WORKSHEET 2.1

Proposal Function Review

What Are Expectations for My Proposal?

For the type(s) of study you expect to propose for your dissertation, describe the extent to which your proposal will be expected to serve each of the functions identified. It may be helpful to consult faculty advisors, more senior dissertation students, and prior local dissertation proposals.

To What Extent Will My Proposal Need To . . . ?
Provide an argument for justifying my study?
Include a work plan?
Provide evidence of my ability to do the study?
Serve as a request for commitment to work with me?
Serve as a contract for how my study is to be conducted?
Be used later to judge the quality of my dissertation work?
Serve as a partial draft of my final dissertation report?

CHAPTER 3

The Proposal as a Chain of Reasoning

CHAPTER CONTENTS

THE PROPOSAL AS A CHAIN OF REASONING

As noted in the previous chapter, not all studies produce findings involving a generalization; some simply describe, leaving the range of application to be supplied by the reader.[1] But, as we will describe in this section, those studies that do seek to generalize, whether the generality is found by prespecified or emergent means, *present their findings as a chain of reasoning*. If the study is prespecified, the initial links of the chain will be developed in the proposal. If the study is emergent, then building as much of the chain as is feasible at the study's outset provides the strongest proposal.

Let us carry this point a bit further. The end goal of research that produces or supports a generalization is the development of a carefully constructed chain of reasoning. Both the write-up of the proposal and the dissertation itself follow a logical, deductive sequence of presentation. The process of doing research, especially in the case of prespecified studies, often follows a similar sequence.

1. Some qualitative research, such as Whyte's *Street Corner Society* (1993), results more in description of situations than in generalizations about them. Though the proposal for such a study may be written deductively, the dissertation is not.

But it also may not, and in that instance the process is reconstructed as a logical sequence in the write-up. Even though the logic involved in developing generalizations from emergent studies is inductive rather than deductive (as is most apparent in exploratory research), *research reports presenting findings supportive of a generalization* do so deductively as a chain of reasoning.

The basic logic underlying the chain of reasoning not only applies to studies seeking generalizable findings, but may also be interpreted so as to apply to the developmental and problem-solving efforts described in the previous chapter as local application studies. For example, the production of a new measuring instrument or curriculum, the solving of a local problem, and conducting an evaluation all follow a series of steps comparable to those involved in studies seeking generalizations. Let us first examine how the chain of reasoning applies in the latter case, and we will then take up the former.

THE CHAIN OF REASONING IN STUDIES WITH GENERALIZABLE FINDINGS

Our most beneficial research studies provide results that are generalizable beyond the context in which they were carried out. Figure 3.1 represents the logic underlying the write-up of such studies as a chain of reasoning analogous to a metal chain. Each of the links in the chain successively develops a logical path from the onset of the study to the presentation of findings. This is described in the discussion of each of the links in the following section. It also shows the value of the metal chain analogy. The chain of reasoning logic also underlies the research proposal.

The Links in the Chain

In the presentation of new findings, as well as in beginning to do a study, one usually links back to what was already known about the phenomenon in terms of published work or experience. Thus, the first link in the chain is *Links to Previous Research.* It shows how the idea for this study arose out of this background.

How much background on the intended study already exists determines the nature of the next link, *Explanation, Rationale, Theory, or Point of View.* With little prior knowledge or experience, it leads to a rationale for doing the study and perhaps a point of view about what to study. With more background, one may have an explanation of a phenomenon; with still more, perhaps a theory about a process.

The specificity of the prior link determines the *Questions, Hypotheses, Models* link. With little background, one may pose a *question* describing the initial focus of attention for the study. With an explanation, one may be able to make a prediction that is presented as a *hypothesis.* If there is extensive prior research so the underlying causative variables may be fathomed, this leads to a model indicating the interrelation of the variables in a process. The study would then seek data to test that *model.*

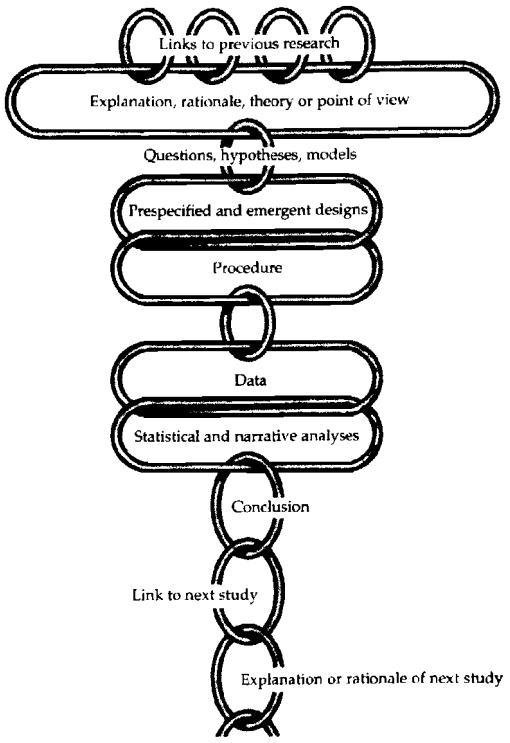

Figure 3.1. The chain of reasoning in the presentation of findings (adapted from Krathwohl, 1998/2004 with suggestions from John T. Behrens).

The question, hypothesis, or model forms the basis for the *Prespecified and emergent designs* of the study, the next link. With little prior knowledge, an emergent design is usually indicated; you don't know where the "handles" are on the phenomena. The more that is known about the phenomena, the more certainty you can preplan the study. Whereas beginning with a question most likely leads to an emergent study, starting with a hypothesis or model leads to a prespecified study. Some studies begin in an emergent mode, and as more is learned a planned study becomes possible.

Just as the question, hypothesis, or model translates into the choice of emergent or prespecified design, the latter choice determines the *Procedure.* The procedure spells out the who, where, what, when, and how of the study. In an emergent study it will tell who will be studied, what will be the focus, when and how it will be done, etc. In a prespecified study, the nature of a treatment or

intervention, the measures of effect, the pattern of treatment and measurement, etc., are decided upon and the details specified of when, how, where, etc., the observations, interviews, measures, treatments, etc., will take place. The link tying *Procedure* to *Data* is detailed below.

Carrying out the design leads to gathering *Data*, the next link. For example, the scores on measures, the observation notes, the recordings or transcripts of interviews, and the results of surveys are the data.

In both emergent and prespecified studies, the data are usually voluminous, more than can be grasped by just looking at them. This requires data reduction using the methods of *Statistical and Narrative Analyses*, the next link. Narrative analysis usually involves finding the significant themes in the observation notes, interviews or documents; statistical analysis, descriptive summary statistics, relationship and pattern-seeking statistics and displays, and singling out findings unlikely to have resulted from chance.

The results of these analyses are summarized in a final section of the report, the *Conclusion*. These conclusions are read by other researchers and lead in turn to continuing the chain of reasoning as these findings are built on by new research. This is indicated in the last two links of the chain, which, although not part of the study report, show each study as part of the continuing research process.

Details of the Links from Procedure to Data

Figure 3.2 provides a more detailed look at the link between *Procedure* and *Data* in the chain. It reveals that instead of a single link, it has been split in order to describe the who, where, what, how, and when of the procedure.[2]

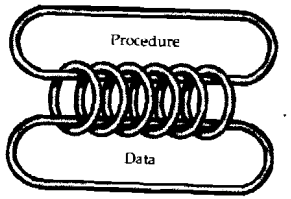

Figure 3.2. Detail of the connections between the *Procedure* and *Data* links.

Figure 3.3 spreads these links out to bridge across the *Procedure* and *Data* links and labels them to indicate the who, where, what, how, and when of procedure that must be described.

More specifically, these six links are:

2. Rudyard Kipling's little ditty usefully describes the elements to describe: "I keep six honest serving men, / They taught me all I knew, / Their names are What and Why and When / And How and Where and Who." We covered *Why* in the *Explanation, rationale* link. The others are covered in *Procedure*.

1. *Who*, the *Participants*—these are all the persons selected for the study or present in the situation being observed.
2. *Where*, the *Situation*—this is the situation and context in which the experiment is carried out, that in which observation is done, that interviewing takes place, etc.
3. *What*, the *Focus(es) of Action*—that is, for experimental research, the independent variable, treatment or experimental variable(s) (cause), the dependent variable (effect), and any control variables (e.g., measures of ability where one wants to rule it out as an alternative cause). For qualitative and nonexperimental research, it is those processes and activities that are the focus of attention.

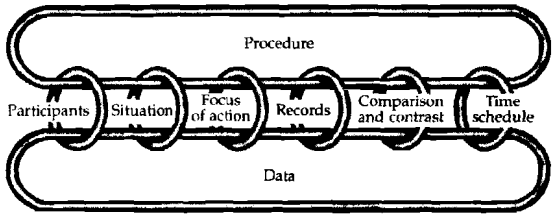

Figure 3.3. The connections in the chain of reasoning between the *Procedure* and *Data* links.

4. Also a *What*, the *Records* from (3) above—these are the data resulting from observations or measures, the field notes and the answers to tests, questionnaires, etc. The latter are scored and interpreted at the next stage.
5. *How*, the *Comparison or Contrast*—in experimental research, that which forms the basis for sensing that the treatment or experimental variable had some effect, or, in nonexperimental research, how things changed as the process or activity continued.
6. And *When*, the *Time Schedule*—when things are done, such as what observations are made, when, where, and of whom, and, if there are measures and treatments, how, where, when, and to whom they were administered.

For example, consider Rowe's (1974) hypothesis. She hypothesized that after posing a question to the class, increasing the amount of time the teacher typically waits before calling on a student would improve the nature of classroom discourse. She found a normal "wait-time" of one second on average could be increased to three to five by training. The six rings translated the above general hypothesis in these ways:

- The *Participants* were the teachers and students in the classrooms where this effect was demonstrated.

- The *Situation* and context were those found in the classrooms. In this instance, as in many, the choice of the "participants and/or informants" determined the "situation."
- The *Focuses of Action* were the treatment, the teacher's increase in "wait-time" (cause), and the change in the students' responses to the treatment (effect). To attain control for variations in what was meant by "delayed wait-time" that might result from embarrassment or discomfort, training of the teachers ensured the "treatment" was administered uniformly and as intended.
- *Records* included measures of effect such as recordings of classroom discourse to determine who talked and what kind of teacher-pupil interchange took place. There were also pre- and posttraining measures of the teacher's wait-time to show that it actually increased.
- The *Comparison and Contrast* involved contrasting measures of both wait-time and classroom discourse prior to teacher training with those after wait-time training.
- Finally, *Time Schedule* involved a procedural plan indicating when and where the training would take place and of whom, and when, and of what, observations would be made.

Were this Rowe's dissertation, her proposal would have provided detail on the links of the chain of reasoning model from the previous literature at the top, down through the six rings of the "procedure" links in Figures 3.1 and 3.3. In addition, it would have included a general description of the data that would be gathered and the methods of analysis of the data.

Rowe's data showed that higher-level thinking appeared in the answers following longer wait-times as well as other positive changes. Note that in figure 3.1 and the next figure, 3.4, Rowe's findings, in turn, link to the beginning of subsequent studies when researchers used her findings to build their studies' chains of reasoning. (To determine the extent to which this occurred, one would look up "Rowe, Mary Budd," in the *Social Science Citation Index*.)

The complete chain of reasoning with the labels attached to the connections between *Procedure* and *Data* is shown in Figure 3.4. This figure may be useful for you to refer to as you read the rest of this book.

FOUR USEFUL CHARACTERISTICS OF THE CHAIN ANALOGY

The chain analogy is useful because many characteristics of a metal chain carry over to research chains of reasoning (Krathwohl, 1998/2004). For example, it is an old truism that a metal chain is only as strong as its weakest link. Similarly, *a research proposal's logical chain of reasoning is only as strong as its weakest link.* If one of the links in the chain is weak—for example, if training is omitted from the

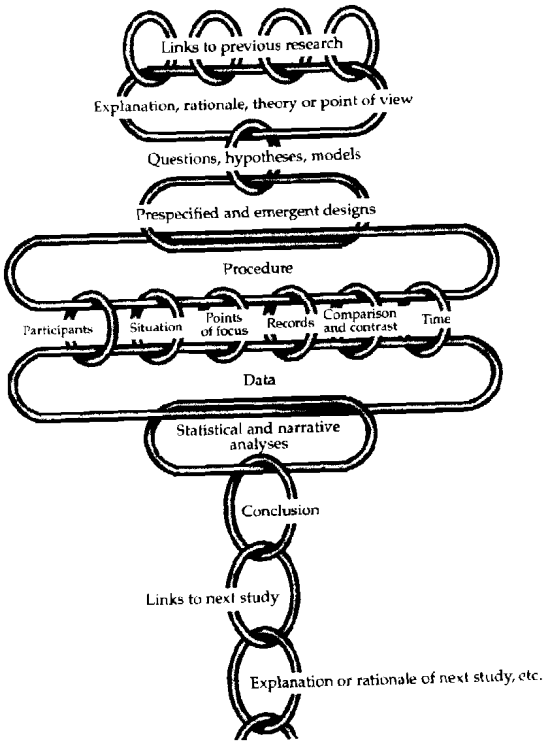

Figure 3.4. The complete chain of reasoning with all the labels (adapted from Krathwohl, 1998/2004 with suggestions from John T. Behrens).

proposal so the teachers do not increase their wait-time—then you can hardly attribute any change to the treatment. Like a metal chain, the research argument is only as strong as the weakest part of it.

A second feature of the analogy, and a corollary of the first, is that each link in the chain should have the same strength. It would make little sense to have one link in a metal chain as thick as that for a ship's anchor and others as thin as sewing thread. Similarly, in planning a project, for the most efficient use of your resources, *each of the links should be the same strength as the others.* Why spend resources refining measures of the effect of a treatment to great sensitivity when resources to ensure that the treatment itself is administered as it should be are not allocated? You should allocate resources to the various links in the chain of reasoning so that each level in the chain can appropriately support the argument.

A third aspect is that just as a chain picks up the load at the beginning and successively transfers it to each link, thereby determining the nature of each

successive link in terms of the load it has to carry, the same occurs in the chain of reasoning. *Each link in the chain determines the nature of the next link.* This aspect became apparent as the chain was described: past research leads to the present explanation, that explanation to a hypothesis, question, or model that determines the choice of design that is translated into procedure, and so on.

A final feature of a metal chain is that at any point in the chain where several horizontal links across the chain's breadth serve jointly to connect the links above and below them, each of the horizontal links shares the load. In the research chain of reasoning, this occurs as shown in Figures 3.2 and 3.3 between *Procedure* and *Data.* In a metal chain, where links share the load, one of them may be made stronger in order to compensate for weakness in another in order to carry the load from the levels above to the levels below them. In the same way, *one of the links connecting Procedure and Data may be strengthened to compensate for another facet that is weak.* For instance, assume the "wait-time" effect, even with training, is so small it is hard to notice the change—a thin, weak " comparison and contrast" link. You may compensate by strengthening any or all of several of the other design links. For example, you could strengthen the *Participants* link by both increasing the size of the sample and using especially bright students who are likely to be particularly responsive to the treatment. You could strengthen the *Records* link by using tests or observations especially designed to catch the small changes that are expected to occur. Thus, various design trade-offs can be made to achieve the strongest overall chain, each of these horizontal links compensating for one another.

RELATION OF THE CHAIN ANALOGY TO THE PROPOSAL

As noted in the Rowe example, the report of the study follows the chain of reasoning, and to the extent possible, the proposal should as well. Insofar as the nature of the study can be anticipated before beginning the actual dissertation data collection, the proposal encompasses all of the upper part of Figure 3.4 through the six horizontal rings of the study's procedure. To the extent possible in anticipation of what is expected to occur, it usually also describes the data that will be collected and the process of analysis to be used. The relations of the successive links described above and shown graphically in Figure 3.4 should be reflected in the preparation of the proposal. The problem statement should be built so that the project's hypotheses, questions, or models flow logically from it. The statement of objectives and method of attack should build upon and move beyond the review of past research, showing how this study will add to prior accomplishments, and remedy past failures. These, in turn, will suggest the population and sample and the rest of the research design. The kind of data gathered will determine what analysis, statistical or narrative, is appropriate.

All research studies presenting the case for a generalization are logical

chains of reasoning. A strong proposal intended to demonstrate or validate such a generalization reflects this chain by the plan of its structure, by its internal logical consistency, and by the appropriate development of each section. Each section reflects the previous material and carries it a step further in a consistent way. Study details are not overlooked: objectives are not slighted, plans for data collection are not included in the analysis section of the plan, and the like. Resources are properly allocated to strengthen weak aspects, and design trade-offs are appropriately made.

The idea of a proposal as a chain of reasoning underlies the advice given in the next two parts of the book. Part 2 provides general advice about how to develop the core proposal components of the problem statement and method statement. Part 3 deals with adapting the core proposal to fit particular types of inquiry approaches. So both parts should be consulted, part 2 in its entirety and such chapters of part 3 as seem relevant to what you plan to do.

THE CHAIN OF REASONING IN DEVELOPMENT AND PROBLEM-SOLVING STUDIES

Earlier, we noted that the chain of reasoning analogy usefully applies as well to local application studies, whether development studies such as those creating a product (e.g., an instrument or curriculum) or problem-solving studies such as performing an evaluation or conducting a cost analysis. When such studies are described in a formal report, they also follow a chain of reasoning sequence, and the chain analogy, together with its applicable properties (strong as its weakest link, etc.), also applies. The interpretation of each of the steps in the conceptualized chain, however, must be adjusted to fit the context—development or problem solving—of the study. Table 3.1 suggests for each of the links in the chain how it may be interpreted for development and problem-solving studies. In some instances, entries are examples of what would represent that link in a particular kind of study.

Most of the entries in the table are self-explanatory, but a word might be said about the data and analysis steps and formative and summative evaluation. What occurs at these steps depends on how quickly you complete the development or problem-solving process, succeeding on the first attempt or requiring several trials. If a prototype or trial, at the data link, you may seek diagnostic information intended to help learn how the product, intervention, or process can be improved. Since you are seeking diagnostic capability, the instruments or measures used may be different from those used once past this stage. And if the data indicate improvement is needed or possible, you may then cycle back through the earlier stages. How far back depends on whether you must start from scratch or are on the right track and satisfaction lies in adjustment. If the evaluation of the prototype or trial yields data that look as though only a bit of tweaking is needed, or if it has been developed as far as you

TABLE 3.1

The Chain of Reasoning in Development and Problem Solving Studies

	How Successive Links in the Chain May Be:	
Links in the Chain	**Interpreted for Development Studies**	**Interpreted for Problem Solving Studies**
Links to previous studies	Lessons learned in previous, similar studies	Analysis of strengths and weaknesses of previous solutions or alternative processes
Explanation, rationale, theory, or point of view	Problem solving rationale, development models	Intervention strategies, diffusion theory, cost-analysis models
Questions, hypothesis, models	Criteria which product must meet	Criteria which solution or process must satisfy
Planned and/or emergent design	Plan for product development	Plan for development of solution or application of process
Procedure		
Participants	Persons used in tryouts	Defined by locale of problem
Situation	Defined by location of persons used in tryouts	Defined by locale of problem
Focus of action	Variables involved in development of product	Variables involved in solution or process
Records	Measures or instruments used to evaluate product	Measures or instruments used to evaluate solution or process
Comparison and contrast	Basis used to determine improvement	Basis used to determine improvement or success of process
Time schedule	Procedural steps involved in developing product and its evaluation	Procedural steps involved in solution or in process and evaluation of outcomes
Data	Prototype product and formative evaluation Or Product and summative evaluation	Trial intervention or process and formative evaluation Or Implementation of intervention or process and summative evaluation data
Statistical and narrative analysis	Analyses appropriate to data gathered	Analyses appropriate to data gathered
Conclusion	Description of product, its uses, advantages, weaknesses, and limitations	Description of solution or process, other possible uses, advantages and weaknesses

intend to take it, or you are satisfied, then you proceed to the summative evaluation. It leads to the conclusion and wrap-up of the project.

A variation for problem-solving studies should be noted. Once you have solved a problem at the local level, even though that is all you intended at the outset, you may realize that the solution or process has more general implications. This may result in cycling back to the design and procedure links of the chain and making new choices in the six aspects of procedure. This would allow you to determine how well the intervention or process works in other situations, with other persons—whether, as they say, "it has legs" and is generalizable.

Worksheet 3.1: Chain of Reasoning Analysis is provided here to give you practice in analyzing how well a dissertation proposal builds a chain of reasoning. Use Worksheet 3.1 to review the chain of reasoning in chapter 11, one of the annotated proposals included in this book. Then, once you have a draft of your own proposal, come back to this worksheet to review the strength of its chain of reasoning so you can make the most convincing case for conducting your study.

WORKSHEET 3.1

Chain of Reasoning Analysis

How Strong Is My Proposal's Chain of Reasoning?

In reviewing your proposal's argument for the study proposed, first describe each element in the proposal's chain of reasoning, and then review its strengths, weaknesses, ways to correct those weaknesses, and, finally, how well it follows from prior elements and contributes to subsequent elements in building a convincing overall argument.

Chain of Reasoning Levels	Description (Comprehensive? Concise? Convincing?)	Strengths?	Weaknesses?	Ways to Correct for Weaknesses?	Follows Well From Prior Links?	Leads Well to Following Links?
Links to Previous Studies, etc.						
Explanation, Rationale, Theory, Point of View						
Question, Hypothesis, Model,						
Prespecified or Emergent Design						
Procedures *Participants* *Strategies* *Points of Focus* *Records* *Comparison & Contrast* *Time Schedule*						
Data Yield						
Statistical & Narrative Analysis						
Conclusion						

PART TWO

Advice Common to Most Proposals

This part gets down to the nuts and bolts of writing a proposal and making it hold together as a logically integrated chain of reasoning (the chain of reasoning analogy was described in the previous chapter; pick it up if you missed it). Although it gives advice that will apply to most proposals, the advice is described in terms that may make it appear to apply primarily to prespecified proposals (the prespecified/emergent distinction is described in chapter 2; go back and pick it up too if you missed it). This is necessary in order to make it specific enough to be helpful. But wherever advice for an emergent or qualitative dissertation would differ from the advice given, that is noted in this part's chapters and then is further developed in appropriate sections of part 3. Part 2 consists of three chapters that cover successive sections of the proposal, the four topmost rings of the chain of reasoning.

Chapter 4 describes how to present the problem and foreshadows the rest of the proposal. It shows how the review of literature develops and refines the problem statement as well as suggesting appropriate refinements in method. The refined problem statement leads to a question, hypothesis, or model, depending on how advanced the state of knowledge is in the area being studied, or leads to a more detailed description of the phenomenon to be focused upon, in the case of emergent studies.

Chapter 5 describes how to present your research method or process in sufficient detail that gatekeepers will be comfortable in approving the proposal as a basis for proceeding with the dissertation.

Chapter 6 describes what kind of additional evidence may be helpful in presenting your case and how this may be marshaled so as to be convincing to gatekeepers.

CHAPTER 4

The Description of the Problem

CHAPTER CONTENTS

Your first task is to describe your problem in terms so enticing as to make the reviewer eager to examine the rest of your proposal. This job falls especially to the introduction and initial problem statement, but is shared with two other sections described in this chapter, the literature review and the questions, hypotheses, and models sections. The introductory section typically develops understanding of the problem by describing its significance in relation to the large, important problems already of concern to the reviewer and by showing the problem in the perspective of the field in which it is embedded.

This leads into a section on related research (the literature review), which further develops problem understanding and appreciation by showing specifi-

cally how the problem is solidly grounded in the previous work of the field and how this project will take a significant step beyond what has already been done.

This makes it possible at the end of the literature review for the problem to be restated in a more precise and detailed fashion with greater understanding. And from that problem statement are teased the research questions, hypotheses of the project, or, if enough is known of the causal factors, a model of how the phenomenon occurs. These are stated in such a way that their translation into project procedure, the topic of the next chapter, is natural and easy.

But first, there is the matter of choosing a topic, a matter that could consume the rest of the book. Instead, we begin the chapter by noting one of the most difficult aspects of selecting a research topic—balancing the trade-offs between the importance of the problem chosen and the feasibility of effectively addressing it.

THE PROBLEM OF THE PROBLEM

The problem of balancing problem importance with dissertation is nicely illustrated in Kathy Beissner's proposal.

> The topic in the dissertation proposal by Kathy Beissner, which is reproduced beginning in chapter 12, is a study of the *Effectiveness of Concept Mapping in Improving Problem Solving*. In many ways, her choice of this topic is typical of the way such dissertation decisions are made. Undoubtedly, Kathy had a personal interest in this topic, an "itch to scratch." Since the improvement of problem solving is central to the work she does as a trainer of physical therapists, why not tackle it in her doctoral dissertation? One must give her credit for undertaking a difficult problem central to her work. Further, where researchers so often work on abstract problems primarily of interest to other researchers, Kathy's problem is for those on the therapist-training front line.
>
> Now comes the "but." An individual's problem-solving skill is developed over a lifetime; in the case of Kathy's students, over the past eighteen to nineteen years. Her intervention, by the constraints on her own time and resources, must be comparatively small. Eisner (1984) noted that the length of the experimental interventions reported in the 1981 *American Educational Research Journal* averaged only seventy-two minutes. We might expect Kathy's intervention to be of similar length or perhaps a bit longer. But this is an infinitesimally small amount of time in comparison with that involved in the habits built into problem solving over years of school. From just the title, we don't yet know the length or the exact nature of the intervention. But Kathy has already set the problem in such a broad context—a common tendency for graduate students—that it presents difficulties in designing a study sufficiently sensitive to show any effect at all, let alone one that would have any practical significance in training physical therapists.
>
> Kathy's choice reflects the trade-offs both the graduate student and her faculty face: how does she define a topic with enough "bite" to be satisfying and interesting, to be more than an exercise by having practical ramifications, to keep within the scope of her own skills and resources, and to avoid areas where even top researchers have not yet found a satisfactory approach? Kathy has chosen to err on the side of possible practical significance—assuming that even a small intervention effect could later be developed into something worthwhile. Her faculty chair and committee, in approving this proposal, apparently decided they could live with this choice as well.

Each doctoral student must balance these trade-offs: finding a problem within his competencies with a reasonable and feasible approach, yet significant enough that he is not just content to work on it, but sufficiently committed to follow it through to the end. Then he must convince his committee of this choice as well. As we noted earlier, if you are still uncertain about your dissertation topic, consult appropriate readings, such as chapter 5, "Finding a Problem," in Krathwohl (1998/2004). Use Worksheet 4.1: Characteristics of a Good Dissertation Topic at the end of this chapter to review how strong your current topic is.

PROBLEM STATEMENT

First impressions are important! The sentences with which you open suggest to the reader whether this proposal will be creative and interesting or just routine. Come back after you have a complete draft and rework your opening so that it invites the reviewer to read further. Because your initial problem description is so important, we provide the following eight guidelines to help you create a focused and effective opening statement.

Show the problem's importance. The opening statement should convince the reviewer that the project is important. For example:

> Just as overseas adaptations of the United States' social-psychological discoveries have contributed to their industrial success, so our failure to use that knowledge has compounded our problems in competing with foreign goods. This project seeks modifications in the use of this knowledge that will be effective in our culture. The reason I think this is possible is . . .

or

> A universal problem at federal, state, and local levels is ensuring that funds intended for a program are used to enhance it rather than merely substituted for program funds already allocated. Accountants are extremely resourceful at moving money around to defeat legislative provisions intended to ensure enhancement. This project will search for successful legislative practices, both here and abroad, that accountants haven't been able to defeat.

Contrast these brief examples with the opening statements in Warters's paragraph 1 in chapter 11, which gets to the problem in the third sentence. But

even Warters could be sharpened; consider this alternative first sentence: "If therapists who treat men who batter their wives view their problem differently from the batterers themselves, clearly the effectiveness of treatment is likely to be affected."

Show the problem in the perspective of the larger field in which it is embedded—management practices as a part of our lagging in international economic competition, accounting procedures as a facet of making government intervention effective. Warters does this in his tenth paragraph.

Show the problem's generality. Although the dissertation's place in the graduate program has become that of a learning experience, it was originally conceived that it should be a contribution to knowledge. And many dissertations still are. If you think yours is or could be, indicate the generality of the problem and the generalizability of the research. A good way of doing this is to point to the project's contribution to theory and to knowledge of the phenomenon. Indicate how the project builds on previous theory or contributes new aspects. Relate it to the large, important problems of the field. If you can, describe the value of some concrete applications of the knowledge as well as the potential importance of these applications.

Note, however, that a generalizable project does not necessarily require a national sample. The sample's characteristics must be known, however, in order to show how and to whom the findings might be transferred. Similarly, the research situation must have enough characteristics in common with other situations that locations to which the findings might transfer can be recognized.

Look at Warters' statement of significance beginning with paragraph 2 as an example of how one embeds the problem in a larger context and shows the generality of the problem.

Limit the problem. Learning to focus a study is a skill. Novices often believe that only by encompassing large pieces of a problem can they avoid triviality. Doctoral dissertation proposals are often rejected three or four times as the project is successively reduced in scope; yet it is only by focusing on the manageable, on the critically important aspects of problems, that progress can be made.

Don't dwell on the obvious. One of us recently read a proposal that used its first eight pages to convince the reader that research in the field was necessary. If the reader were not already aware of this, he would not have been asked to be a reviewer or should not have agreed to be when asked. Assume your reader's interest in research in the area.

Find the balance between completeness and brevity. Some researchers are too brief, taking too much for granted concerning the reviewer's knowledge of the topic (e.g., knowledge of the job market for technicians in a technician employment survey). Conversely, one may make this initial problem statement extra

long on the assumption that if one sells the reviewer on the importance of the project, flaws in the remainder of the proposal may be overlooked in order to get something going in this field—that isn't likely. In this section of the proposal, as in several others, find the balance between completeness and brevity; adjust the length of this section to correspond to the way the rest of the proposal is developed.

Give the reader perspective on the whole proposal. Include a two—or three-sentence sketch of the approach you are planning to use. Also, briefly point out the merit of this approach. Foreshadowing what is to come can be used throughout the proposal to good effect, serving to integrate it. In this and other sections that tend to be lengthy and unbroken by headings or subsections, it is especially important to help the reviewer find a succinct statement that summarizes the points being made. Underlining and paragraphing are especially useful.

Here again, take a look at the first paragraph of Warters's proposal, chapter 11.

Set the frame of reference. The problem section establishes the frame of reference and the set of expectations that the reviewer will carry throughout the proposal; be sure they are the correct ones. Unfamiliar terms or words used in unusual ways may cause problems. If such terms cannot be avoided, work their definitions into the presentation early and prominently so that the reader learns them.

RELATED RESEARCH

The related research section of the proposal builds further understanding of the problem by showing that the proposal is solidly anchored in past work yet moves beyond that work in important ways. *It is an excellent place for you to give an indication of your scholarly competence: Writing this section well is a sign of professional maturity. It indicates your grasp of the field and your methodological sophistication in critiquing others' research. It shows the breadth and depth of your reading.*

Qualitative and emergent dissertations may differ in the way they handle the literature review from what is described below, particularly if they are oriented toward "It is best not to be influenced by the past literature until I know what is of significance in the situation I want to study." Those of you adopting this point of view will still find this section of value, since you will do a review of the literature during the dissertation research, if not for the proposal. Discussion of qualitative proposals and the place of the literature review in them are included in chapter 7.

What to Include

No project starts de novo. The extent to which the researcher builds the project upon what has already been done shows command of the current state of the field and the extent to which the proposed project moves the field ahead in some significant manner. Some section of the proposal should, therefore, deal with how the project contributes to this forward movement. The section on related research provides such an opportunity.

In writing this section you should:

- survey a select group of studies that provide a foundation for the proposed project,
- discuss these studies in detail sufficient to provide an understanding of their relevance,
- describe how they contribute to this study, and
- indicate how this study moves beyond them.

Beissner's literature review, paragraphs 19 and 20, is an example of citing apparently relevant literature, but then she doesn't make the connection to her study. This is a common error.

Obviously, the review should encompass the best and most recent literature in *both* content and method; an outdated review hardly adds to the impression of scholarliness. Similarly, dependence on secondary sources such as other literature reviews may be appropriate, but the scholar must review key pieces of the original literature *herself.* Work in your original findings from the basic literature to indicate this.

In discussing studies, *point out their technical and methodological flaws* and show how these pitfalls will be avoided in your work. State whether the authors correctly interpreted the findings of their studies and how their findings impact your study.

If there is a *theoretical base* for your study, be sure to discuss it here. Science is a systematically accumulated body of knowledge. Theories interrelate individual findings and permit greater generalization. This section is an excellent place to convey your grasp of how theory is currently being developed and tested in your area and to critique the solidity of the structure being erected.

See Warters's section on theoretical issues beginning with paragraph 26 as an example.

Be highly selective in this section, citing only those studies that form the base from which your study is building. More is not necessarily better. *The most common error is including too many references and doing too little with them.* Proposals are often submitted with lengthy bibliographies on the research topic rather

than selected references that relate directly to the proposal. Such a comprehensive list does little to convince the reader that the researcher has any skills other than the ability to use an index.

It is what you do with the references that is the basis for judging this section. The skill shown in selection, the technical competence used in evaluating contributions, and, above all, the originality displayed in realistically and constructively synthesizing the conceptual bases of past and proposed work are what will impress readers.

Don't give up and say that the literature is too large to summarize easily; this is another point in the proposal where you must find the balance between the extremes of being too broad and too narrow.

Except for studies you are sure your readers will be familiar with, summarize the pertinent information needed to understand the study's contribution to the work being proposed. Do not expect readers to go to the library to look up references.

Warters's paragraph 6 is an example of citing relevant material but not going far enough with it nor showing its relevance to the study.

Become aware of relevant literature from disciplines other than your own. It is surprising how often researchers who could benefit from learning what each other is doing proceed on parallel tracks in different fields completely unaware of each other's work. Review research in related disciplines using bibliographic sources that extend broadly, such as the *Social Science Citation Index.* Discuss your proposal with colleagues from other disciplines. Use of colleagues in other fields alerts you not only to relevant literature, but also to the jargon these fields use to discuss your problem, thus helping you use journal indexes much more successfully.

If possible, *include studies currently under way* that are likely to overlap your project. Knowing what is currently being investigated in one's field is another sign of competence. Show how your project differs from such studies and/or meshes with them in a constructive way. The various government agencies have set up Web sites (you can access them from http://www.firstgov.gov [accessed September 29, 2004]) on the Internet and usually post newly funded projects there. *The Chronicle of Philanthropy* Web site (http://www.philanthropy.com [accessed September 29, 2004]) also lists grants by foundations and individuals and is searchable.

Sometimes the literature review section is an afterthought. After the "fresh, new idea" has been developed into a project, one may go to the library to complete the sole remaining section—related research. Such a practice makes it difficult to reconcile past research with the "new" project. If past studies are taken into account during the planning stage, the project is much stronger.

Being human, researchers naturally want their ideas to be their own, to

claim them as original, unrelated to what others have done. However, research programs cannot go on "rediscovering America" to satisfy the egos of individual investigators. All too often readers will encounter the statement that this is a "new idea" and that "nothing has been written" that bears on the problem. This is a red flag! Your chairperson and committee members know that few projects start from scratch, and they know how often the "wheel has been reinvented" by someone who did not do the proper background research. They are likely to feel challenged to search their memories for relevant studies. If they find some, they may be inclined to question the thoroughness of your scholarship and, perhaps, your technical competence as an investigator. Therefore, *if you state that "no research bearing on the problem exists," cite the closest research you found and show how it falls short.* Also indicate under what headings and in which references checks were made.

Although various fields have their own conventions, most use the *Publication Manual of the American Psychological Association*'s (2001) format of author and date of publication in parenthesis—for example, (Smith, 1981)—to identify reference sources in the text. That is the method used in this book. Accompany it with an alphabetical list of the references. In contrast to numbering the references, this saves flipping pages back and forth to see who was referred to. Reference list format should also follow the format used in your field. Again, this book uses the *Publication Manual of the American Psychological Association* format (American Psychological Association, 2001; also see http://www.psywww.com/resource/apacrib.htm [accessed September 29, 2004]).

If you refer to an obscure or difficult to obtain reference that is very important to your argument or research method, it may be helpful to your chairperson and committee to supply copies in an appendix.

SEARCH STRATEGIES AND INFORMATION SOURCES

Figure 4.1 is a diagram that summarizes the information sources that are discussed below. Refer to it to see where you are in your literature search and to suggest sources not yet used.

Cooper (1998) is an excellent updated compendium of the earlier very thorough reference on the skills of literature search in the third section of Cooper and Hedges (1994). In the latter, White (1994) discusses different search strategies, Reed and Baxter (1994) review the use of reference indexes and abstracts, and M. L. Rosenthal (1994) covers how to find fugitive literature.

Use of the Internet and World Wide Web

The Internet has changed searching forever and is likely one of the first sources to which the computer literate student turns. Using search engines (browsers such as Microsoft Explorer, Netscape, Safari, or Opera), you can use key terms to search for relevant material on such postings as faculty and methodology

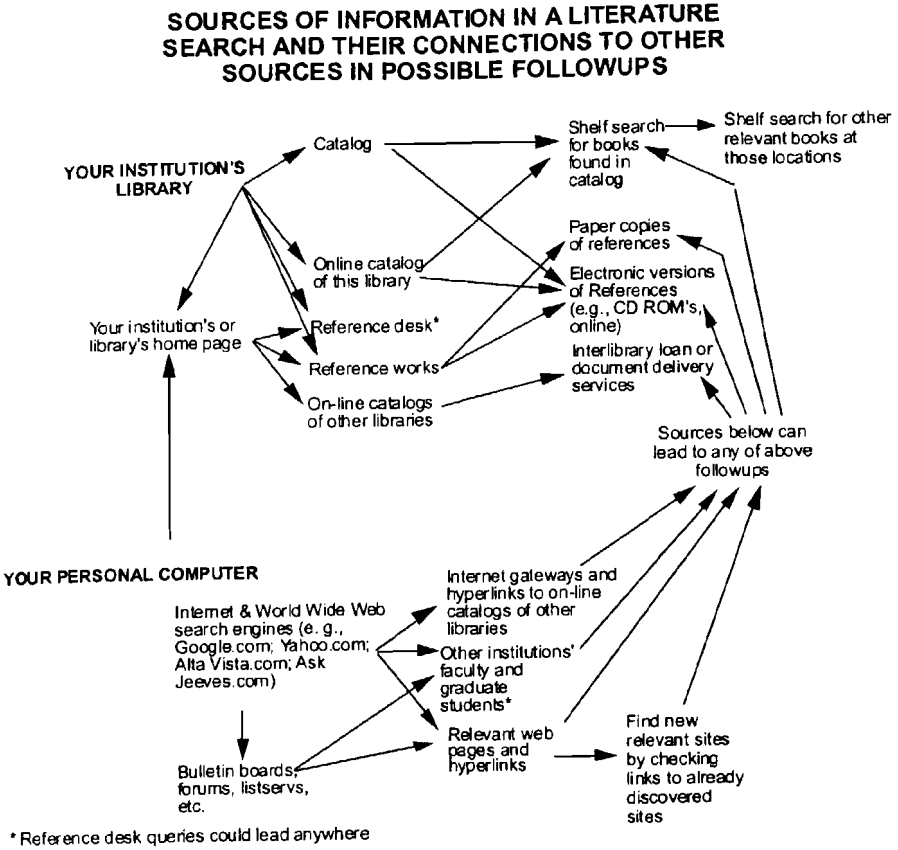

Figure 4.1. Sources of information in a literature search (adapted from Krathwohl 1988).

Web sites, online syllabi, archives, and conference proceedings, wherever the search engine has indexed the Web. Among widely used engines are: AltaVista.com, AskJeeves.com, Google.com, and Yahoo.com. There are also meta search engines like Alltheweb.com, Dogpile.com, and Metacrawler.com that simultaneously submit your query to multiple search engines. Depending on the search engine, you can find relevant sites not only in your own country but in others as well, and many engines have a translation facility. As you make these searches, you learn the terminology of the field and therefore are in a much better position to benefit from the variety of abstracting and indexing services.

It is important to realize that search engines don't run out and search the Internet each time you enter a query. It is much faster and more efficient for them to search a proprietary index of the Internet created by software that continuously roams it looking for new sites and changed ones. But variances in how

they do that may result in different responses for the same query from unlike search engines. These differences arise primarily from three sources:

1. *The interface provided you to describe your query.* Engines may interpret the same query differently and/or use unique codes for advanced searches. Soople provides an interface for Google.com that makes it easier to access some of Google's advanced features (http://www.soople.com [accessed September 29, 2004]).
2. *Their use of different indexes.* Some use proprietary software to create their index; some contract for one. Indexes can differ in what sites they index and what they harvest from each site. Boardreader.com, for instance, indexes only message boards on the Web. A number of such specialty search engines exist; see http://www.searchenginewatch.com/links/article.php/2156351 (accessed September 29, 2004).
3. *The proprietary software used to evaluate matches, rank, and present responses.* Even search engines using the same index may present different responses depending on their selection, ranking, and presentation procedures.

Clearly, with queries for which there may be more than one recognizably right answer, consult multiple search engines or use a metasearch engine like Vivisimo.com.

Learn to use special search features (called "advanced searches" in some; go to http://www.searchenginewatch.com/facts [accessed September 29, 2004] and see "Power Searching for Anyone"]. Type "search engine reviews" into a search engine to learn about new ones, to learn what a particular one does, or to find comparative reviews. One-click access to a variety of specialized information sources is available at http://www.extremesearcher.com/ [accessed September 29, 2004].

Research Strategies Before the Internet

The Internet is useful, but suffices in only rare cases because some of the best indexing and abstracting services are proprietary. The traditionally used sources are still needed, though most can now be accessed through the Internet. According to White (1994, where he cites Cooper, 1985, 1987, 1989; and Wilson, 1992), here are the strategies experienced authors found most useful and widely used in searches before the advent of the Internet:

- consultation,
- traditional indexing and abstracting services, and
- "footnote chasing" (tracking down the cited references in articles on the topic of interest)

Browsing through library shelves and citation indexes were more helpful but less widely used.

Consultation

Cooper (1985) had reviewers rate sources for their centrality (significance or centrality of references found) and utility (number of references yielded). When one combines these two ratings, the most helpful, widely used strategy involved consulting others: persons who regularly share information with you, contacts at conventions and with other students (highest combined utility and centrality), and formal requests to those active in the field. White (1994) quotes a noted author on scientific communication: "If you have to search the literature before undertaking research, you are not the person to do the research" (p. 48). That is much, much too strong, but his point, as White notes, is "you may read to get to a research front, but you cannot stay there waiting for new publications to appear; you should be in personal communication with the creators of the literature and other key informants" (White, 1994).

Once you have located who these persons are, you can contact them through phone, e-mail, or correspondence. You may find contacting information in the directories of professional organizations. Many of them are available online. Such individuals will almost always be willing to send you references, possibly reprints of prior publications, and usually new manuscripts (return the favor for the latter by sending them helpful comments).

As White (1994) notes, in consultations, one is searching the bibliographies in persons' heads. That means you are tapping into their information network, as wide or limited as that may be. Experienced researchers quickly learn who is working in their field, and they tend to communicate with them and be influenced by them (what is called the "invisible college," those in regular communication in a field). Thus, all may come to use similar references and be familiar with roughly the same literature. You need to be aware of this limitation when using consultation and, if possible, also tap those who lie on the periphery or in related fields as well.

Indexing and Abstracting Services

The next most useful strategy that Cooper (1998) identified was a hand or computer search of indexing and abstracting services such as *ERIC, Psychological Abstracts, Sociological Abstracts, Social Science Citation Index,* and the other citation indexes. Traditional abstracting services were widely used, but citation indexing, though it had a higher combined rating of utility and centrality, was used by only a quarter as many of the reviewers. Old habits die hard, but you, as the new generation, need not be bound by them. Citation indexing is discussed further below.

Abstracting and indexing services are currently largely limited to the journal literature, although *PsychINFO* has a separate service that indexes chapters

in edited books. An advantage of these services is that their collections are inclusive of everything in the journals they regularly cover. One is not limited by the subscriptions of a library. M. L. Rosenthal's (1994) chapter on fugitive literature lists a number of sources of conference proceedings (pp. 90–91). Many university libraries subscribe to the online versions of various abstracting and indexing services, making them available with passwords to their faculty and students. *PsychINFO* is available on the Internet to anyone for a fee. Alternatively, it is easy to search a wide variety of indexes on compact disc at university libraries, including the heavily used *PsychINFO (Psychological Abstracts)*, *Sociofile (Sociological Abstracts)*, and *Social Scisearch (Social Science Citation Index)*. Note, especially, that you can search these abstracts for not only terms that would typically appear in an index, but also, in *PsychINFO* and *Sociofile*, much rarer ones that would usually appear only in an abstract. (In *Social Scisearch*, the words would have to appear in a title.) For example, this allows you to find studies that employ certain methodology, software, or equipment where that fact might be abstracted but not typically indexed.

Browsing the Library Shelves

Although used by only a quarter of the reviewers in Cooper's study, browsing the library shelves had a higher combined rating than any of the above! The usefulness of browsing depends: (1) whether you are working so close to the research frontier that the research has not yet had time to get into the books, or the literature is still mainly in journals, and (2) whether books on your topic are located together on the shelves or spread all over the collection. When they are scattered, inefficient use of time is added to the already present luck-of-the-draw character of browsing—much search time results in only a few "hits."

As with consultation, the particular library collection you are browsing represents the selections of a particular librarian and/or faculty. Depending on the arrangements your library has with others, and/or your skill in attaining access on the Internet, you can browse by Library of Congress catalog number in the online catalogs of some of the best research libraries in the country. Books not in your institution's library then may be available via interlibrary loan.

Citation Indexing

Citation indexes result from copying all the references cited in each article of the journals covered and merging them into a single list ordered alphabetically by the person cited. Thus, if you look up an author and title of an article in the citation index, you can find the journal articles that included it in their references. Then, in the same set of volumes, by looking up the citing article's author in what is called the "source index," you can see all the references the author cited in that article. From those and the title, you can usually discern if it is an article worth pursuing.

Using citation indexing, you can find who has built on a given article, since in doing so they will cite it. You can therefore trace the development of ideas forward in time. This is something, at best, only imperfectly done by subject indexing. Starting with some of the pioneering or recently important papers in your topic of interest, you can find who has developed those ideas to create new work in the same area.

Though used by about only 9 percent of searchers (Cooper, 1985), the citation index is an especially valuable tool, since it is likely to retrieve items not found by other search methods. Citation referencing is independent of the language used in an article. Therefore, unusual terminology, the terminology of another field, or inadvertent omission by indexers is corrected by the links the author made to other articles. Such referencing reflects the greater expertise of the author than the indexer. Further, because of the multidisciplinary nature of citation indexes, references are more likely to cross academic lines.

Published by the Institute for Scientific Information (ISI), Inc., the *Science Citation Index* thoroughly covers the current literature in more than one hundred fields of science and technology. The *Social Science Citation Index* covers the social and behavioral sciences literature thoroughly and broadly from 1960 on. In 1977, the *Arts and Humanities Citation Index* began as well. Among the three of them, they cover most of the journal literature one would be interested in searching. Since current articles refer to past work, the significant past literature rapidly becomes mapped as well.

Staying Abreast of Current Literature

There is an easy way to find what one should read to stay abreast of developments in one's field, especially if it is spread across a variety of journals. Also published by ISI, *Current Contents: Social and Behavioral Sciences* collects and indexes the most recent tables of contents from the major journals in the behavioral sciences. It is available online to subscribers and in CD-ROM format.

Obtaining Journal Articles not Locally Available

Sometimes your library may not have a journal article, paper, etc., that is needed for your research. First, try your interlibrary loan office. Alternatively, or if you are in a hurry, use *ISI Document Solution*. Order from the Internet at http://www.isinet.com/products/docdelivery/ids/ (accessed September 29, 2004). There is a significant fee. Delivery is prompt and can be made by fax. Articles in journals published by the American Psychological Association are available from their Full-Text Document Delivery Service. Their Web site has a list of services that may be able to locate articles not published by the association (see http://www.apa.org/psycinfo/about/fulltext.html [accessed September 29, 2004]).

Relevant Information Sources Appropriate to Successively Specific Stages of Problem Definition

Table 4.1 suggests different starting points depending on where you are in the conceptualization of your problem. It suggests appropriate reference sources, some or all of which you may consult, as your problem develops.

A useful source for additional reading on literature searching is Reed and Baxter (2003).

Save Steps and Time with Your Computer—An Example

Susan was interested in the impact of cognitive styles on online instruction. For her literature search, she thought of using one of the search engines like AltaVista.com on the Internet from her home computer. "Cognitive styles" yielded too many responses that were irrelevant, and she wasn't sure how to refine her search. She had heard the name of a professor who might have written in the area, but could only guess at how to spell his name. She typed in her approximation of it using a wildcard, the asterisk (*), to substitute for the letters she wasn't sure of (some search engines use a question mark) but was unable to find a lead.

Her library, however, made a large number of databases available to its students through its subscription to *OCLC FirstSearch* (a database is a compilation of information; in this case, the databases were indexing and abstracting services [e.g., *Sociological Abstracts*], statistical facts, texts of journal articles, etc.). So she tapped into it from home, using her student number and name to gain access, and found that it included *PsycINFO*, an abstracting journal that has followed the psychological literature since 1894. Searching its database, she turned up a number of relevant articles. One, a dissertation, she could order from her library's interlibrary loan office on its Web site.

She had noticed that there was an entry that read "More like this" on the *First Search* record of the dissertation. Clicking on it opened a form where she could refine her search by checking several of the search terms offered. This led her to a number of new journal articles. Now that she knew the best search terms, she tried the meta search engine DogPile.com that queries several search engines at once. Where a query required more than one term to describe what she wanted, she placed plus signs between them (e.g., qualitative+analysis+software). (If she had wanted the three words to show up as an exact phrase, she would have put them in quotation marks instead of joining with plus signs.) She turned up a number of relevant sites to check. When she found relevant references on the sites, she entered the references (or, in the case of library entries, downloaded) the entries into bibliographic software. The software would format them into proper APA or MLS format and save her a lot of time.

Susan noticed that one faculty member's work at another institution was particularly relevant. She put his name in Google.com, found his Web site, and

TABLE 4.1

Relevant References and Reference Sources at Entry Points in the Literature Search That Are Increasingly Close to a Specified Problem.

Entry Points	Purpose	Sources to Consult
A general problem area	To find the important sources of information in an area—encyclopedias, handbooks, reviews of research	General guides to reference books such as *Guide to Reference Books* (Balay, 1998). Reference guides specific to a field like Reed and Baxter (1992). To find online sources, consult your institution's website for the databases available to students and faculty. Try a metasearch engine like www.vivisimo.com (accessed 9/30/04) that clusters results and ranks the clusters to provide a view of the terrain.
A specific problem area	To learn what research has been done, what terminology is being used, where the frontier is, what keywords to pursue in journal literature, dissertations of others in the area	A library's subject index or on-line catalog for relevant bibliographies, books and other materials (Find one centrally relevant book; try clicking on its call number to bring up the list of books shelved with this one; browse! Or do a call number search.) Compilations such as handbooks *(Handbook of Research on Teaching, Handbook of Social Psychology)* and research reviews *(Annual Review of Anthropology, Annual Review of Psychology, Annual Review of Sociology, Review of Educational Research, Encyclopedia of Educational Research, Encyclopedia of Psychology)* Most dissertations can be searched at www.umi.com/dissertations (accessed 9/30/04); on-line dissertations are at: oai.dlib.vt.edu/~etdunion/cgi-bin/index.pl (accessed 9/30/04) Thesauri *(Thesaurus of Psychological Index Terms)* and the *Cross-Reference Index* show what terms to search.
A specific problem	To find recent research, learn how terminology is changing, identify new fields related to the problem, explore current methodological approaches, determine the current frontier To identify the major aspects of a topic and prolific writers in the area	Appropriate indexes and abstracting services, such as *Psychological Abstracts* and *Sociological Abstracts; ERIC* and its *Current Index to Journals in Education (CIJE) and Research in Education (RIE); Education Index; Dissertation Abstracts International;* Permuterm Index of *Social Science Citation Index, Science Citation Index,* and *Arts and Humanities Citation Index* (particularly good for searching current jargon, but requires knowledge of vernacular of the time for older references)

TABLE 4.1 *(cont.)*

Entry Points	Purpose	Sources to Consult
Finding research studies basic to the problem*	To find out which scholars followed up on this research and what they did with it To find the most cited authors in an area of work and the basic references to which other authors in the field refer To trace the historical development of an area by tracing back to who was cited first in an area, who cited this work, and who, in turn, cited that work, and so on	Citation Index of the *Social Science Citation Index, Science Citation Index,* and *Arts and Humanities Citation Index*
Latest terminology for a problem or the names of persons doing extensive work in the area	To locate the most recent work in an area, including ongoing work	For latest published work, *Current Contents: Social and Behavioral Science* Find relevant electronic bulletin boards and forums on the Internet. Often these are sponsored by divisions or interest groups of professional organizations and can be found from the associations' home pages. For a roster of listservs see www.lsoft.com/catalist.html (accessed 9/30/04) and www.topica.com/dir/?cid=841 (accessed 9/30/04). Participate in the dialogue and post requests for help. For ongoing research, search the Internet, especially for sites listing funded projects of government agencies [e.g. www.firstgov.gov (accessed 9/30/04) or specific sites if known like nsf.gov/home/sbe (accessed nsf.gov/home/sbe 9/30/04). For private funding, the *Journal of Philanthropy* [www.philanthropy.com (accessed 9/30/04)]. Convention programs of professional associations are often posted and increasingly searchable. Write to researchers working in the area (addresses are in convention programs or in membership directories of professional societies).

noted his publications. There she located a particularly useful book. Finding it checked out in the online catalog of her library, she placed a recall on it using the library Web site; she would be notified by e-mail when it became available. She also checked to see what sites were linked to the faculty member's by placing his Web site's uniform resource locator (URL) after the word link followed by a colon in the Google search form. This led to a list of Web sites interested in the same things he was, some of which appeared to be relevant and could be followed up. The URL for one site turned up a "not found" message; she trimmed successive pieces from the complex URL (e.g., from http://www.nova.edu/ssss/QR/QR5-1/pifer.html, she trimmed to http://www.nova.edu/ssss/QR/ and then to http://www.nova.edu/) until she found one that worked. From that she was able to trace where the one she sought had been moved.

Susan noted that this author had also been an officer in an interest group of the American Educational Research Association. From Yahoo.com she found the association's Web site and, in turn, the interest group's Web site. It indicated that the group sponsored a listserv that she could receive via e-mail. The listserv records the free-floating conversation on topics listserv members raise for discussion. It had an archive of the previous discussions, and she searched it and found some interesting material on her topic. She also noted persons actively contributing to the site on her topic and checked for their Web sites and publications. A little bashful about asking a question on the listserv, she did e-mail one of these contributors who had no Web site, asking where his publications might be available. His e-mail address was available on the university's Web site under faculty and staff directories.

While Susan was at the library picking up the book, she checked the *Social Science Citation Index* to see who had cited the book she was picking up and who was citing this author's work. She looked at the titles of these works and found some that appeared to be building on that faculty member's work. She also looked at the other books on the shelf where the book she was picking up had been shelved to see if there were other relevant materials. (Note that she also could have done a shelf scan from home by entering the call number in the library's catalog search software.)

One of the difficult problems of an extensive literature search is keeping track of interrelated points in your notes. Susan had taken a lot of notes on these various materials, and it was time to organize them. Using a word processor's table function, or a spreadsheet program, she entered the notes in rows of the table, putting the notes on a topic in one column and an easily recognized code for the source in a second. Then assigning key words to the notes, she broke up the notes into themes or salient points to confine those in a row to a main topic. She described that topic with a keyword in a separate column in the row and, if it was needed, a second keyword using another column for these secondary descriptors. Using the sort function, she brought together first the rows for the

same secondary descriptor, then sorted on the primary descriptors. This moved into successive rows notes with the same descriptors. She then considered how she might outline the material she had. This brought to her attention the areas where the notes were thin and those where they were ample. This would provide a road map guiding her further literature searching.

She could have organized the notes more elegantly using qualitative analysis software ATLASti, NVivo, NUD*IST, and winMAX (free downloadable demonstration software at their Web sites—locatable with a search engine—but results cannot be saved) that allow you to code notes, interrelate codes, and organize them. Di Gregorio shows how to use NVivo for the literature search (http://www.sdgassociates.com/training.html; look for "Using NVivo for Your Literature Search" [accessed September 30, 2004]). Some software provides a graphical depiction of the interrelation of codes. Two listings of such software are the Web sites of Content Analysis Resources (http://www.car.ua.edu [accessed September 30, 2004])—click on software—and the Computer Assisted Qualitative Data Analysis Networking Project (http://www.qualitativeresearch.uga.edu/QualPage [accessed September 30, 2004]); the latter includes hotlinks to software sites. Also listed at the first site are the increasingly sophisticated software available to computer analyze text to show its important themes; it may help you determine whether to take the time to read it.

Quantitative Literature Summaries

If you are researching an area where there are a number of prior quantitative studies, consider doing a quantitative literature summary. Some of the summary methods, such as tabulating pro and con studies, are relatively simple. Other methods that compute an effect size may require getting statistical help if you don't have the statistical skills.

Traditionally, literature reviews analyze the positive and negative findings of studies relevant to a proposition. But to draw an overall conclusion, the authors find it difficult to know which studies to weight most heavily—the largest, the best experimental design, the most representative sample, the most valid and reliable instruments? Rarely does each in a set of studies satisfy all these criteria, so there are difficult trade-offs to consider. Further, where the results of studies are mostly in the expected direction but were not statistically significant, should these be counted as positive evidence or, as the statistical purist would suggest, as merely chance aberrations? Because of these problems, most traditional reviews conclude with ambiguous generalizations that call for more research. This contributes to the impression that the social and behavioral sciences have a weak knowledge base.

Meta-analysis is a way not only of taking into account a series of near misses but also of summarizing a series of conflicting studies. Cooper and Hedges (1994) describe a variety of ways of doing quantitative summaries:

- Counting the positive, neutral, and negative results and comparing these with what would be expected by chance (Bushman, 1994). If one counts only statistical significance as positives, because so many studies have too small samples to be sufficiently sensitive to real differences, positives will likely be underrepresented and result in biased findings.
- Combining the results of individual studies into a single test of significance (Becker, 1994).
- Developing something resembling a standard score estimate of the average strength of treatment across all studies. This is called the "treatment effect size" or just "effect size" (R. Rosenthal, 1994; Fleiss, 1994; Shadish and Haddock, 1994).

When doing a meta-analytic study, it is often a good idea to show the results several ways such as comparing the effect sizes: (1) when each sample contributes only one estimate to the combined average vs. where there were multiple measures of the effect in a given study, allowing all of these to enter the combined average, (2) with and without corrections for restriction in range, and/or (3) when the best studies are separated from those poorly designed and executed.

Should you include a meta-analysis in your review? The first question to ask yourself is whether there are enough comparable quantitative studies to supply the raw data. A pilot study of the literature will provide an estimate. If the pool of studies is very large, the meta-analysis could possibly become the dissertation in and of itself.

When the task is beyond suitable proposal development effort, not suitable as the dissertation, but doable and desired, add it to the proposal as a first stage of the study and describe the magnitude of the pool of studies. Because this leaves open the impact of the meta-analysis results on the study, base the proposal on the most likely outcome of the literature search. Also, discuss likely alternative results and how they would affect the direction of the study. This serves notice to your readers that you have given this matter consideration.

Combining a meta-analytic study with traditional judgments of the quality of the studies is particularly useful for small pools. Meta-analyses have their advantages, but traditional reviews can take into account the individual circumstances and problems of particular studies in a way that quantitative reviews don't. Such a proposal section provides good evidence not only that you are on top of the literature, but also that you really do understand how to write technically and judgmentally sound literature reviews—clearly, things you wish to demonstrate in this section of the proposal.

Literature reviews can be conducted to summarize and assess knowledge in order to *answer* a research question. A thoughtful, comprehensive review can be, itself, an important research contribution, and may serve as the entire dis-

sertation or be published independently. Meta-analysis studies (chapter 8) are examples of such dissertations. Generally, however, the purpose of the literature review in a dissertation is not only to answer a question of what is known about a given problem, but also to support the argument *posing* the research questions to be further investigated. In doing such a literature review, then, you will be looking for what is already known about your research problem, what methods have been used successfully (or not) to study the problem, and other resources that might support your work, such as names of key researchers, relevant instruments, existing data bases, etc. See Worksheet 4.2: Topics of Interest in Reviewing Literature for a Dissertation at the end of this chapter for a list of items to keep in mind as you review the literature for your dissertation.

QUESTIONS, HYPOTHESES, OR MODELS?

So far in the problem statement, you have described the problem in general terms, shown its importance, and set it in a larger context. In the related research section, you described what previous work has been done and alluded to how you are going to build on it: going beyond previous accomplishments, opening new territory, redoing a study a new and better way, possibly replicating a study to show the generality of its findings, and so forth. This section, which then follows, further shows the study emerging from the background of previous thinking and theory. Like every link in the chain of reasoning, this section forms a basis for judging the remainder of the proposal. It sets the stage for showing how one intends to solve or contribute to the solution of the problem set out in the first sections. Just how specific this section can be depends on what you have said in the previous sections, and what turned up in the review of literature:

- The less you have found out about the area, the more likely this section will be devoted to questions or descriptions of where to look.
- If you have some ideas about at least certain aspects, you may have hunches to test to see if they are true. This section will set forth those hunches as hypotheses.
- If you have a good idea about how things work, you may be able to construct a model of how various variables are related to each other. This section then describes the model you would like to test.

Because this section comes early in the proposal, you may still be in an expansive frame of mind and desirous of solving a problem of "major" significance. As a result, you may cast the problem more broadly than is possible to address once the procedure section is completed. Therefore, after the proposal is completed, reread it to ensure that this section flows smoothly from the preceding problem statement, and that the next section, that on procedure, adequately encompasses all that is covered in this section.

The most frequent error made in writing this section is that it becomes a set of vague generalities rather than clear-cut criteria against which the rest of the project can be judged.

Another error is that instead of setting forth specific research objectives, they are imbedded, usually by implication rather than explicit statement, in a running description of the project. Your readers must then tease them out, trying to infer what you are implying and to place emphasis on different ones as can be "guesstimated" from contextual clues. Obviously, the readers' accuracy in doing this is critical. Rather than run the risk of misinterpretation, you will fare better by making the objectives clear and explicit in this section.

Descriptions of Where to Look and Questions

Questions, or descriptions of where to look and at what to look, are most appropriate where the study is an emergent one, where the research is exploratory, or where the study is seeking certain facts or descriptions. The specificity of the questions or descriptions shows how carefully the problem has been thought through and/or studied through previous research. For example, consider a study of the effects of female teachers on male students.

> You would not gain the impression that the researcher has a grasp of his problem if he merely lists the question "What is the effect of the female teacher on male students?" But if the researcher poses the question "Which of these is the dominant effect of female teachers on male students?" and then follows with a list of the possible dominant effects and explanations, it is clear that he has thought through the possible alternatives and is prepared to investigate at least these particular ones.

> Alternatively, the researcher, believing that previous research has not adequately compiled the important effects, may be searching for new ones. Instead of specifying questions, the proposal can present an argument as to why there are significant ones yet to be found and how they might be identified.

So, if your literature search was futile, and you have little basis for constructing hypotheses, state questions or describe areas to be explored and indicate:

- Why these are the important questions to ask or areas to be explored.
- What their potential implications are for moving your field ahead.
- Why other reasonable questions that might be asked or areas of exploration are not of interest and will not be addressed.
- What the implications of addressing and possibly answering these particular questions or exploring these areas may be.

Warters's proposal embeds the description of the goal of the study and the focus of attention in the first paragraph in the second from the last sentence: "To assist in . . ." instead of making it a separate statement, paragraph, or section. This works well in this particular proposal because it provides an early foreshadowing for the reader that is then amplified by statements in paragraph 5, especially in paragraphs 8 and the end of 9 where research questions are specified.

• Suppose that, in order to come to your own conclusions about what is significant, as some qualitative researchers do, you are refraining from reading previous research. Then this section will mainly state questions or indicate areas on which to focus. Describe the kinds of questions or what areas will initially guide your observations or your inquiries, and why you are starting with these instead of other possibilities. If you are a "purist" about starting de novo in the situation, this will be a very short section. But as indicated in chapter 7, this gives your chair and your committee very little to go on, and you'll want to develop this section further as described there.

Hypotheses

You may find it helpful to phrase your objectives as hypotheses that are to be tested. If at all possible, hypotheses should be related to a theoretical base. If the theoretical base was not introduced in the previous sections, state it here, then refine and extend it to show how the study's objectives are derived from it, carefully building the bridge from theory to study so that the relation is clear. For instance, a study of the effects of a vocational education program would be strengthened if the choices that the student must make in the program were related to the developing theory that describes why and how students go through stages of vocational choice.

Hypotheses as objectives must be stated in such a way that they are *testable*. That is, they can be translated into the research operations that will give evidence of their truth or falsity.

The topic may be chosen because it is judged to be important, but the objectives should not themselves be stated as value judgments (e.g., "All sixth-grade boys should learn to play a musical instrument."). Research can indicate the extent of popular support for such a value statement (e.g., "A large majority of our town [two-thirds or more] believe that all sixth grade boys . . ."); or it can indicate the consequences of an action (e.g., "If all sixth-grade boys play musical instruments, they will attend more concerts outside school."). But humans must judge how much value to attach to these consequences or to the extent of popular support.

Directional hypotheses should be used wherever there is a basis for prediction. There will be such a basis if the study has a theoretical underpinning. State hypotheses as succinct predictions of the expected outcomes and findings

rather than in the null form. For instance, say: "Students who receive the experimental treatment will have more differentiated interests than those who do not," rather than "There will be no difference in interest patterns between the experimental and control groups." The latter statement is an important part of the logic of the statistical test, but it does not belong in the objectives section and leaves an amateurish impression with experienced researchers.

One would expect hypotheses in a prespecified study such as Beissner's. There they are, in paragraph 15, in a section of their own. Further, note that they are all directional; the theoretical rationale for the study has provided a basis for predicting the direction of the outcomes.

Similarly one would expect hypotheses in the Phelan proposal, but paragraph 9 is titled "The Research Question." As one reads it, however, his hypothesis is clearly there. But, after stating it verbally, he restates it in null form and does not capture the centrality of motivation he stated earlier. Note how the null form not only adds nothing to the description, but actually detracts from the argument.

Models

When one is concerned with a larger picture than the relationship between two variables, and begins to look at the interrelationships among a set of variables, one is into the construction of models. Usually, these are built upon previous research. In an effort to synthesize disparate pieces of a larger picture, you construct a representation of how each variable influences and/or is influenced by other variables. Usually, this results in the construction of a diagram with arrows indicating the direction of influence. The task of the study is to provide evidence that the relationships exist, confirm the directions of influence, and estimate their size. Most such dissertation models are relatively simple; confirming complex relationships requires large-scale studies unlikely to be undertaken by graduate students.

In the literature review section of the proposal, show the basis in previous research for the proposed model. Indicate where you have gone beyond previous work and how this study contributes new knowledge to the field. Describe the model both graphically and narratively and indicate the parts of it that are well confirmed by previous research and those that are more tenuous. If there are alternative conceptualizations of the relationships, indicate them and give the basis for each. If you believe that one is more likely to be supported by the data, indicate that as well.

Since the study of models is only recently appearing in dissertations, there are no examples of such studies in this book. But linear equation modeling is increasingly an important statistical tool, as is apparent from numerous federally

funded behavioral studies. So modeling studies will no doubt become more common in dissertations.

As you draft and revise your proposal problem statement, it is helpful to periodically review its strong points and shortcomings. Worksheet 4.3: Characteristics of a Good Proposal Problem Statement is provided here to help you check your progress.

WORKSHEET 4.1

Characteristics of a Good Dissertation Topic

How Strong Is My Current Dissertation Topic?

A dissertation topic is continually developed and refined as you move toward a specific study design. Briefly describe your topic below as you currently understand it, and then use the following list of criteria to see how well it measures up. You might also use this worksheet to have other researchers or your dissertation chairperson rate your topic and then offer suggestions for next steps. You will probably need to return to this worksheet several times as you reconceptualize and reshape your interests into a strong dissertation topic.

Current Topic Description:

Review Criteria	Strong	Acceptable	Weak	Don't Know Yet	Not Applicable
Topic Importance					
Is relevant to a larger, significant problem, and is conceptually grounded.					
Is focused, and not trivial.					
Reflects a creative or original perspective.					
Has important practical implications.					
Has important theoretical implications.					
Has important methodological implications.					
Is acceptable within the academic or professional field.					
Personal Match					
Reflects a strong personal interest.					
Will promote my academic and career interests.					

(Continued on next page)

Review Criteria	Strong	Acceptable	Weak	Don't Know Yet	Not Applicable
Is of interest to potential dissertation chairpersons and committee members.					
Is acceptable within my academic department and school.					
Operational Feasibility					
Is a good fit with the knowledge and skills I have or can acquire.					
Is a good fit with the resources I have or can acquire.					
Can effectively build on prior theory, knowledge, and personal experience with the topic.					
Can effectively build on prior personal and professional experience with possible methods.					
Can be developed into a manageable study.					
Can be investigated in an ethical manner.					

What to Look for in Reviewing Literature for a Dissertation

What I Should Look For as I Begin Searching the Literature

As you review the literature, you should seek to understand more fully the nature of the problem you are investigating, how best to study it, and what relevant resources are available. The following is a checklist of items to look for as you review the literature.

Topics	Key References
Research Phenomena of Interest	
Problems: nature, incidence, significance	
Contexts: historical, social, political, economic, geographic, psychological	
Conceptualizations: values, perspectives, philosophies	
Terms/Concepts: definitions, distinctions, operationalizations	
Theories: descriptive, explanatory, causal models	
Facts: confirmed, generally accepted, hypothesized	
Solutions: tried, successes, failures, problems, shortcomings	
Questions/Concerns: unknowns, uncertainties, preconceived aspects of issues	
Research Inquiry Methods	
World Views: perspectives, purposes of inquiry, epistemologies	
Queries: questions, variables, hypotheses, models	
Designs: design logics, inquiry methods	
Techniques/Procedures: field conditions, interventions, controls, measures, information sources, data collection, data analysis, modes of interpretation, study management	

(Continued on next page)

Topics	Key References
State of the Art: successes, problems, limitations	
Dissertation Resources	
Professional Groups: associations, societies, agencies, departments, institutes (re: policy, research, method, practice)	
Special Interest Groups: commercial firms, non-profits, advocacy groups	
Fund Sources: foundations, private sector, government agencies	
Key Individuals: policy makers, researchers, methodologists, national figures, local and regional experts, practitioners	
Study Resources: data bases, instrumentation, measurement collections, hardware, software, courseware, multimedia	
Information Sources: publishers, libraries, journals, newsletters, websites, online publications, listservs, bulletin boards, chat rooms, distribution lists	
Skill Development Resources: courses, workshops, training materials, mentors, tutors, consultants, collaborators	

Characteristics of a Good Proposal Problem Statement

How Strong Is My Proposal Problem Statement?

Since it usually takes many iterations to produce a strong, convincing problem statement, you will want to refer to this worksheet repeatedly as you refine your proposal. For assistance with weak points that need improvement, refer back to the relevant sections of this chapter and to the annotated proposal examples in chapters 11, 12, and 13. Also consider having others review your working drafts using this worksheet.

Current Problem Statement:

How Well Have I . . . ?	Strong	Acceptable	Weak–Improvements Needed	Not Applicable
Problem Statement				
Begun the statement with a strong, interest generating opening?				
Clearly stated and described the problem?				
Demonstrated the problem's importance?				
Shown the problem's generality?				
Appropriately limited the problem's scope?				
Adequately balanced completeness and brevity?				
Provided a perspective on the entire proposal?				
Set a proper frame of refetence?				
Literature Review				
Selected the most appropriate studies to support the proposed research?				

(Continued on next page)

WORKSHEET 4.3 *(cont.)*

How Well Have I . . . ?	Strong	Acceptable	Weak–Improvements Needed	Not Applicable
Carefully evaluated the strengths and weaknesses of prior research and thought?				
Explained how the essential details of each study are relevant to the problem to be studied?				
Critically, yet succinctly, summarized current substantive knowledge about the problem?				
Critically analyzed relevant theoretical positions related to the problem?				
Critically assessed methodological alternatives for studying the problem?				
Demonstrated awareness of relevant work both in progress and in other disciplines?				
Stated an explicit set of goals for my research to accomplish and how they will be achieved?				
Convincingly argued why my study will appropriately address questions, hypotheses, or models?				
Clearly shown how my study will both build upon, and go beyond, prior research, substantively and methodologically?				

CHAPTER 5

The Method Section

CHAPTER CONTENTS

The method section, which describes the procedures that will be used, translates the problem section developed in the previous chapter into project activities. *This is usually the most carefully read section of the whole proposal.* Up to this point, you may have told in glowing terms and appealing generalities what

WORKSHEET 4.3 *(cont.)*

How Well Have I . . . ?	Strong	Acceptable	Weak–Improvements Needed	Not Applicable
Carefully evaluated the strengths and weaknesses of prior research and thought?				
Explained how the essential details of each study are relevant to the problem to be studied?				
Critically, yet succinctly, summarized current substantive knowledge about the problem?				
Critically analyzed relevant theoretical positions related to the problem?				
Critically assessed methodological alternatives for studying the problem?				
Demonstrated awareness of relevant work both in progress and in other disciplines?				
Stated an explicit set of goals for my research to accomplish and how they will be achieved?				
Convincingly argued why my study will appropriately address questions, hypotheses, or models?				
Clearly shown how my study will both build upon, and go beyond, prior research, substantively and methodologically?				

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you hope to do and what this will mean to your field. The section on method brings this down to earth in operational terms. Frequently, proposals that sound as though they will revolutionize a field appear much more mundane in the method section; the techniques proposed for attacking the problem may fall far short of what was implied when the earlier sections were written. Obviously, the method section should fulfill the expectations created by the foregoing sections.

The following material assumes that you have a reasonably clear idea of what you wish to study and how you wish to study it. The term *design* is used to describe the latter, both here and in the chain of reasoning. So the study's design is described in the method section. Obviously, that term *design* applies quite loosely to studies with emergent topics.

Our discussion of the method section is in two parts: In Section 1 we discuss general points to take into consideration in developing and describing method. Section 2 is a detailed discussion of each of the subsections of design that together, typically, are required to describe the method.

SECTION 1: GENERAL CONSIDERATIONS

Adapt the Material on Method to Your Study

Of all the proposal parts, the method section is the most dependent on the nature of your study. Some of the material in this chapter may be irrelevant to your kind of study. Consider what is important in your study and adapt it. For example:

> If the study is a sample survey, elaborate on the sampling section. If it is an emergent study, collapse the sections on the links in design into a single description of how and where data will be gathered and the initial focus of attention. Suppose you plan to examine the educational and medical records of late-nineteenth-century Italian immigrants to determine how they differed from nonimmigrants. Describe where you are going to study the records, what you expect to find there, how you will get access, what information will be gathered and how, and what analyses will be performed.

Further discussion of how to adapt this section is given in chapters 7, 8, and 9, addressing the special requirements of various kinds of proposals.

The Method Section Flows from the "Questions, Hypotheses, or Models" Section

Considering a project as a chain of reasoning, the "design" link in the chain is logically derived from the previous links, specifically the "questions, hypotheses, or models" link. The design specifies the operations by which you will investigate whatever you chose at the questions-hypotheses-or-models link. If it is a question, it will indicate where, how, and when you will seek an answer to it. If it is a hypothesis or a model, it will describe how you will provide evidence in support of the prediction and relate it to the underlying explanation of the phenomena that resulted in the prediction. Also, it will indicate how relevant alternative explanations can be ruled out.

The process is usually one of a direct translation of the concepts in the question, hypothesis, or model into the choice of:

1. participants,
2. situation,
3. focus of action—the core variables such as treatment and effect,
4. records—measures and observations,
5. comparison and contrast (basis for sensing attributes and changes)—the basis on which the change due to an independent variable or experimental treatment or whatever happens at the focus of attention will be sensed (e.g., pre/post comparison or comparison with another group), and
6. time schedule—the study's procedures and the schedule of the various activities involved. These may involve observations, sensing the presence and strength of the independent variable, administering an experimental treatment, and/or measuring and observing any effect.

For example:

> Consider this hypothesis: "Up to some reasonable point, the more time African American students spend studying African American history, the stronger their self-concept." This hypothesis suggests that increasing levels of study of African American history will result in gains in self-concept up to some point. To develop the design, decisions will have to be made about how to translate into operational terms all the concepts in the hypothesis:
>
> The researcher must specify what is meant by "African American students" in terms of age, grade, and whether such variables as socioeconomic class or urban/rural background are important.
>
> What does "study African American history" mean? Will any African American history curriculum do, or does it need to be one that stresses African American accomplishments?
>
> Is there a measure of self-concept that is valid for African American students at the age chosen? The easily available measures for college students are not appropriate for elementary pupils.
>
> What design will determine whether the variables change together as hypothesized? For example, one design might involve groups of students who are comparable except

for the time they have studied African American history. You could compare self-concept change for those who have studied it for short vs. longer times. Alternatively, a longitudinal design might be developed that follows the changes in a group exposed to a lengthy study of African American history.

For many of the decisions (e.g., choice of age and grade or use of comparable groups vs. longitudinal designs) you must choose among alternative translations. Thus, a variety of interpretations can result when a hypothesis is translated into operational terms. The same process is involved in translating questions and models.

Some terms seem to immediately translate into design features. Here are some examples:

Long-term retention vs. immediate recall	Requires multiple posttests. Note that even here there are alternatives: the same group can be tested several times, or, to eliminate the effect of retesting, use different groups—one tested immediately, others for different lengths of retention.
Cumulative treatment effect	Requires multiple posttests. Again these could all be of the same group or of different groups, each tested after a different length of treatment.
Anticipatory effect (e.g., effect of studying sculptures on enjoying paintings)	Pre—and posttesting. One group before exposure to sculpture as well as before and after paintings exposure; one group before and after paintings exposure only.
Enhancing or interactive effect of a variable with treatment (e.g., printing the words that are key to understanding a text in a contrasting color in a reading test)	Separate treatment groups with and without the presence of the interactive variable conditions.

Operationalizing Terms May Result in New Conceptualizations

As terms are operationalized, you often come to a different understanding of the study from when it was initially conceptualized. Terms take on new meaning, and often the initial conceptualization has to be sharpened and modified as the problem becomes better understood.

Suppose that you start out to study the relation of per pupil expenditures to achievement across a set of public school districts. In operationally defining per pupil expenditures (determining their dollar value), you find that different districts include different costs.

In an effort to get comparable data across districts, you adjust each district to include a common set of basic costs. But at that point, the study begins changing. There isn't much variability in these basic costs across districts; the variability is in the nonbasics, the discretionary money available to a school's principal to improve instruction. So that becomes the focus of the study, forcing you to go back and change the whole front end of the proposal to fit this new conceptualization of the problem.

Some researchers argue that you really come to understand the problem only in operationalizing the study. However, operationalization may never be completely satisfactory when you are dealing with constructs that can't be concretized so as to satisfy everyone (e.g., personality characteristics such as likableness, monetary estimates of the value of good health, etc.). Remember this if you are dissatisfied with your study and/or the redevelopment of the method section seems never-ending. A compromise operationalization may be the only way to study your problem but, also, the source of your dissatisfaction.

Sometimes, when the questions, hypotheses, or models are given operational translations, it becomes immediately apparent that the problem is too large or too complex. In the per pupil expenditure example above, an attempt to estimate *all* the discretionary resources available in a given classroom might put the project beyond the realm of feasibility (parent volunteer time, laptop computers brought into the class by students, etc.). Yet these might be important inputs to the classroom in certain circumstances. First attempts at problem definition are particularly susceptible to impracticality where the student insists on doing "something significant."

Refocusing and delimiting the problem to restore feasibility are the answers. But, sometimes, even after the problem has been refocused, certain requirements may still be too great. Consider whether these may be handled by alternative design choices. For example, if there are too few cases to establish both a control and an experimental group, the participants may be used as their own control with pre—and posttests.

Development of the design is an iterative process. The researcher sets an initial set of pieces in place, but changing one sets off a cycle of resulting changes. That may in

turn result in a reconceptualization, further changes, and so on, until all the pieces fit together and are feasible. The new curriculum takes too long, so it must be reduced to its essentials. That is likely to result in weaker learning, which in turn requires the size of the sample be increased in order to detect it. To get a larger sample you must include atypical persons. Now you must find a comparison group that includes similar atypical persons. And so it goes.

Often you must go all the way back to the beginning and redesign the study on a different basis. Many cycles may take place before a satisfactory solution is reached.

Restrain the Design to Realistic Limits

Even as the design is first being considered, you must make tentative decisions on what level of resources you can practically employ. Take into account your own time and what access and cooperation you can expect from other institutions, participants, etc. These estimates are important for making methodological decisions: the possible number of participants, number and location of study settings, and so on. Indeed, the limits may rule out certain methods that take too long, such as a longitudinal study. Getting parents' consent to test children may be difficult or impossible. The most desirable and cooperative institutions may be too distant.

Some of the limits are easy to estimate, others more difficult, but some reasonable determination must be made for all of them if development of the design is to proceed realistically. Further, just as other parts of the design are successively adapted, so initial limits may have to be adjusted as the plan develops. Since many of these judgments are based on practical experience, seek the advice of your chairperson, committee members, and other researchers who have conducted similar studies and learned what is realistic through hard experience.

Resource Limits

As soon as you begin to translate the study into operational terms, the question immediately arises, "How big shall I make it?" Although it need not be answered precisely at the outset, some working estimates must be set. A key one is how long you can afford to work on your dissertation. Here again, seek the opinions of others: ask more senior graduate students how long the various pieces of their dissertation research are taking them.

Institutional Limits

When other institutions or agencies are involved, either as collaborators or as sources of data collection, support, etc., their perspective must be considered to ensure that requests made of them are reasonable. Most institutions operate by trying to do too much, for too many, with too little time and resources,

and so may limit access to participants, facilities, equipment, or personnel. Further, they tend to resist changes in routines that interfere with "business as usual."

Ethical Limits

Ethical limits must be considered in developing the design. Any federally funded research involving human participants must be approved by a Committee on the Protection of Human Subjects concerned with the ethical implications of the study. Federal regulations prescribe the composition of the committee, which includes individuals outside the university. Although approval is required only for federally funded projects, nearly every university extends that requirement to all other research involving human participants, *including dissertations.* If clearance has already been routinely obtained, note it in the discussion of method. If not yet obtained, or expected not to be routine, it may require a section of its own along with other assurances. Committee on the Protection of Human Subjects clearances are further discussed in the next chapter (p. 110–11).

Time Limits on Proposal Development

It seems you ought to be able to control your schedule. But pressures to get your degree in a reasonable time, to gather data before certain natural breaks in institutional schedules, faculty unavailability due to trips and sabbaticals, and other scheduling difficulties may impinge on your timetable. Circumstances may, for example, require completion and approval of your proposal by an early date, enforce a particular schedule on data collection, or compel use of nonpreferred sites for data collection.

Consider the trade-offs involved in rushing to meet the immediate deadline or, if there is one, waiting for a later one when some of these problems could be more successfully resolved. A several-month delay in proposal approval might pay handsome dividends in more cooperative site conditions as the staff of these institutions and agencies are given a chance to contribute to the research plan and feel it is partly theirs. Considering that this may make for a more cooperative milieu and possibly better data, the delay may be worthwhile. But other considerations such as the availability of your own or a key person's time may be overriding.

Sort out those things that can be done satisfactorily in the time available for proposal development from those that are unwise to attempt or, perhaps, cannot be done even if tried. Attempting too much usually results in a proposal that shows it, as does similar haste in data collection and analysis in the dissertation. As in sewing, "find a pattern that fits the cloth available," or as in sports, "find a league in which you can comfortably play."

Eliminate Plausible Alternative Explanations

Whatever the methodology, all studies concerned with setting forth an explanation for a relationship must be concerned with the elimination of competing plausible explanations. Whether experimental, qualitative, survey, or whatever, if the design is not adequate to ensure the integrity of the study's chain of reasoning against plausible alternative explanations, readers may prefer an alternative to the explanation that the study is intended to support. The proposal should describe how the design so structures the study that plausible alternative explanations are ruled out as significant explanatory factors. Here's an example.

> In a study comparing the effect of two different curricula, the researcher would be concerned that any initial differences in the groups might be reflected in their after-treatment performance. Otherwise, such after-treatment differences might be attributed as well to the initial differences as to the effect of the curricula. In this situation, the researcher might be expected to control such potentially contaminating factors as the beginning level of competence, general academic ability, and/or motivation.

The term *design* seems to go with *experimental* as in *experimental design*. You might be tempted, therefore, to assume that this discussion is of little importance to other than experimental studies, to a qualitative study, for example. Nothing could be further from the truth! A qualitative study observer, for example, must protect against a variety of alternative explanations; to name just a few:

- the possible effect of the observer's prevailing attitudes and values as they affect observations,
- the possible choice of individuals and times to observe which are "atypical" samples,
- the possible effect of "dropouts"—persons present at the start of the observations but not as they progress (usually referred to by the name *mortality*),
- the possibility of going "native" and perceiving things differently as observations progress.

Clearly, when we refer to *design* in qualitative studies, we are using the term to refer to such investigator decisions as whom to study, what persons or situations to contrast, what instances in time to compare, and similar judgments.

Control of Alternative Explanations

How do you control for possible alternative explanations that might equally plausibly be considered the cause of what you are studying? We have three ways: (1) elimination, (2) adjusting, and (3) spreading their effect equally across whatever groups or individuals are being compared (if all units are equally affected, then differences must be due to something else, presumably what you are studying). This last method is used in the two-curricula comparison. Individuals are ranked on achievement (assuming that achievement is a reflection of both ability and motivation so it controls for both), and persons with even-numbered ranks are assigned to one curriculum group, those with odd-numbered ranks the other.

Clearly, one of your tasks in writing the proposal is to *identify potentially serious plausible alternative explanations and discuss which ones to control and how to control them.* That is, you must:

- decide which alternatives are the most serious threats to the study,
- decide how they can be controlled,
- determine how controls for the set of the most serious threats can be combined into a design, and finally
- determine whether the design is feasible, adjusting it until it is.

This requires asking such questions as:

- How likely is each of these alternative explanations to appear?
- In your estimation, therefore, how critical is it that each of them be controlled?
- If there are several requiring control, how will you prioritize their relative importance?
- Will your chairperson, committee, and intended audience likely agree with your priority order?
- How, taking your own and these other opinions into account, shall these alternatives be prioritized in their claim on your resources?
- Which design best controls the top-priority alternative explanations?
- Is that design feasible? If not, how can it be modified so it is?
- Given the other claims on resources, what design is preferable?

The final decision must depend on the particular circumstances of each study, but a general principle is to find the design configuration that provides the best possible use of available resources at the same time that it:

1. Gives priority to the most serious alternative causes of the effect, taking into account their likelihood, and
2. Control by elimination if that is possible; by adjustment as a second choice if a good method is available; or, where it is not, as a third choice, by building them equally into the groups being compared.

Control for as many variables as are important and as can feasibly be accommodated. This is one of many areas subject to your good judgment for

which no set of foolproof rules can be provided. *Every study is a compromise between what it is realistically possible to control and those variables that would be nice to control in the most perfect of all possible worlds.*

Unfortunately, not all judges will weigh the desirability of controlling possible contaminating factors the same way. Their "most acceptable compromise" may differ from yours. Once again, this is a place to demonstrate your mastery of the problem. Nobody knows better than you do the multiple sources of contamination that might affect your study. Therefore, in your proposal, convincingly indicate:

- The nature and basis of the particular compromise being proposed,
- The reasons for accepting it,
- The reasons for choosing to control the variables selected,
- The reasons for ignoring certain others, and
- How the design realistically controls the critical variables without sacrificing the integrity of the study.

Where do you place this explanation of elimination of alternative explanations in the proposal? Usually, you will find it in the discussion of one of the links of the design, especially the comparison and contrast—the basis-for-sensing-attributes-and-changes link. But it can be covered anywhere it fits; the important thing is be sure it is included.

It is possible that you can do the study only in a laboratory-like situation if your design becomes sufficiently complex. This markedly reduces the generality of the findings. Such a consideration is obviously more of a worry in an applied or developmental study than in one dealing with basic research. But even in doing basic research, the need for generality may force consideration of other design choices.

Avoid expediency as a reason for failing to control a factor if reasonable effort and/or expense would permit doing so. For less critical variables, experienced faculty will recognize the reality of expediency as a good and sufficient basis.

Which alternative explanations are likely to be most troublesome varies with methodology and the study's circumstances. The most thorough delineation of alternative explanations has been in the context of experimental studies where they are termed *threats to validity* (see Campbell and Stanley, 1963; Cook and Campbell, 1979; Krathwohl, 1998/2004, pp. 526–531; Shadish, Cook, and Campbell, 2002; thirty-three of them are listed in Wortman, 1994). But there are also lists for qualitative studies (see Krathwohl, 1998/2004, pp. 317–320).

Some Illustrative Common Alternative Explanations to Be Eliminated or Controlled

For purposes of illustration, some examples that plague a variety of types of studies are briefly described below.

Reactivity. The effect of special attention is a reaction to the perception that there is something special about this situation. It usually elicits "I'd better do what is right" or "I'd better be good" behavior. One looks for reactive effects where obtrusiveness tips the situation from normal to special:

- The presence of an observer can change normal behavior—a teacher better controls her temper; the children are on their "good behavior."
- The treatment obtrusively stands out from the normal sequence of events—the experimental group is taken from the classroom to the computer cluster.
- Measurement of effect is obtrusive—students spot the video camera that is recording their use of reference books in the library.

Obviously, reactivity is eliminated or at least reduced when things proceed naturally, or as much so as possible. Concealing the observer by providing him a social role in the group being observed and allowing time for him to become a normal part of the situation may control for reactivity. Having the usual classroom teacher, social worker, or other professional administer a special treatment, instead of the researcher, may do so as well. Further, that person may be the best one to decide how and when to introduce a treatment into the situation. Where measurement is a problem, see Webb, Campbell, Schwartz, and Sechrest (1981) and Lee (2000), books on unobtrusive measurement and methods as ways of reducing reactive behavior.

Researcher Expectancy and Placebo Effects. A very closely related influence is the expectation of the researcher that influences result in the direction the researcher hopes to see. It refers both to the elicitation of such behavior from those studied as well as to faulty or self-deceiving perceptions by those recording the study's results. Researchers or their assistants may inadvertently tip the scales in favor of preferred results in a variety of ways: Participant observers may give inadvertent cues to desired behavior. Participants typically try to fathom the purpose of the study and give the responses they perceive as wanted. Ambiguous situations may be recorded as instances of the study's expected outcome. Errors in recording, observation, or measurement procedure may unintentionally favor the expected outcome (when totaling your checking account register, why do errors usually favor you instead of the bank?).

Use of "double-blind" procedures, where neither observer, measurer, nor subject knows the intended outcome of the study, eliminate expectancy effect. Treatments appear as identical as possible, but participants are coded so some uninvolved party can separate comparison groups after treatment. The control treatment is referred to as a "placebo" or "placebo treatment" after the inert pill that is used to mimic an experimental drug. Double-blind procedures cannot be used when: (1) the participant's knowledge of treatment is part of the treatment itself, (2) it is obvious which treatment is to be favored from merely ob-

serving the treatment or being exposed to it, (3) the treatment can be readily identified from side effects, or (4) withholding a more favorable treatment would have ethical consequences.

Selection and Mortality Effects. Selection and mortality are opposite sides of a coin. Selection adds an alternative explanation by affecting the composition of the group through the nature of the persons selected for study, mortality by those leaving the study as it progresses.

The alternative explanation comes about because the persons selected are distinguished from those not studied by a factor that may also cause the desired effect. If unrecognized, it can lead to the wrong conclusion, like assuming that, generally, bottles are discarded in the ocean with their caps on, because they predominate along the shoreline. Rather, the others sank—these are the survivors. Similarly, high school graduates and college and graduate students are "survivors." Volunteering is a common selective factor. Alternative explanations arise from the fact that those who volunteer are different from nonvolunteers (usually brighter, better educated, higher in social status, more sociable, have a higher need for social approval, etc. [Rosenthal and Rosnow, 1975]).

"Mortality" as an alternative explanation is not the death of an individual, but the change in group composition resulting from their leaving. "Leavers" depart for a reason—uncomfortable, bored, afraid to fail, etc. Because this modifies the average characteristics of the study group, their leaving should be noted and taken into account. Their having left can be easily overlooked when concentrating on others in the group.

Instrument Decay. Changes in the measuring instrument over time might cause one to conclude an effect occurred when it was the recording standards that were changing. In qualitative studies, since the observer is the "instrument," changes may occur as she becomes more familiar with those studied and/or the situation. Where measuring equipment is concerned, as in hearing or other discrimination tests, lack of calibration may cause the effect. Where essay tests are involved, the first ones graded may be held to a different standard than the last. Instrument decay can take many forms.

A General Strategy. The important thing is to be aware of possible alternative explanations, to describe the likely ones in the proposal, to tell how they will be handled, or if they won't, why not. Show in the description how well you have analyzed the design and how familiar you are with the literature on this topic so that you have recognized and adequately taken into account the relevant threats to your study.

Design Efficiency

At some point, *determine whether the design is maximally efficient.* For example, can better use can be made of participants or informants; data collection points be reduced; more data collected at each visit, measurement, or observation; persons be scheduled more efficiently; and so on? The development of the work plan, discussed in the next chapter, is especially helpful in showing where economies can be made in scheduling (your time is the major resource to allocate for a dissertation). If feasible, considerable savings in resources can result from combining your study with that of other researchers so as to use the same participants, situations, and/or data.

Give Special Care to Those Sections Critical to Your Research Method

As noted at the beginning of this section, the nature of your study affects what parts of the proposal are critical and therefore need special attention. But, regardless of the kind of study, the design aspects of the method section deserve special attention because within any research method, there are a variety of ways to proceed.

Choice of design is still an art. A design's strengths in one aspect may result in a weakness elsewhere. Choice requires assessing the gains and losses involved in various alternatives. Unfortunately, they are rarely known accurately in advance; good estimates come from knowing one's field and having worked with it long enough to have learned which options yield gains, which losses, and their frequency and seriousness. As a new researcher you may not have the experience to weigh all these variables as your chairperson and committee will, but use all the resources you can to develop the best possible design. Talk with other graduate students and particularly with those faculty members who frequently serve as design consultants. Then rely on your chairperson and committee to point out problems and solutions that you may have overlooked.

Because choice of design is an art, reasonable persons may differ as to the best design for a given problem. Your initial choice may not be that which springs to the mind of your chairperson or committee members. But they may be thinking in stereotypes, and your approach may indeed be best. Help readers follow your line of reasoning so that they, too, may see your design choice rationale—your reasons for so choosing and why this choice over alternatives. *Creating a strong proposal is also a matter of knowing your audiences and being able to adequately anticipate and meet their concerns.* There is more on this point in the material that follows.

SECTION 2: DEVELOPING THE SUBSECTIONS OF METHOD

The method section describes the structure of the investigation: the way participants or situations will be studied; how groups will be organized; if there is a treatment, when and how it will be administered; when observations will be made, of whom, when, and, if known, of what; the protection against alternative explanations; and the like. Begin the write-up of this section with a one-paragraph summary or overview of the method to be used.

Then, in whatever order seems most appropriate for what you plan to do, cover the six links of design in the chain of reasoning so as to describe these various aspects of method:

1. Participants—population and sample
2. Situation
3. Focus of action—the core variables such as treatment and effect,
4. Records—instrumentation and data collection,
5. Comparison and contrast (basis for sensing attributes and changes)—the basis on which the change due to an independent variable or experimental treatment or whatever happens at the focus of the study will be sensed (e.g., pre/post comparison or comparison with another group), and
6. Time schedule—the procedure.

Having described your data gathering plan, next describe your

- analysis plan and
- expected end product.

Although one can use the six links in design as an organizing framework, most proposals will not have a subsection for each of them. This is apparent in the annotated proposals in part 5 of this book, and they are typical. But the information describing all six links is somewhere accounted for. Be sure to adapt your proposal format to best describe your study. The following discussion specifies what is typically included to describe each link, examples of where this appears in the proposal, suggestions for writing it, and some of the common, and/or most serious, errors.

Participants—Population and Sample

For all studies involving gathering data from people, a description of who they are is essential to determining the potential generalizability of the study findings. The characteristics of the population to which the sample studied belongs define the group to whom the study's results may transfer. Obviously, this generality should be consistent with the generality claimed in the problem statement and objectives sections. The representativeness of the sample indicates how confidently we can generalize from sample to population.

While random sampling provides *on average* a sample that is representative in every respect—even some characteristics we don't care about, like length of one's little toe—*there is no guarantee that any given sample will be representative of those characteristics crucial to our study.* Therefore, we often take steps to ensure that the sample is representative with respect to key variables. There are a number of ways of doing this such as stratified and cluster sampling with random selection within strata or clusters.

For studies concerned mainly with description, characterizing the nature of the participants allows readers to determine what, if any, parallels exist to their own experiences, thus allowing a determination of whether the results "ring true" and, if they do, what, if any, implications the study might have.

Therefore, regardless of how those studied were or will be selected, be sure to describe that process in detail, giving a rationale for why that process is the best of those available. If you seek findings that generalize, indicate the variables that will be used as the basis for ensuring representativeness—e.g., the basis of stratified and cluster sampling, the significance of those variables for the study, and why they were chosen over others. Indicate where the data on the variables used to stratify or cluster individuals will be obtained. If there is any reason to believe the database from which they are to be selected is not error free, give some indication of the anticipated error's extent and its likely impact on the study.

To study a proposition that is presumed to be universally applicable, you can use anyone or any situation except where the choice of participant or situation might favor or disfavor it. Any random sample of the world's population will do. We often substitute a convenience sample such as graduate or undergraduate students for such an unbiased sample. But if one or more characteristics of university students would normally be expected to affect the study's outcome, you must explain why you believe this will not be so for your study. It is important to anticipate such concerns.

Sample size is another important decision. Giving a good rationale is more impressive than picking an arbitrary number or using whatever size convenience sample is available. Power analyses provide such a rationale by providing a design basis such that if the expected result does appear, the study will be sensitive enough to show it as statistically significant. Increasingly, studies intended for publication must be designed using such analyses. They require making some decisions about:

1. How precise must the estimate be? Put another way, how small a difference is to be sensed? Other things being equal, the greater the precision required and the smaller the difference to be sensed, the larger the sample required.

2. How different are individuals with respect to the characteristic being estimated; how much variability is there? If everybody is about the same, other things being equal, you can estimate from a few cases. But if people differ greatly, that is, there is high variability from person to person, more cases will be needed.

3. How much certainty is required of the estimate? This is another way of asking whether you want to use the 1 percent level of significance, 5 percent level, 10 percent level, and so on. At the 5 percent level, your confidence that the

population value is bracketed by the confidence interval is expressed by odds of 19 to 1. Again, other things being equal, the greater the certainty required (e.g., the 1 percent rather than 5 percent level, the smaller the confidence interval), the larger the sample required.

Where does the information come from to determine sample size? For questions 1 and 2 above, from your pilot studies, from other researchers' use of the same instruments with comparable participants, or, failing these, from "guesstimates" made on the best basis you can command. With such estimates and a decision on question 3, any good statistics book or Cohen (1988) or Lipsey (1989) will show how to calculate a sample size such that if an event of interest occurs, the odds heavily favor that it will be statistically significant. For an interactive statistical power analysis site on the Web, try http://www.stat.uiowa.edu/~rlenth/Power/index.html (accessed October 1, 2004). To create the tilde (~), press "Shift" and the key to the left of "1." Alternatively, after "link:" copy and paste its URL into Google.com to find similar sites (e.g., link:www.stat.uiowa.edu/~rlenth/Power/index.html).

Occasionally a student will propose using the total population, which, though large, is presumably manageable. In such instances, even though feasible, it may be preferable to work more intensively or carefully with a sample than to use the same resources trying to cover the entire population. Indeed, if a power analysis indicates a sample instead of a census can satisfactorily be employed, the resources required to canvass an entire population when concentrated on a sample may result in better and deeper information or the same information obtained more cheaply. However, if your research is intended to convince lay policy makers, there may be no substitute for a census. How best to employ your resources is determined by the sophistication of your intended audience and the purposes of your study.

Situation

In many instances, the situation or the setting in which you will gather your data is determined by the sample, so one has already described it in the previous section. But where that is not the case, such description indicates where the design will be implemented. It helps readers determine the possible applicability of findings to comparable situations. Though typically covered in the population and sample section, description of the situation may be covered in other sections of the proposal.

See for example, Beissner's paragraph 48, which is in the "Procedure" section.

Focus of Action—Treatment(s), Independent and Dependent Variable(s)

Here is where you describe what it is you are studying—the effect of one or more treatments, the effect of one or more independent variables, or whatever one is focusing attention on, such as what results when certain conditions occur.

Warters, for instance, specifies his focus of action early in his proposal as he is citing literature to indicate the importance of his study in paragraphs 8 and 9.

Except in emergent studies, description of the treatment and variables is most often put in cause and effect terms where the causes are treatments or independent variables and the effects are the dependent variables—that is, they are dependent upon the presence, and often the strength, of the independent variable. In some instances, this information is covered in the instrumentation or measurement section.

Beissner, for example, describes the independent (paragraphs 40–47) and dependent (paragraphs 28–39) variables within the section titled "Instruments." Note especially in Beissner that she also describes independent variables that might cause the same effect as the treatment—level of factual knowledge, critical thinking ability, and the processes by which one relates new knowledge to old (measured by her "Inventory of Learning Processes"). If one is to claim an effect has a particular cause, one must eliminate such alternative causes as plausible.

In an experimental study, one normally finds a careful description of the treatment.

Beissner assumes the readers are familiar with concept mapping and with Novak and Gowin (1984) (see her paragraph 14) and so describes only the scores that will be produced (see paragraph 46, the section "Instruments"). In contrast, although omitted in this cut-down version, Phelan provided detail regarding his treatment—a workshop on self-directed learning—in an appendix (see paragraph 26). Placement in the appendix is a common practice.

So it is clear, the specifications of the treatment and variables in the study, the focuses of action, need to be explicitly spelled out somewhere in the proposal, but they need not have a section of their own. They are frequently specified and described in the course of completing other sections of the proposal.

Records—Instrumentation and Observations

In this section, records—the measures and observations—to be made in gathering data should be detailed and their appropriateness for the task convincingly described. Instruments may be unnecessary in a case study with few individuals. They may be inappropriate for exploratory and emergent studies, where to start by using instruments would presuppose you already knew what you were seeking to study. But they are both appropriate and necessary for the many studies that are confirmatory in nature, highly structured in their approach, concerned with cross-case comparisons (individuals, programs, sites, etc.), or combinations of structured and/or exploratory-confirmatory designs. In all of these instances, some forethought about instrumentation at the pro-

posal stage will help reduce data collection and analysis problems and facilitate and enhance comparisons within cases and across them.

Instrumentation may range from those with very light structure—categories of behavior or phenomena to count—through increasingly structured data gathering: observation scales, rating scales, interview guides, interview schedules, conventional questionnaires, computer-adapted branched questionnaires, individually administered tests and measures, computer-adapted tests, and group tests. Which of these, if any, are appropriate will depend on the study, what is already available, and the trade-off of expending time and energy early in instrument construction in order to save time and energy at the analysis end. Whatever your choice, indicate it and describe its supporting rationale in the proposal.

The Observer as Instrument

As noted under "Instrument Decay," studies using observation have their own set of problems. The discussion of them and safeguards against them will typically appear under a section title like "Research Method" rather than "Instrumentation." This is discussed more extensively in part 3.

Measures

Some variables—time or distance measures, for instance—present little problem. But most studies in the behavioral sciences involve constructs that must be translated into behaviors that can be sensed in order for us to assess them. When we meet people, we cannot directly sense their intelligence, for instance, but we judge it by their behavior. Sometimes we do this by exposing them to a standard set of problems, an intelligence test. This permits comparison of their behavior with other persons on a common scale. Psychological, sociological, and economic constructs such as anxiety, socioeconomic class, and marginal utility require interpretation into characteristics that can be sensed and measured. The instrumentation section is where that translation is described and the case made for its adequacy.

This is another section in which the expansive rhetoric of the problem description may be reduced to mundane terms when the reader sees what the problem has become in measurement terms. If the realities of measurement are modest, keep the early rhetoric modest too.

Often the translation process helps to sharpen your understanding of the study's constructs as you are forced to choose among alternatives that represent different operational definitions.

> "Anxiety" may be undefined in the hypothesis, but one will find many possibilities when one comes to choosing a measure. They range from self-report of one's "state" of anxiety to self-perceptions of it as a persistent "trait" to physiological measures (galvanic skin response or heart and breathing rate). Are these interchangeable definitions of the same characteristic? The problem definition and explanation should provide sufficient guidance to choose among the possibilities; if they do not, they need further refining.

When it is impossible to find totally satisfactory measures, describe the problem and justify, as well as possible, the measure that comes closest, indicating why it will be adequate for your study.

Be sure that all the terms critical to the questions, hypotheses, or models are discussed in this section. Variables mentioned earlier and then dropped leave ends dangling that are sure to be noticed by your chairperson or committee. And it is hoped that they do, since attending to them at the proposal stage may save you a real crisis later. In addition, dropping variables leaves the impression that you are not paying sufficient attention to important details and suggests there may be other carelessness in the proposal.

The interpretability of commonly used instruments may be well established for the purposes you intend. For new or experimental tests, however, your audience will expect empirical evidence of the test's quality and meaning. If it is not available from use of the test by others, make provisions in the proposal for establishing that the test has appropriate characteristics (if possible, before the data are collected. For an example, see Beissner's paragraph 39, regarding her plans to gather evidence of validity for the test she developed.). Here, as elsewhere, do not assume that the reader will rush to the library to look up missing reliability and validity information. If there is any doubt that the reader is likely to know it, supply it.

Validity. Construct validity provides evidence that forms the basis for intended score interpretation and serves as a unifying framework for other validity evidence. Evidence based on relations with other variables shows, for instance, that the test correlates with an already accepted measure of the variable. It correlates with measures it ought to be related to and does not correlate with those it should not. Look at an example in paragraphs 28–31 and 45 of Beissner's proposal.

Validity evidence based on content, also called "content" or "curricular validity," provides a comparison of the test items with specifications of what subject matter content and skills the test is supposed to cover. Predictive and concurrent validity evidence shows the measure predicts or is correlated with work or academic performance. Evidence of validity is usually found in a test's manual or in such references as Buros's *Mental Measurements Yearbooks*. Cite evidence for those kinds of validity needed for the problem posed.

Although not usually considered part of construct validity, "face validity"—that the test looks as though it measured what it was intended to measure—is very important when the study's acceptance is determined by policy makers, parents, and others with little or no professional background. Treat it in the validity discussion if it is likely to be a factor in your study.

Reliability. Just as there are various kinds of evidence for validity, there are also for reliability: stability reliability—the test scores are stable over time; internal consistency reliability (homogeneity)—the various test items measure the same characteristic so the scores are interpretable; and equivalence reliability—different test forms are comparable. Which reliabilities are required depends on the design. For example, test results compared over a substantial period of time require evidence of stability reliability and internal consistency reliability (for an example, see paragraphs 41 and 44 of Beissner's proposal). If the retest used a different form of the same test, equivalence reliability would be required as well. Again, such evidence is usually given in a test's manual.

Objectivity. Observation scales, in particular, require that all observers in a study use them the same way so that they agree when rating the same phenomenon; this is objectivity. Observers often train by rating the same videotapes, continuing until all observers respond to events the same way. Describe any planned training and what level of agreement among observers will be sought. Remember that a correlation coefficient will show agreement on relative but not exact position on the score scale; it does not detect that one person is a tougher grader than another, for instance. Use the intraclass correlation to show exact correspondence of judgment.

Objectivity is also a problem for multiple raters of essay or similar material.

> Beissner's scoring of concept maps is an instance of this; see her paragraph 47 and the related annotation.

Sources of Instruments. If you are looking for available instrumentation, be sure to use the considerable resources for finding both established and experimental ones. At one time the sole source of information about tests was Oscar Buros's *Mental Measurements Yearbook*, published at irregular intervals since 1938. Information on commercially available tests is available from the Buros Web site, http://www.unl.edu/buros (accessed October 1, 2004); reviews on the most heavily used tests can be downloaded for a fee. In addition, there are now a number of compilations of instruments (Backer, 1977; Goldman and Mitchell, 1995–2003; Fabiano and O'Brien, 1987; Educational Testing [ETS] Service's TestLink—http://www.ets.org/testcoll/index.html [accessed October 1, 2004]).

The Internet is continually changing, so check for new sources, but these sources, which include ETS TestLink's more than twenty thousand tests, should go a long way toward pointing you in possible directions. Pursue them in databases like the *Social Science Citation Index*, *PsychINFO*, or *Sociofile*. In these, one may be able to find instances where a specific instrument has been used, its strengths and weaknesses noted, and sometimes an improved version.

Constructing and validating new instruments is both difficult and expensive. Established instruments may not be quite as close to the desired operational definition as new or experimental ones, but usually are better validated and more easily and widely understood by one's audience. However, a specially designed instrument may result in a more on-target study. Which to choose? Consider such factors as: How much difference in validity would be gained with new construction? What are the odds the construction effort will be successful? How feasible is it? Must the results be accepted by a lay audience who might better accept the established instrument? Can data be obtained that document the new instrument to your audience's satisfaction?

If you lean toward constructing a new instrument, consider it carefully with your chairperson and committee. Developing an instrument can be a dissertation in itself. They won't want you to overcommit yourself by undertaking more than is reasonable in a dissertation, any more than you do. But they may have a better idea of the time and effort involved. So, lay it all out for them to consider. (Remember as indicated at the outset, approval of your proposal is a "shared decision-making situation"—see chapter 1, pp. 3–5. If given a green light, describe how the test will be developed and lay out a development plan. Display sample items in an appendix. Such plans will be found in many measurement books (e.g., Gronlund, 2001; Hopkins, 1998).

Comparison and Contrast—The Basis for Sensing Attributes or Changes

This link in the design serves two purposes that are most easily seen in experimental studies. The first purpose is providing a basis on which one can say that a treatment had an effect. This might be by comparison with an untreated experimental group as in the Beissner study. (Beissner describes the difference in treatment of the two groups in her "Procedure" section, paragraphs 48 and 49, and examines the effect of the treatment in her "Data Analysis" section, paragraph 50.) As with previous links, in those sections of the proposal where it is relevant—the procedure section being a common one—show how you will sense attributes or changes.

The second purpose is the elimination of alternative explanations, as discussed earlier in this chapter.

> Beissner eliminates the alternative explanations of differences in prior knowledge, in critical thinking ability, and in learning style. The assessment of these variables is noted in Beissner's "Instrument" section (paragraph 41 and 43) and their effect in the "Analysis" section (paragraph 50).

Although it is less obvious in nonexperimental research studies that seek explanations and generalizable findings, this link serves the same two purposes: noting attributes and changes and protecting against alternative explanations.

For instance, Warters is seeking attributes of effective programs. In paragraph 17, he notes how, using theory-based sampling procedures, he will select individuals for interview from three or four different treatment programs to allow "the opportunity for some comparison of treatment modalities" and to identify "specific aspects of group process thought useful by the men themselves in eliminating abuse."

In terms of protecting against alternative explanations, Warters notes in paragraph 31 that he is "currently functioning as an advocate of social intervention to reduce men's domestic violence," and that "This perspective will most certainly affect my interpretation of events and discussion during the course of my study." He then indicates in paragraph 32 how he hopes to overcome this concern on the part of his audience.

So, regardless of study method, if one is advancing a generalizable explanation, somewhere in the description of design, one needs to note how these two functions of this link will be attended.

Time Schedule—The Specification of the Procedure

The description of the procedure is a narration of the plan for data collection over time. It indicates what observations or measurements will be made, when, where, and of whom, and, if there is a treatment, how, where, when, and to whom it will be administered. It is usually the place where a reader can get the clearest idea of exactly what you plan to do and how and when you plan to do it. Usually, it is a verbal account, with the actual schedule with dates, which is described in the next chapter, forming a later section. It often contains a graphic of the work plan. Obviously, the procedural narrative and activities in the work plan or schedule should be coordinated so they tell the same story. Because of this relationship, you may wish to lay out the work plan or schedule section first and then describe it in the method or procedure section. Alternatively, constructing your work plan or schedule from the procedure section provides a test of its adequacy.

Usually the account is labeled "Procedure," as it is in Beissner, where it begins with paragraph 48. But it sometimes appears, as in Warters, under the heading "Methods," where it starts with paragraph 11, or "Research Methods," as in Phelan, where it starts with paragraph 10. In all three instances, readers can get quite a clear picture of what the researcher plans to do from these sections.

Problems in Data Collection

Indicate your provisions for handling potential problems that may arise in the course of gathering data.

Beissner, for instance, fearing that students may communicate so that the control group may learn how to do concept mapping, indicates that "the participants will be advised not to discuss the content of their sessions with other study participants" (paragraph 49).

The social-psychological aspects of studies are all too often ignored. Use of middle-class Caucasian interviewers in an economically depressed African American or Puerto Rican community is an example. Active opposition by teachers threatened by a study of their teaching methods is another. In both instances, the social dynamics of the data collection situation, if ignored, may destroy a study's validity. Project TALENT, a large longitudinal study, found this out the hard way when parents at one data collection location gleefully made a bonfire of all their children's answer sheets because they believed the information sought was too personal. The contingencies are too numerous to cover, but the following examples may sensitize you to some concerns.

A most serious problem occurs when those familiar with an experiment are concerned that an untreated or unobserved group is being discriminated against. This can be especially serious with therapy, remedial, accelerated, or enriched treatments where administrators, other professionals, or parents may become upset when control or unselected groups are not also helped. This can often be handled by setting up a waiting list of individuals who can be used as a control group and then treated later.

For most studies, the more normal the situation, the more generalizable the results. Show your good training in field method by avoiding periods immediately preceding or following holidays, a big athletic or social event, etc.

The more your planned activities will disturb normal routine, the fewer institutions or organizations likely to be willing to cooperate. Further, those sites that do may well be atypical, so generality of findings may be reduced. Include letters in the appendix from persons in authority indicating intent to cooperate with the study so your committee learns who is involved and can assess any implications.

If you are studying a controversial topic such as sexual attitudes or other highly personal matters, obtaining permission may be difficult. Even such apparently innocuous topics as school achievement may present problems if it is a sensitive issue. Anticipate these problems and show how you plan to handle them.

Whenever data are gathered from more than one group, or in several situations, describe the provisions made to ensure that the circumstances for data collection are comparable.

Using an observer, tape recorder, or television camera may markedly influence a situation or create an artificial one. Describe the steps to be taken with respect to this problem, such as concealment of the camera, special rooms with provisions for concealed observation, or an adaptation period. Kounin (1970) left a box in the classroom throughout the year. Participants never knew whether it contained an active video camera and came to ignore it. Of course, the ethical implications of such possibly deceptive practices have to be dealt with in your proposal and ultimately approved by your local Committee on the Protection of Human Subjects.

Analysis

The method of analysis must be consistent with the objectives and design. For instance, when the study calls for finding the extent of a relationship, some measure of the size of relations such as a correlation coefficient is in order. Too often, we find instead a contrast of high with low groups to compute a difference statistic such as a *t* test. A statistically significant *t* test would indicate that had a correlation been computed, it would be significantly different from zero. But the extent of statistical significance does not indicate the size of the relationship; it could be so low as to be, practically speaking, insignificant. That a difference is statistically significant at some extremely small percentage level may be testimony more to the statistical power of the study than to the strength of the relationship. Without knowing the size of the correlation, you don't know whether the relationship is strong enough to permit any kind of reasonable prediction and, therefore, any practical application.

The assumptions of the statistics should fit the data. If they seem not to, describe the corrections that can be made. For instance, analysis of variance assumes normally distributed populations, but corrections in the level of significance can easily be made for nonnormal data.

A description of how missing data and/or unequal cell frequencies of a complex design are to be handled displays a sophistication that is comforting to the reader.

When new statistical techniques, computer programs, or other unfamiliar analytic tools are to be used, adequately describe them and show their advantages over current methods so the reader may be assured of their appropriateness.

It is not always possible to completely anticipate in advance the nature of the analysis that will be called for; it may depend on the nature of the data collected. This is especially true of content analysis procedures, but it may also be true of statistical methods. As is probably obvious by now, the best strategy is to *reveal the depths to which these problems have been anticipated and describe the projected solution in sufficient detail as to clearly convey its nature. At the same time, show awareness of where anticipated departures from plan may occur.* Before leaving this section, check to make sure the analytic procedures will handle all the relevant data that will be gathered and will yield evidence bearing on all the questions, hypotheses, and model aspects proposed for investigation.

Expected End Product

This section will not appear in all proposals, but is a good section to include if there are products in addition to the usual report of results or if the report of results is other than routine. Tests, evaluation instruments, curriculum materials, videotapes, audiotapes, films, pamphlets, and the like, even though they may be but by-products of the project, are sometimes more important and more enduring than the project results. Describe them and their possible use outside the project.

One possible very important end product is your dissertation formatted as an article ready to publish! Read how next to achieve that.

AN ALTERNATIVE DISSERTATION FORMAT: ARTICLES READY FOR PUBLICATION

If you are serious about obtaining a position in higher education, consider writing your dissertation as an article ready for publication in an appropriate journal. Nearly all institutions will allow this, even though it is a rarely chosen route in the social and behavioral sciences. Some encourage it; it is more common in the sciences than the social sciences, but ought to become more common over time. See Krathwohl (1994) and Duke and Beck (1999).

Having the dissertation ready to send off for publication will net you an early career publication and save you from trying to cut your dissertation to journal size at the same time that you are adjusting to your postdoctoral situation. After all, a new job, learning the ropes in a new institution, planning courses and writing teaching materials, starting a research program, and learning how to advise students, to say nothing of all the non-higher education problems of relocating, provide a full plate. You don't need, in addition, a dissertation that you may possibly have grown tired of hanging around your neck.

Publication will require that you use the format of the particular journal to which you intend to submit. The length of their typical article will unquestionably be less than dissertation length, requiring a significant departure from dissertation format. Depending on your chairperson and committee, and the typical procedure at your institution, you may be required to put considerable work in an appendix so that your committee and the external readers at the final oral examination can understand what you did. The literature review may need to be prepared as a separate article for a different journal than the main body of the study.

If you plan to use the dissertation-as-article format, share this idea early with your chairperson and committee. Be sure they will cooperate with you in this endeavor. Then make your intent regarding writing format a part of the proposal compact. This makes clear to everyone what to expect.

If there is likely to be any question regarding "how much is enough," that is, when your committee is willing to agree that you have fulfilled your "contract," read the last section of chapter 7. It is discussed there because it is a common problem with qualitative proposals, but can be for other kinds of studies as well.

Finally, since the description of your study methods may be the most closely read section of your proposal, it is important to produce a carefully thought-out statement. Use Worksheet 5.1: Study Methods Review to assess and improve your methods statement.

WORKSHEET 5.1

Study Methods Review

How Strong Are My Study's Methods?

As you develop your proposal, periodically review how strong your study's methods are, and where they need to be strengthened.

In Describing My Study's Methods Overall, How Well Have I . . . ?	Strong	Acceptable	Weak–Improvements Needed	Not Applicable
Selected procedures that address the expectations created in prior chapters?				
Adapted my procedures statement to the specific methods of my study?				
Clearly shown the connection between my method and the questions, hypotheses, or models I have chosen to study?				
Constructed a design that is a relevant, feasible, and internally coherent operationalization of the concepts being examined?				
Appropriately considered resource limits, institutional limits, ethical limits, and time limits?				
Identified and eliminated or controlled each major alternative explanation of the results I might obtain?				
Anticipated and accommodated possible study problems?				
Outlined appropriate analysis procedures?				

(Continued on next page)

...lowing specific ...s of my method, ...ould have I selected ...scribed . . . ?	Strong	Acceptable	Weak–Improvements Needed	Not Applicable
...cribing My Study ...ds Overall, How ...Have I . . . ?				
...participants, ...ing population(s) ...mple(s)?				
...situation?				
...focus of attention, ...ing treatments or ...ations, if any, and ...ariables?				
...records, including ...ations, measures, ...instrumentation, ...their technical quality?				
...comparisons ...ans for sensing ...ata or change?				
...time frame ...procedures?				