, and require additional text to explain the image to the reader. A good illustration actually says something clearly and makes a positive contribution to help the reader understand the accompanying text and data.