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RESEARCH QUESTIONS

I think the material in this chapter is central in the training of research students, but also – with the exception of the section on hypotheses (see later) – not difficult to understand.

Hierarchy of concepts

I find it is worthwhile to spend quite a bit of time on this idea, making sure students fully understand it. I see it as very useful for such things as:

- organising the thinking and planning of a research project
- writing about the project, as in a proposal, and communicating about the project generally
- showing the role of important concepts of induction, deduction and levels of abstraction and connections between them.

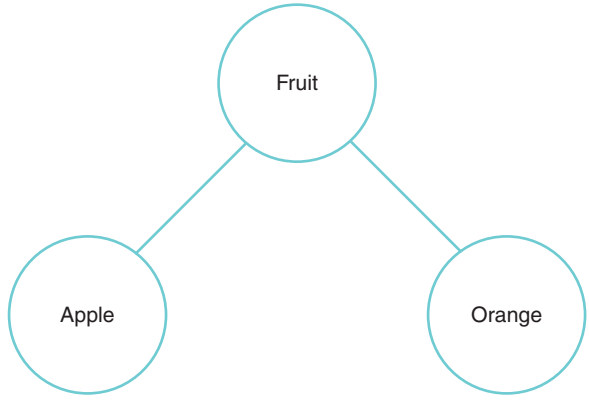
Projects may not necessarily develop in the orderly fashion implied by this hierarchy – that does not matter. Rather, presenting projects in these terms can be very useful. I have given the example of youth suicide in the book. It is worthwhile having other examples to discuss in class, and especially also to have students develop their own examples. When the latter is done, I find that three common problems often arise:

- Concepts appear at lower levels in the hierarchy which are not implied or foreshadowed by higher levels, so there is a 'logical disconnect'. Something new (usually a new variable or factor) has been introduced, which comes as a surprise, out of the blue. This requires returning to higher levels and reworking to make everything internally consistent. It usually means that there are more general research questions than were first thought.
- The distinction between general and specific research questions breaks down. Sometimes this can be rectified by more careful and logical reworking. But, at other times, the distinction just does not seem to fit, especially when a qualitative project is being developed. If this is the case, there is no need to force it – the distinction can be ignored (at least for the time being).
- Students often confuse research questions and data collection questions. Data collection questions are at the most specific level – they help in collecting the data necessary to answer the research questions, and are not themselves 'research questions'. Examples are interview questions and survey questionnaire questions. As such, they would very often not appear in a

proposal, because they need to be developed and this comes later. But they are another chance to stress the importance of logical connections across levels of abstraction.

Induction, deduction and levels of abstraction

There is often little recognition or understanding of these important concepts among beginning research students. If we start with the concept of levels of abstraction, induction and deduction can be shown to simply follow from it. As indicated in Chapter 2, I think it is very interesting how centrally important the concept of levels of abstraction is, but how little attention is devoted to it in the literature. Yet it can be explained very simply, as below:



Even little children can understand this easily, and have no trouble supplying the concept of 'fruit' at the higher level. We all do it, and very frequently, without even thinking about it – that is, we do it unproblematically. This suggests to me that this process of moving quickly across different levels of abstraction may somehow be hard-wired into our way of dealing with the world (see, for example, George Kelly's personal construct theory, 1955). However, it is worth unpacking (or decoding) even this simple example.

Apple and orange are at one level of abstraction (or specificity). Fruit is at a higher level. Put another way, apple and orange are specific examples of the more general category 'fruit'. Yet this simple and unproblematic operation is at the heart of how we do much quantitative research (as explained in Chapter 11) and inductive qualitative analysis (as explained in Chapter 8). In two places in the book (Chapter 9, p. 178 and Chapter 12, p.271), I have shown in a diagram the similarities between qualitative and qualitative research on this point. In my view, this concept of levels of abstraction is central to all empirical research (and, for that matter, to everyday personal and professional functioning).

One further point about this hierarchy of concepts: Very often it is not sufficiently understood by beginning researchers that research documents – proposals and reports,

including theses – have to be written and are later read (and, usually, assessed). Therefore, the clarity of presentation, in a stand-alone document, is all-important. If a researcher's ideas can be organised into this hierarchy (even if only partially), it makes communicating about the project so much easier. Specifically, it makes writing early stages of the proposal (and later, of the thesis) quite straightforward. Thus:

The area of the research is ...

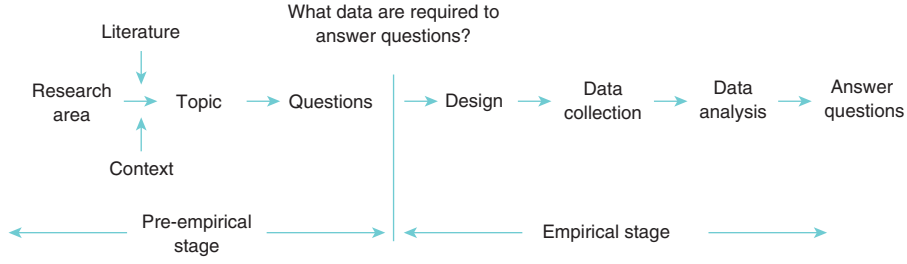
The topic is ...

The research questions are ...

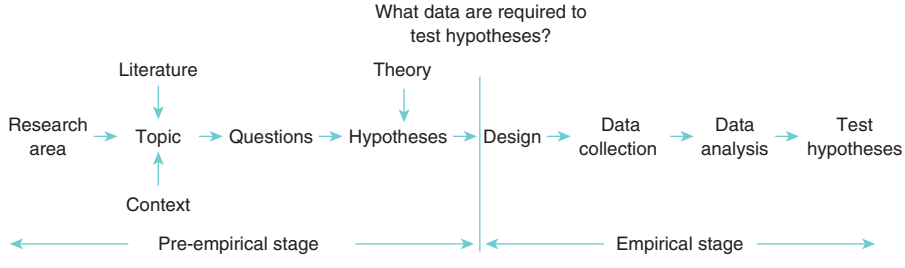
Just as important, and sometimes not understood by students: such a hierarchy makes it easier for readers to come quickly to an understanding of what this particular piece of research is about, and what it is trying to find out. And if there are tight logical links between area–topic–research questions, the reader is immediately re-assured about the internal consistency of the proposal or thesis. Such re-assurance is an important part of favourable assessments.

Developing research questions

I think what I have said in this section is fairly self-explanatory. The point I would stress here is that once we start asking, and re-asking, 'What are we trying to find



(a) Without hypotheses



(b) With hypotheses

Figure 4.1 Simpilified model of research

out?' – in other words, once we start thinking carefully about research questions for a topic (or in an area) – there are usually more (often many more) possibilities than we thought. In other words, the project expands, sometimes dramatically. I regard this as normal, though it often causes (understandable) anxiety for students. For a certain period of time, I think it is fine for the project to 'blow out' like this, though not indefinitely, of course. There soon comes a time when it is necessary to order and re-order the many questions that have emerged and to trim the project down to size.

I use the following diagram to illustrate this process:

Hypotheses

In some contexts, this section might be seen as somewhat esoteric and it can therefore be skipped. On the other hand, I think there is benefit to students understanding the classical hypothetico-deductive model of research, which used to be *the* way for social science research to be done. This still has repercussions in some places today.

I think we have moved well past the point where 'every proposal must have hypotheses', though I still hear this in some research forums. I have nothing against hypothesis-testing research. Some of the best research is done following this model. But I am strongly against the view that *all* research should be hypothesis-testing research. And I am also against the misuse of hypotheses (or at least their use when their function is not understood).

The first thing to get clear is what hypothesis-testing research really is, and the connection between hypotheses and theory. I deliberately ignore the long and complex definitions of hypotheses which can be found in some philosophy of science literature, because I have found that these can confuse students more than they enlighten them. Instead, I begin by defining a hypothesis simply as a predicted answer to a (research) question. I use the examples of gravity and the weather thus:

Gravity: Holding a pen or pencil, I ask what will happen if I remove my fingers from the pencil (question). The predicted answer is of course that it will fall to the floor (hypothesis). The next question is the crucial one: Why do we predict this? There are two possible types of answer to this question: (1) *Because every other time I have done this, the pencil falls*. True enough, but it does not help us understand why this happens. We have no explanation; (2) *Because of gravity, by which larger bodies attract smaller bodies* … and so on, and the theory of gravity is sketched. Now we can understand why the pencil falls. In other words, we can make the prediction that it will fall and we can explain the prediction (thus showing that explanation and prediction are two sides of the same coin in the structure of scientific knowledge). Notice that we now have an if-then propositional structure:

IF the theory of gravity is true, THEN it follows that the pencil will fall to the floor. I use this diagram, as shown above.

If (theory) then (hypothesis).....

Weather: I ask if it will rain in (say) Perth, WA tomorrow (question). Students give me their answer (prediction). Again, the crucial question is: Why do we predict this? Now we ignore the first possible type of answer (*Because it rained/did not rain yesterday*, or something similar) and go straight to theory: *Because there is a high pressure system sitting over the Great Australian Bight, and the winds will be coming from the east, therefore travelling across land, therefore not moisture bearing*, and so on. (Some students know a great deal more meteorology than I do!). *If* this theory is true, *then* it follows that there is a very low probability of rain in Perth tomorrow. So, again, we have the if-then structure between theory and hypothesis. If the theory about the weather is true, it follows that there is unlikely to be rain tomorrow.

Because of the if-then structure, both examples illustrate the point that a theory cannot be proved by empirical research, only disproved. We cannot, in other words, prove the 'if' part (the theory) by confirming the 'then' part (the hypothesis). This is the logical fallacy of 'affirming the consequent', which can be written by logicians as:

If X then Y

$Y \not\Rightarrow X$

Not Y $\not\Rightarrow$ X

I illustrate this with the example of chocolate. Consider testing and trying to prove this proposition:

If this is chocolate, then it will taste nice.

Now imagine we say to someone: 'Close your eyes and put out your tongue'; then we place something on their tongue; then we ask, 'Does that taste nice?' The answer given is 'Yes'. Does this enable us to conclude (or prove) that it is chocolate? Obviously not – it could be one of any number of things that taste nice.

So we cannot prove the 'if' part by confirming the 'then' part. And this is ultimately why we cannot prove theories, only confirm them. All is not lost, however. Take the same proposition: If this is chocolate, then it will taste nice. Now go through the same routine – eyes closed, tongue out, etc. Does that taste nice? If the answer is 'no', we have proved that it is NOT chocolate.

So while we cannot prove a theory this way, we can definitely disprove a theory. This is why it is often said that the scientific method works on disproof.

The point of all this is to show the connections between hypotheses and theories. In hypothetico-deductive research, hypotheses are deduced from the theory which explains them, and are then tested empirically. Thus, hypothesis-testing research is really theory-testing research – this is how scientific knowledge is built. It follows that there is no point in having hypotheses just for the sake of having hypotheses. If we hypothesise, we should identify the theory which explains the prediction. If we cannot do this, it seems to me to be better left at the level of research questions, rather than us bothering with the business of prediction, because the empirical operations we carry out are the same whether we are answering questions

or testing predictions. The simple questioning sequence shown in this section can help us sort these things out.

(I have found that when students are adamant that they want to make predictions, it is usually because they have a 'theory' in mind – that is, they can 'explain' their prediction, though usually imperfectly. The interesting and rewarding thing then is to tease out and examine their explanation. This invariably results in a better and more complete study.)

Figure 4.1 shows that the model of research with hypotheses is the same model as that without hypotheses, with the exception of the inclusion of hypotheses and theories

The role of the literature

I'm sure everyone is familiar with the view that the literature is reviewed before research questions are identified, and before the project itself is designed and carried out. Indeed, in this model of research, reviewing the literature is part of the process of developing research questions. I have no problem with this sequence of events in developing a research project.

Once again, I only have a problem with the view that *all* research should proceed this way. While many projects can and should proceed this way, I think there are some situations where this is not the best way to proceed. Two such situations are:

Professional doctorate projects: I often find that when professionals in different fields return to university for higher degree work (as in professional doctorates), they want to investigate interesting and important professional questions. But they also have a lot of 'experiential knowledge' highly relevant to the research they are planning. I think it is important that we don't ignore (or devalue) such knowledge – on the contrary, we should get such knowledge out on the table and see how it could be used in framing the research questions and guiding the study. A slavish devotion to reviewing the literature before planning the research can work against this – and can often lead the student to devalue experiential knowledge. We should use common sense and judgement in dealing with such matters.

Grounded theory (GT): 'Classical' GT studies will often (perhaps usually) defer reviewing the literature until some empirical work has been done and some theoretical stability has emerged in the analysis of data already collected. Then the literature itself will be consulted and treated as further data. The logic behind this is clear. We want concepts (the building blocks of theory) to emerge from the data, to be grounded in the data, not brought to the data. If we go too early to the literature, it is easy to be influenced by concepts in the literature, which are then 'brought to' the data.

These are not the only two types of situations. The implication is that it is a matter of judgement how and when the literature is dealt with in each research situation. In other words, situations need to be judged on their merits. Here, as in so many other aspects of research, a 'formula-like' approach is not appropriate. Common

sense should prevail and common sense is usually enough to deal with this issue, project by project.

One caveat: Sometimes students hear me make these points about the literature (such as in discussing and describing GT research), and they are attracted to this way of doing things because it means 'I don't have to review the literature'. Wrong! The issue is not whether the researcher needs to be familiar with the relevant literature or not. He/she always does. Mastery of the relevant literature is a non-negotiable requirement of higher degree research. The issue is when and how to deal with the literature in a particular project and, later on, how to demonstrate the required mastery in a thesis or dissertation.