The Problem: The Heart of the Research Project

The problem is the axial center around which the whole research effort turns. The statement of the problem must be expressed with the utmost verbal precision. The problem is then fractionated into more manageable subproblems. So stated, we can then see clearly the goal and the direction of the entire research effort.

At the very heart of every research project is the problem. It is paramount in importance to the success of the research effort, and it should be so considered by every researcher. The situation is quite simple: no problem, no research. To see the problem with unwavering clarity and to be able to state it in precise and unmistakable terms is the first requirement in the research process.

Where Are Research Problems Found?

Problems for research are everywhere. Take a good look at the world around you. It teems with researchable problems. Whatever arouses your interest, tweaks your curiosity, and raises questions for which as yet there are no answers or where answers exist but where dispute arises as to their validity—there is fertile ground for the discovery of a researchable problem.

At the outset, it is extremely important that you distinguish between two basic types of problems: personal problems and researchable problems. When some students think of problems, they lump together all of the perplexities they are faced with and fail to distinguish between their essential characteristics. You may have a problem: how to get along with your mother-in-law, how to ask the boss for a raise, how to make a success of your life. And these problems are real, but they are not researchable. Researchable problems fit the requirements of the scientific method, which we will discuss more fully in chapter 5. And there is no scarcity of them.

The human race does not have the final word on most of the problems that are important to it. Inspect any segment of life, any phenomena happening at this moment, any of the events that swim before your eyes. In all of these situations lie innumerable problems to claim the attention of the researcher.

Where does your interest lie? Is it in agriculture, chemistry, economics, education, electronics, engineering, health sciences, languages and literature, medicine, music, political science, physics, sociology, zoology, or perhaps in any one of dozens of other categories? Go to the library; inspect any volume of Dissertation Abstracts International under the general heading of your interest and you will suddenly be aware how intimately the world of research and the world of everyday life have become intertwined. You will see research intimately related to the ever-expanding and exploding universe of knowledge. You may also realize after such an experience that all you need is to see your own area of interest in sharp, clear focus and then enunciate the problems indigenous to it in precise lucid terms, and you will have a problem for your own research efforts. But it is with an unmistakably clear statement of the problem that research begins.

Problems for research are usually found at two theoretical levels: (1) the problems...
whose aim it is to increase our knowledge, and (2) the problems whose prime purpose it is to make life better. There is usually a link between the two. We find a researcher interested in the effect of a stimulus on rats and, frequently, we say to ourselves, "Of what use is the expenditure of this time and money?" But the regimen keeps the rats active and busy into their old age. At the death of each rat, its brain cells are closely examined. A startling difference appears between the brain cells of the active, stimulated rats and those who have lived out their days in an impoverished and restricted environment.

Other researchers attack the problem from different angles, calling upon other means of stimuli. They come to similar conclusions. We are now coming very close to knowledge that, transferred from rat to human, may say much in the matter of aging. The wise choice of a researchable problem can lead the researcher into a truly unexpected and fascinating domain.

Problem begets problem and the helical process, which we discussed in chapter 1, begins. By its very nature, research always suggests more problems than it resolves. Both danger and challenge reside in this phenomena. The danger is that, for the mind that cannot lock on a single problem and pursue it purposefully, the research effort may be more of a scatteration than a concentration. The challenge lies in the magnificent unexplored vistas that are a fertile domain for future investigation.

Keeping the Research Process in Focus

Research, as a process utilizing the scientific method, is a new concept to many students. This becomes obvious when they attempt to formulate a researchable problem. In chapter 1, we discussed briefly some types of pseudo research and false concepts of the research process that have become a part of many students' earlier education. In learning a new orientation to research, confusion arises easily.

At the very beginning of the research process, students are confronted with stating a problem for research. Many students find it difficult to formulate an acceptable research problem. The heart of their trouble usually lies in their inability to appreciate the struggle between thinking and doing. One of the first things that any researcher must learn is to distinguish between what it is to think with respect to the data and what it is to do with respect to the data. In research, it is very easy to become entranced with action, with merely doing—making notes, sleuthing facts, comparing, collating, correlating. Just so long as you are doing something, you can convince yourself that you are making progress in "doing research." Perhaps that phrase itself suggests to the researcher action rather than thought. There is also a certain euphoria that accompanies the discovery of a fact. Research has a way of becoming an inspired dedication to the researcher. This dedication can become a vicious cycle of finding more facts, making more notes, applying statistical tests and measurements to the data already in hand, digging further and deeper—always doing, doing, doing!

If you become aware that you are developing such a frame of mind, and if the elation of fact finding becomes a driving force in your enthusiasm to do research, slow down and look at the situation with detachment and objectivity. Remember, the heart of the entire research project is the problem. The first responsibility of the researcher, therefore, is to articulate an acceptable problem. Whatever you do should have but one purpose: to formulate a problem that is carefully phrased and represents the single goal of the total research effort.

For this reason, successful researchers, at every step in the process, ask themselves constantly, "What am I doing, and for what purpose am I doing it?" These questions discipline your thinking concerning the ultimate purpose for garnering the facts: to resolve the problem.

There is nothing wrong with frenzied data acquisition, except that you need to monitor the data constantly and keep your purpose in mind. The euphoria, the inspiration in doing
A colleague of mine once said, 

There is an inspiration in doing research that few other academic activities afford. But that inspiration is quite different from the common understanding of the term. The inspiration or research is not an ethereal afflatus that transports the spirit aloft and leaves the brain behind: that sends the researcher into tailspins of uncontrolled activity. It is, rather, the excitement of the mind that, in contemplating a galaxy of data, discerns the unexpected flare of a factual nova in the area of the research problem—"a glimpse of new meaning—where previously there was nothing but a black hole of inchoate fact. That is the excitement—the inspiration—that accompanies the research process."

The Wording of the Problem

The statement of the research problem must imply that, for the resolution of that problem, thinking on the part of the researcher will be required. Such analytical thinking, which squeezes meaning out of the mere accumulation of fact, is what we call the interpretation of the data. Those who read the statement of the research problem must explicitly understand that at the summit of the research you will dispassionately analyze the accumulated facts to discern what those facts say in terms of the resolution of the problem.

Consider the difference between an accumulation of data in a research project and a mass of data as you find it in, for instance, The World Almanac. The Almanac is a treasury of fact, but there it ends. The facts in The World Almanac are certainly full of meaning, yet they remain sterile-static and frozen upon the page. Let the thoughtful mind of the researcher contemplate any galaxy of facts and meanings will begin to emerge. Yet, how many students attempt to produce a research document in the tradition of The World Almanac? They are completely comfortable in their delight at merely having "found the facts," hypnotized by the discovery and accumulation of facts. There is no research whatever in what they have done.

What is Not a Research Problem

The above discussion suggests that certain problems may not be suitable for research. This is primarily because they lack the "interpretation of data" requirement, they lack the "mental struggle on the part of the researcher to force the facts to reveal their meaning." Here are a few situations to avoid in considering a problem for research purposes:

Don't use a problem in research as a ruse for achieving self-enlightenment.

All of us have great gaps in our educations, and diminishing them is the joy of learning. But it is not the purpose of research to educate you. Your lack of information may be a personal problem, and you may want to know more about a certain area of knowledge. That is laudable. You may find gathering facts and dissipating your own informational deficiency gratifying. That is good. But do not confuse gathering data with a similar activity that is characteristic of the research process. From the standpoint of the purpose for which they are initiated, the two are entirely different.

A student submitted this as the statement of a research problem:

- The problem of this research is to learn more about the way in which the Panama Canal was built.

We stated above that for a research problem to be valid, the statement of the problem must indicate that at the summit of the research effort there will be dispassionate looking at the galaxy of facts to discern what whose facts say in terms of the solution of the problem. For this student, the summit of the fact-finding effort will provide only the satisfaction of having gained more information about a particular topic. Personal satisfaction and self-

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(1) See the discussion relative to this same point in chapter 2
enlightenment are not the goals of research.

Problems whose sole purpose is merely to compare two sets of data are not suitable research problems.

The statement of the problem must be taken at its face value. We assume you intend to do precisely what the wording of the problem statement says you will do.

Take this proposed problem for research:

- This research project will compare the increase in the number of women employed over 100 years—from 1870 to 1970—with the employment of men over the same time span.

Fine! We can do that without any effort. And we can complete this "research effort" in two lines:

<table>
<thead>
<tr>
<th></th>
<th>1870</th>
<th>1970</th>
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<tbody>
<tr>
<td>Women employed</td>
<td>13,970,000</td>
<td>72,744,000</td>
</tr>
<tr>
<td>Men employed</td>
<td>12,506,000</td>
<td>85,903,000</td>
</tr>
</tbody>
</table>

Finding a coefficient of correlation between two sets of data merely to show a relationship between those data sets is not acceptable as a problem for research.

Why? Because the basic requirement for research is ignored. Nowhere can we see a human mind struggling with facts. What we do see, however, is a proposal to perform a statistical operation that a computer can do infinitely faster and more accurately than a person can. A coefficient of correlation is merely a decimal fraction to express within a range of 100 degrees how closely two sets of data are related to each other. Aside from being a decimal fraction, a coefficient of correlation is merely a signpost. It points in the direction of a meaningful relevancy.

Under every coefficient of correlation lies an ulterior cause. Statistics look for the decimal indication of the proximity of the variables in the relationship; research, on the other hand, derives a correlation coefficient as a signpost to look deeper into the cause for that relationship.

We feel most pompous at times when we collect data and by means of a statistical procedure determine that two variables are closely related (the intelligence quotients of parents and their offspring, for example). We go off trumpeting to the world that "research has shown that the correlation between the intelligence of the parents and that of their children is point-.") We are blindly mistaken. Research hasn't shown that; a tool of research has given us this tantalizing fact. It has suggested a problem for research. The problem for research is: Wherein lies the cause of that intellectual relationship? Is it genetic? Is it social? Is it environmental? Is it a combination of certain or all of these?

To find the answer to these questions and to isolate the causal basis for the relationship—that is research; that takes thinking on the part of the researcher; and when we have discovered what underlies the correlation, that is the supernova that illuminates our ignorance. But to plug data into a mathematical formula and get a decimal value—that is merely to demonstrate one's ability to work an equation. It is no more than stopping by the wayside to discover a signpost that points to truly adventurous country beyond.

Problems that result in a yes or no answer are not suitable problems for research.

Why? For the same reason that merely finding a correlation coefficient is not satisfactory. Both situations look at the froth on the top of the mug and mistake it for the substantive drink below!

"Is homework beneficial to children?" That is no problem for research, certainly not in the form in which it is stated. It simply misses the point. If homework produces better students, then it is beneficial; if it does not, then it is not beneficial. But like an ignis fatuus, the question as originally asked hovers over the real research issue as elusively and

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insubstantially as marsh gas. A question as flimsy as that need not involve the power and complexity of the scientific method for its resolution. Action research can answer that question in a hurry. If all you want is a simple yes or no, give the students homework to see what happens.

The researchable issue is not whether homework is beneficial, but wherein the benefit of homework, if there is one, lies. What factual components of homework are beneficial in the process? Which ones are self-defeating? If we knew the answers to those questions, then our wisdom would be enlarged, and we could structure the homework assignment with more purpose and greater intelligence than we can now. We could also educate our children much more efficiently. Finding the answers to these problems demands the full power of the scientific method and perhaps the ancillary help of statistics, computerization, discriminative and analytical thinking, creative research methodology, a critical consideration of factors that have a tendency to pollute the data (bias, attitude, emotional reaction, etc.), and a very careful use of language so that the research findings might be expressed in the most accurate manner possible. There is quite a difference between this view of the benefit of homework and the superficial question, "Is homework beneficial to students?"

The Statement of the Research Problem

There are bad habits in research just as there are bad habits in other areas of human behavior. One of the worst is the habit of mumbling fragmentary nothings begotten of fuzzy thinking and mental lassitude.

Some students try to state a research problem by jotting down meaningless groups of words-verbal fragments-in lieu of a well thought-out and fully articulated statement. Such wisps of verbal fog are no help in seeing the problem clearly. There is a basic directive for the statement of the problem: Always state the problem in a complete grammatical sentence in as few words as possible.

Your problem should be so clearly stated that anyone anywhere in the world (who reads English) may read it, understand it, and react to it without help. If the problem is not stated with such clarity and precision, then you are merely deceiving yourself that you know what the problem is. Such self-deception will merely cause you trouble later on.

Here, for example, are some meaningless half-statements, mere verbal blobs that only hint at the problem. Students submitted these at the beginning of their course in research methodology:

A student in sociology submitted this:
- Welfare on children's altitudes.

A student in music, this:
- Palestrina and the motet.

A student in economics proposed this:
- Busing of schoolchildren:

Finally, this from a student in a school of social work:
- Retirement plans of adults.

All four students uttered uncommunicative nothings. Generally, fragments such as these demonstrate that the researcher either cannot or will not think in terms of specifics. Although it may be irksome to express your thought accurately and completely - if you are one of those who think in terms of scraps and pieces - you had better begin to think in terms of specific researchable goals expressed in complete communicative statements.

We shall take the preceding half-utterances and develop each of them into a complete statement that expresses a fully researchable problem.

Welfare on children’s altitudes becomes:
- What effect does welfare assistance to parents have on the attitudes of their teenage children toward work?

Palestrina and the motet becomes:
- This study will analyze the motets of Giovanni Pierluigi da Palestrina (1525?-
written between 1575 and 1580 to discover their distinctive contrapuntal characteristics and will contrast them with the motets of his contemporary William Byrd (1542?–1623), written between 1592 and 1597. During the periods studied, each composer was between 50 and 55 years of age.

**Busing of schoolchildren** becomes:
- What factors must be evaluated and what are the relative weights of those several factors in constructing a formula for estimating the cost of busing children in a midwestern metropolitan school system?

**Retirement plans for adults** becomes:
- How do retirement plans for adults compare with the actual realization in retirement of those plans in terms of self-satisfaction and self-adjustment, and what does an analysis of the difference between anticipation and realization reveal for a more intelligent approach to planning?

Note that in the full statement of each of these problems the areas studied are carefully limited so that the study is of manageable size. The author of the Palestrina-Byrd study carefully limited the motets that would be studied to those written when each composer was between 50 and 55 years of age. A glance at the listing of Palestrina's works in *Grove's Dictionary of Music and Musicians* will demonstrate how impractical it would be for a student to undertake a study of all the Palestrina motets. He wrote some 392 of them!

**Think, Consider, and Estimate**

Students sometimes rush into a problem without thinking through its implications. Take the student who proposed the following:

- *This study proposes to study the science programs in the secondary schools in the United States for the purpose of...*

Let's think about that. There are 22,383 public secondary schools in the United States and 2,237 private secondary schools, for a total of 24,620 "secondary schools in the United States"—in the words of the students proposal. These schools, north to south, extend from Alaska to the tip of Florida; east to west, from Maine to Hawaii.

Certain practical questions immediately surface: How do you intend to contact each of these 24,620 schools? By personal visit? Being very optimistic, you might be able to visit two schools per day—one in the morning, one in the afternoon. That will amount to 12,310 visitation days. Counting the number of school days in the average school year (180), it will take you more than 68 years to gather the data. Now add in 11.8 years of "dead time" during which schools will not be in session because of holidays or summer vacation. Assuming that you are ready to do your graduate thesis or dissertation by the age of 25 (and very few people are!), you will be older than 105 by the time you have collected the data. And you have just begun your study!

Another important question is, have you estimated what the financial outlay for this project will be? Being very conservative, a reasonable estimate is that you will not be able to live for less than $75 per day (including on-the-road lodging). The traveling expense alone will amount to almost a million dollars—$923,265 to be exact. During the 11.8 years when you will be immobilized because of vacation days and summer recess, your daily living expense (rent, food, clothing, incidentals) is only half of your traveling expense. This will still add another $161,512 to your total. Now you are looking at a total of $1,004,777—over a million dollars! And this is the cost of just collecting the data.

But, you explain, I plan to gather the data by mail, with a questionnaire. Fine! Each letter to the 24,620 schools, with an enclosed questionnaire and a return postage-paid envelope, will cost 58 cents. The total cost for letters to all the schools is $14,279.60. But you have overlooked the fact that you will need a second, and perhaps a third, mailing. A 50 percent return on the first mailing would be considered a good return. But for the nonreturnees you will need another mailing at a cost of $7,139.80. Now the mailing bill stands at $21,419.40.
In addition to this figure you will have the cost of envelopes, stationery, questionnaire duplication, and miscellaneous items for a total of 37,000 questionnaires and an additional 37,000 cover letters explaining your reason for sending the questionnaire. Add to this the processing of some 18,500 questionnaires, programming the data, computer time, and the compilation and typing of a research report, and you will realize that the project you have proposed is not an inconsequential undertaking. $40,000 to $60,000 would not be an unrealistic estimate!

But, you protest, I had no idea of surveying all of the secondary schools in the United States. No? This, then, brings up a matter of utmost importance.

Say Precisely What You Mean

If you did not mean what you said in the statement of your problem, you should have corrected the error right up front—in the statement of the problem itself. There is no place for evasion, equivocation, or mental reservation in research. You must mean what you say and assume total responsibility for the message your words convey. You cannot assume that others will know what is in your mind. In the statement of the research problem, there is no room for the words, "Well what I mean is—." Others will always take your words at their face value: You mean what you say. That’s it.

Your failure to be careful with your words can have grave results on your standing as a scholar and a researcher. In the academic community, a basic rule prevails:

Absolute honesty and integrity is assumed in every statement that a scholar makes.

You should say precisely what you mean. We assume that you mean to fulfill precisely what you have stated. No double talk, no pleading thoughtlessness, no avoiding the obligation to perform strictly what you have committed yourself to do. Had you intended not to survey "the science programs in the secondary schools in the United States," then you should have said so plainly: "This study proposes to survey the science programs in selected secondary schools through-out the United States," Or perhaps you should have limited your study to a specific geographical area or to a student population within certain designated limits. That would give the problem a limitation that the original statement lacks and would honestly communicate to others what you intend to do. Furthermore, and vastly more important, it would have preserved your reputation as a researcher of integrity and precision.

One further haunting thought lingers with respect to the statement of the problem. If a researcher cannot be completely responsible for the statement of the problem and its attendant parts, one might question seriously whether such a researcher is likely to be any more responsible in gathering and interpreting the data. And this, indeed, is very serious, for it reflects upon the basic responsibility of the whole effort, it can be a brutal blow to one’s degree aspirations.

We have discussed two of the three most common difficulties in the statement of the problem: fragmentary and meaningless splutter, and irresponsible and extravagant wording. To these we now add a third: generalized discussion that ends in a foggy focus. Occasionally, a researcher will announce an intention to make a statement of the problem. From that point the discussion becomes foggier and foggier. Such a researcher talks about the problem instead of clearly stating it. Under the excuse that the problem needs an introduction or needs to be seen against a background, the researcher launches into a generalized discussion, continually obscuring the problem, never clearly articulating it.

Take, for example, what one student wrote under the heading of "Statement of the Problem":

• The upsurge of interest in reading and learning disabilities found among both children and adults has focused the attention of educators, psychologists, and linguists on the language syndrome. In order to understand how language is learned, it is necessary to understand what language is. Language acquisition is a
normal developmental aspect of every individual, but it has not been studied in sufficient depth. To provide us with the necessary background information to understand the anomaly of language deficiency implies a knowledge of the developmental processes of language as these relate to the individual from infancy to maturity. Grammar, also an aspect of language learning, is acquired through pragmatic language usage. Phonology, syntax, and semantics are all intimately involved in the study of any language disability.

Is there a statement of problem here? If so, where is the problem explicitly stated? Several problems are suggested. None is articulated with sufficient clarity that we might put a finger on it and say, "There, that is the problem."

You need not write an orientation essay in order to state a problem. Earlier in this chapter, we invited you to go to Dissertation Abstracts International to see how the world of research and the real world of everyday living are intertwined. Now return to that same source, and note with what directness the problems are set forth. The problem is stated in the very first words of the abstract: "The purpose of this study is to ...." No mistaking that; no background buildup necessary—just a straightforward plunge into the depths of the business at hand. All research problems should be stated with the same clarity.

**Edit Your Writing**

The difficulties we have been discussing can be avoided by carefully editing your words. Editing is sharpening a thought to a gemlike point and eliminating useless verbiage. Choose your words precisely. To do so will clarify your writing.

The sentences in the previous paragraph began as a mishmash of foggy thought and jumbled verbiage. The original version of the paragraph contained 71 words. These were edited down to 38 words. That is a reduction of 46 percent, an improvement in readability of 100 percent. Figure 3.1 shows the original version and the manner in which it was edited.

Note the directness of the edited copy. We eliminated garrulous phrases—"relating to the statement of the problem," "a process whereby the writer attempts to bring what is said straight to the point"—replacing the verbosity with seven words: "sharpening a thought to a gemlike point." Clichés are trashed; inanities are junked. "By editing the words we have written ... "—Well, who else do you think wrote them? Such language is inane. People who write...

![Figure 3.1](image)

like this throw their heads out of gear before their pens get going! And remember, I myself wrote those silly phrases in the original version of that paragraph.

Editing almost invariably improves your thinking and your prose. Many students think that any words that approximately express a thought in their own minds are adequate to convey it to others. This is not so. Approximation is never precision.

You need to be rigorous with the words you write. Punctuation will help you. A colon will announce that what follows it explains the general statement that precedes it.
Similarly, the semicolon, the dash, quotation marks, parentheses, brackets, and italics are all tools in clarifying your thought. Learn to use the comma correctly.

Any good dictionary will usually have a section dealing with punctuation usage. Most handbooks of English will help you to write clear, concise, and effective sentences and help you to combine those sentences into unified and coherent paragraphs.

Cliches, colloquialisms, slang, jargon, and the gibberish of any group or profession usually obscure thought. The irresponsible use of professional jargon is evidence of a lazy mind. Those who employ it do so usually because they feel that it is impressive or that it adds importance to what they are saying. They are almost always wrong.

The thought's the thing. It is clearest when it is clothed in simple words, concrete nouns, and active, expressive verbs. Every student would do well to study how the great writers and poets set their thoughts in words. They have much to say by way of illustration to those who have trouble putting their own thoughts on paper.

In general, however, some basic guidelines for clear writing may help you to express problems and subproblems effectively.

1. Express the thought fully with the least words possible.
2. Use a thesaurus: It will help you find the exact word.
3. Never use a long word where a short one will do. In straightforward discussion, use one- or two-syllable words rather than longer ones.
4. Keep your sentences short. Vary the length, of course, but break up those long, contorted sentences into shorter, more succinct ones.
5. Look critically at each thought as it stands on the paper. Do the words say exactly what you wish them to say? Read carefully phrase by phrase. See if one word will carry the burden of two or more. Throw out superfluous words.
6. Be alert to modification. Misplaced phrases and clauses can create havoc with the thought.

Here is an example of misplaced modification: "Piano for sale by a woman with beautifully carved mahogany legs that has arthritis and cannot play anymore." Place the modifier correctly and all's well that ends well: "FOR SALE: A piano with beautifully carved mahogany legs by a woman that has arthritis and cannot play anymore."
Practical Application

Up to this point we have been merely discussing the problem for research. OW, you will apply the principles governing the problem in a Practical Application. What you will be asked to do is not a mere exercise or a review assignment. It is the first step in preparing a final proposal for a research endeavor. You will be guided in framing a statement of a problem for research.

Future Practical Applications will build on the problem statement that you are now about to articulate. When you have completed all of the Applications in this text you will have a final proposal suitable for submission as an actual research endeavor.

Stating the Research Problem

1. Write a clear statement of a problem for research:
   a. Is your problem fully stated in the form of a complete, grammatical sentence?
      Yes ___ No ___
      If yes, go on to subsection b; if no, do not continue until you have stated the problem clearly, and can answer this question "yes."
   b. Is the fact of interpretation of the data apparent in the statement of your problem?
      Yes___ No ___
   c. If yes, quote the section of the statement of the problem that implies interpretation of the data
      ________________________________________________________________
   d. If no, rephrase the problem, or revise it, or get a new problem that fulfills the demands of b and c above
   e. Have you said precisely what you mean to do in your research endeavor?
      Yes___ No ___

2. Have you edited your problem? Yes ___ No ___
   If yes, write the original statement of your problem; write it immediately below the edited version

3. Evaluate your problem according to the following Checklist for Evaluating the Problem

Checklist for Evaluating the Problem

The following checklist will assist you in evaluating your problem. It may indicate to you those aspects of your problem that need further refinement. In using the following checklist, be realistic. Read the problem as you have it written; read the checklist statement; then, to the best of your ability, try to decide whether the checklist item is applicable. There is no value at this point in wishful thinking. Either the item is applicable or it is not. Check the appropriate column.

Faults Resulting from Lack of Understanding of the Nature of Research

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Problems seem to be merely an exercise in gathering data on a particular subject. (&quot;I don’t know anything about the subject; I'd like to learn more by researching it.&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Problem seems to be little more than a simple comparison.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Problem can be resolved finally with a yes or no answer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Problem seems to indicate that all you will have ultimately is a list of items.</td>
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<tr>
<td>5</td>
<td>Problem seems to indicate that your study will be little more than an exercise in finding a correlation, coefficient-the discovery that there is a relationship between various data.</td>
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</tr>
<tr>
<td>6</td>
<td>Problem has no identifiable word within it that indicates the need for interpretation of the data.</td>
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*Diagnosis of your difficulty:* If you have checked any items in the yes column, you need to go back to the text. After you have reread the chapter, and restudied your problem in terms of items 1-6, check here.

**Faults Relating to Pseudoproblems**

<table>
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<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>7</td>
<td>You do not have a problem <em>per se</em> but rather an expression of an opinion that you would like to defend or prove.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Your problem does not focus on <em>one</em> research aim or goal but rather diffuses into several problems.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>The problem is too broad; it attempts to research too much-too large a geographical area, too great a population.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The problem seems to suggest that you wish to learn more about the particular area you propose to research and that you are using the project as a means of gathering such information.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The problem seems to be more in the area of <em>applied</em> research than in that of <em>basic</em> research: You wish to research the problem merely because it has a practical application-“it needs to be done”-rather than because it seeks to discover a basic truth underlying a practical application.</td>
<td></td>
</tr>
</tbody>
</table>

*Diagnosis of your difficulty:* If you have checked any items in the yes column in the preceding section, you need to go back to the text. After you have reread the chapter, and restudied your problem in terms of items 7-11, check here.

**Faults Relating to the Language and Manner in Which You State the Problem**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Problem statement is a meaningless fragment: you have no sentence.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Read your problem <em>literally, phrase by phrase.</em> Are there any areas in the wording where the words do not say precisely what you <em>mean?</em> Is there any fogginess in the statement?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Problem is stated in clichés or in other inexact or involved language that does not communicate clearly.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>You use reference words with no referents: pronouns without antecedents.</td>
<td></td>
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<tr>
<td>16</td>
<td>You have additional discussion: a preamble, apology,</td>
<td></td>
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</tbody>
</table>
Diagnosis of your difficulty: If you have checked any items in the yes column in the preceding section, you have trouble in an area that is corollary to the domain of this book: you need to develop your skills with written English. Many people have difficulty in putting their thoughts in writing. Read the chapter material again and follow the suggestions given there.

After you have read the preceding pages (and whatever other sources were necessary) and have edited your work and are satisfied with it—and do not be too easily satisfied with your own efforts—check here.

Now rewrite the statement of your problem, if necessary, precisely as you wish it to stand after checking it out and editing it according to the preceding sixteen criteria.

The Subproblems

Most problems in their entirety are too large or too complex to be solved without subdividing them. The strategy, therefore, is to divide and conquer. Every problem can be broken down into smaller, discrete units. From a research standpoint, these units are easier to comprehend and resolve. From here on, the matter is one of the simple axiom of numbers: The sum of the parts equals the whole.

The subparts of the main problem are called subproblems, discussed briefly in chapter 1. By viewing the main problem through the subproblem, the researcher frequently gets a better global view of the entire research endeavor. Always think of a problem, therefore, in terms of its component parts.

Characteristics of Subproblems

Because some researchers may not be entirely familiar with the nature and the purpose of subproblems, we will discuss them briefly.

Each subproblem should be a completely researchable unit.

A subproblem should constitute a logical subarea of the larger research undertaking. Each subproblem might be researched as a separate subproject within the larger research goal. The solutions of the subproblems, taken together, combine to resolve the main problem of research. It is necessary, therefore, that each subproblem be stated clearly and succinctly. Often, a subproblem is stated in the form of a question. A question tends to focus the attention of the researcher more directly on the research target of the subproblem than does a mere declarative statement. After all, the interrogative attitude is the normal psychological condition of every true researcher's mind.

Pseudosubproblems are not researchable subproblems.

Each researcher must distinguish subproblems that are an integral part of the main problem from what look like problems but are nothing more than procedural indecisions. These latter we call pseudosubproblems. These pseudosubproblems arise quite logically from the ambience of the research situation. They are, in fact, merely decisions that the researcher must resolve before further progress toward the resolution of the research problem is possible. We need to think acutely. Pseudosubproblems are problems for the researcher, not subparts of the research problem. They are decisions that must be made
outside of the principal research environment. Consider these:

- What is the best way to choose a sample?
- What instruments or methods should be used to gather the data?
- What measurement instruments are available for measuring the strength of a person’s convictions?
- How large should a representative sample of a population be?
- How do I find the subproblems within the main problem?

The last of these questions we will resolve for you later in this chapter. Note that these pseudo-subproblems result from either a lack of knowledge or a demand for creativity on the part of the researcher. You cannot research any of these problems by gathering and interpreting data.

Deal with pseudosubproblems forthrightly by making a firm decision with respect to them, and then get on with the solution of the research problem. To deal with pseudosubproblems, two avenues are open to you. You must decide: 1) -and try this first- whether a little common sense and some creative thinking might help to solve your "problem," or 2) whether this is a purely factual deficiency on your part: you simply lack knowledge; in this case you have three options:

1. Turn to the index of this text to see if the "problem" (pseudosubproblem) is discussed. Look under "Subproblems, how to find."
2. Peruse carefully the suggested sources in "For Further Reading" at the end of each chapter in this book to see if they contain any references that may help you. Be alert for standard research references. such as the Encyclopedia of Educational Research or the International Encyclopedia of Educational Research and Studies. Consult these and similar works.
3. Go to a library-preferably a college or university library-and consult the listings under the heading "Research Methodology." Consult the indexes of these texts, as you did with this text. Also check the leading periodical indexes under the heading "Research Methodology" to determine if you can locate any articles on the subject of your query. Determine whether the library has the periodical or periodicals that you need.

**Within each subproblem; interpretation of the data must be apparent.**

At some point in the statement of the subproblem – as, indeed, within the main problem-the fact that data will be interpreted must be clearly evident. This may be expressed as a part of each subproblem statement, or it may occupy an entire separate subproblem.

**The subproblems must add up to the totality of the problem.**

After you have stated the subproblems, check them against the statement of the main problem to see (1) that nothing in excess of the coverage of the main problem is included, and (2) that you have no omissions, so that all significant areas of the main problem are covered by the several subproblems.

**Proliferation of subproblems is circumspect.**

If the main problem is carefully stated and properly limited to a feasible researchable effort, the researcher will find that it usually contains in the vicinity of two to six subproblems. Sometimes the inexperienced researcher will come up with as many as ten, fifteen, or twenty problems. When this happens it generally means that a careful review of the problem and its attendant subproblems should be undertaken. The researcher should study each subproblem to see whether it is truly a subproblem of the main problem or whether it falls into one or more of the following categories:

1. The researcher has confused his or her personal problems with problems for research. Has the researcher stated as subproblems procedural decisions that need to be made before the research can proceed?
2. The researcher has fragmented the true subproblems. Can any of the subproblems be combined into larger researchable units lesser in magnitude than the main problem?

3. There may be a mixture of the preceding errors. If so, a careful study of each subproblem is necessary to separate procedural questions from purely researchable goals.

**Beware of unrealistic goals.**

Be cautious of committing yourself beyond what is possible to achieve. We have discussed this area with respect to the main problem. If it is there controlled, the researcher then will experience little difficulty with it in the subproblems. But be mindful of this tendency with respect to the subproblems also.

**How to Locate the Subproblems**

Students frequently have difficulty in locating the subproblems within the main problem. Here are some guidelines:

**Begin with the problem itself.**

If the problem is correctly written you will be able to detect within the problem the subproblem areas that may be isolated for further study. The old axiom that the sum of the parts equals the whole applies here. All of the subproblems must add up to the total problem.

**Write the problem. Then box off the subproblem areas.**

Take a clean sheet of paper. Then:

1. Copy the problem on it, leaving considerable space between the lines.

2. Read the problem critically to discover the areas that should receive in-depth treatment before the problem can be resolved. Box off these areas. Within each of the boxes lies a subproblem.

3. Every subproblem should contain a word that indicates the necessity to interpret the data within that particular subproblem. Underline this word.

4. Arrange the entire problem, which will now have the subproblems boxed off, into a skeletal plan that will show the research structure of the problem. You should now have a structure of the whole research design.

Let us take the problem of the motets of Palestrina. (This procedure for finding subproblems will work for any problem in any academic discipline. A problem in musicology is used here merely to illustrate the technique.) We will do exactly as we have suggested above. We will delete the factual matter, such as life-span dates and the fact that these men were contemporaries. These facts merely help to give a rationale for certain elements within the problem. Slimmed down to its essential parts, the motet problem reads as follows:

- The purpose of this study will be to analyze the motets of Palestrina written between 1575 and 1580 to discover their distinctive contrapuntal characteristics and to analyze the same characteristics in the motets of William Byrd [to determine what a comparative study of these two analyses may reveal].

Note that we have transposed the "and will contrast them with" phrase in the original statement of the problem to the wording in brackets to provide the logical third subproblem, which, incidentally, resolves the main problem.

Note also the words in italics. The research process demands the intervention of the mind of the researcher at the point where the researcher needs to analyze the two groups of compositions and determine what a comparative study of these analyses may reveal. This is where the data will be regarded analytically, the point where the interpretation of the data will take place.

Recall the statement made earlier in this chapter: the statement of the research problem
must indicate that, for the resolution of that problem, thinking on the part of the researcher will be required." Those were not idle words. You are probably beginning to see how this requirement is being implemented.

**Figure 3.2** A Structural Representation of the Palestrina-Byrd Problem

Let us now take that problem and arrange it so that we may see precisely what the design will be. Figure 3.2 is a structural chart of the problem. We have taken the problem and divided it into three subproblems. The first and second of these have the same general structural configuration. The analytical aspect of the subproblem is stated first, in the first of the two boxes, then the purpose of the analysis is stated in the accompanying box immediately beneath the first one. The third subproblem, in effect, analyzes the findings of the two preceding subproblems to determine what actually has been discovered.

**Every Problem Needs Further Delineation**

Up to this point we have been discussing only the problem and its subparts. The statement of the problem establishes the goal for the research effort. The subproblems suggest ways of approaching that goal in a more manageable way. But a goal alone is not enough.

Confusion can arise, and if we are to comprehend fully the meaning of the problem, we need to have information other than merely the statement of the research goal. The discipline of research is based upon a clear understanding of every detail in the process, both on the part of the researcher and on the part of those who read the research.

In every research endeavor, the researcher should eliminate any possibility of misunderstanding certain matters by:
1. **Delimiting the research**: giving a full disclosure of what he or she intends to do and, conversely, does *not* intend to do.

2. **Defining the terms**: giving the meaning of all terms, used in the statement of the problem or subproblems that have any possibility of being misunderstood.

3. **Stating the assumptions**: offering a clear statement of all assumptions upon which the research will rest.

4. **Stating the hypotheses**: offering a complete statement of the hypotheses that are being tested.

All these matters are important for the researcher in facilitating the research and for the consumer in facilitating understanding of the research. Taken as a whole, they comprise the *setting of the problem*. We shall look at each of these components in more detail in the following paragraphs.

**Components Comprising the Setting of the Problem**

**Delimiting the Research Problem.**

We need to know precisely what the researcher intends to do. We need to know with equal candor precisely what the researcher does *not* intend to do.

What the researcher intends to do is stated in the problem; what the researcher is not going to do is stated in the *delimitations*. The limits of the problem should be as carefully bounded for a research effort as a parcel of land is for a real estate transfer.

Problems arise out of a much more expansive area than is covered by the statement of the problem. The researcher can very easily be beguiled by discovering interesting facts that lie beyond the precincts of the problem under investigation. In the Palestrina-Byrd problem, we have just discussed, it is possible, since the two men were contemporaries, that Byrd may have met Palestrina or at least have come in contact with some of his motets. Such contact may have been a determinative influence upon Byrd's compositions. We are not, however, concerned with influences on, but rather with characteristics of, the motets of the two composers. We are interested in analyzing musical style, musical individualism, the contrapuntal likenesses and differences in the motets of these two composers. To study the contrapuntal characteristics—that is what a researcher of this problem will do. What that researcher will *not* do is become involved in any facts extraneous to this one goal—no matter how enticing, interesting, or appealing such an exploratory safari may be. Only a researcher who thinks carefully about the problem and its focal center will distinguish between what is relevant and what is not relevant to the problem. All irrelevancies to the problem must be firmly ruled out in the statement of delimitation.

Figure 3.3 may make the matter of delimitations more understandable.

**Defining the Terms.**

What precisely do the terms in the phrasing of the problem and the subproblems mean? For example, if we say that the purpose of the research is to analyze the harmonic characteristics of motets, what are we talking about? What are harmonic characteristics? Without knowing explicitly what a term means, we cannot evaluate the research or determine whether the researcher has carried out what, in the problem, was announced as the principal thrust of the research.

A term must be defined operatively; that is, the definition must interpret the term *as it is employed in relation to the researcher's project*. Sometimes students rely on dictionary definitions, which are seldom either adequate or helpful. In defining a term, the researcher makes that term mean whatever he or she wishes it to mean within the particular context of the problem or its subproblems. We must know how the researcher defines the term. We
need not necessarily subscribe to such a definition, but so long as we know what the researcher means when employing a particular term we are able to understand the research and appraise it objectively.

Formal definitions contain three parts: (1) the term to be defined, (2) the genera, or the general class to which the concept being defined belongs, and (3) the differentia, the specific characteristics or traits that distinguish the concept being defined from all other members of the general classification. For example, harmonic characteristics (the term to be defined) shall mean the manner (the genera) in which tonal values are combined to produce individualized Polyphonic patterns associated with the works of a particular composer (the differentia: telling what particular "manner" we mean).

Figure 3.3 Delimitation of a Problem

A spurious type of definition, commonly called a circular definition, or defining in a circle, is sometimes encountered. The most classic example is perhaps Gertrude Stein's, "a rose, is a rose, is a rose." Defined in a circle, harmonic characteristics would be "those characteristics that derive from the harmonic patterns found in the works of a particular composer." In circular definitions, the term to be defined is employed in defining that term, as above, where characteristics and harmonic are used to define harmonic characteristics.

Stating the Assumptions.

We discussed the matter of the assumptions briefly in chapter 1. Here, however, the matter needs further discussion. Assumptions are so basic that without them the research problem itself could not exist. For example, we are attempting to determine by means of a pretest-posttest whether a particular method of teaching has produced the results hypothesized. A basic assumption in such a situation must be that the test measures what it is presumed to measure. We must assume also that the teacher can teach. Without these assumptions, we have no problem, no experiment.

Assumptions are what the researcher takes for granted. But taking things for granted may cause much misunderstanding. What I may tacitly assume, you may never have thought of. If I act upon my assumption, and in the final result such action makes a vast difference in the outcome, you may face a situation that you are totally unprepared to accept. For each of us to know, therefore, what is assumed is basic to an understanding of the research results. If we know the assumptions a researcher makes, we are then better prepared to evaluate the conclusions that result from such assumptions. To many students,
the stating of assumptions may be tantamount to stating the obvious, but because in research we try to leave nothing to chance in the hope of preventing any misunderstanding, all assumptions that have a material bearing upon the problem should be openly and unreservedly set forth. To discover assumptions, ask, "What am I taking for granted with respect to the problem?" The answer to that question will bring your assumptions into clear view.

Stating the Hypotheses.

We also discussed hypotheses in chapter 1. There we pointed out that hypotheses are tentative, intelligent guesses posited for the purpose of directing one's thinking toward the solution of the problem. Hypotheses are necessary because the researcher needs to have some point around which the research may be oriented in searching for relevant data and in establishing a tentative goal against which to project the facts.

We should keep in mind that hypotheses are neither proved nor disproved. They are tentative propositions set forth as a possible explanation for an occurrence or a provisional conjecture to assist in guiding the investigation of a problem. To set out deliberately to prove a hypothesis would defeat impartiality in research. The researcher would bias the procedure by looking only for those facts that would support the hypothetical position. Difficult as it may be at times, we must let the chips of fact fall where they may. Hypotheses have nothing to do with proof. Rather, their acceptance or rejection is dependent on what the facts—and the facts alone—ultimately reveal.

Hypotheses may originate in the subproblems. A one-to-one correspondence might well exist between the subproblems and their corresponding hypotheses. Generally, we have as many hypotheses as we have subproblems. Each hypothesis becomes, in a sense, a target against which the data of each subproblem may be projected. As a point of reference, a hypothesis is to a researcher what a point of triangulation is to a surveyor: It provides a position from which the researcher may begin to initiate an exploration of the problem or subproblem and also acts as a checkpoint against which to test the findings that the data seem to reveal.

If, however, the facts do not ultimately support the hypothesis, you should not let such an outcome disturb you. It merely means that your educated guess as to what the outcome of the investigation should have been was wrong. Frequently, unsupported hypotheses are a source of genuine and gratifying surprise for the researcher. When such an outcome occurs, you have truly made an unexpected discovery.

We must introduce one further type of hypothesis here: the null hypothesis. The null hypothesis is an indicator only. It reveals that some influence, force, or factor has either resulted in a significant statistical difference (one that cannot be accounted for by mere chance, that occurs within certain arbitrary statistical limits) or in no such difference. Much research stops at this point. This is comparable to getting off at the mezzanine instead of descending to the subbasement where the foundations of the building are located. If the null hypothesis shows the presence of dynamics that have caused a change, then the logical next questions are What are these dynamics? What is their nature? How can they be isolated and studied?

A social worker finds statistically that a particular social program is making a great difference in the attitudes of those exposed to it. The hypothesis stating that the program will make no difference has been rejected. Fine! That's encouraging news. But it's a mezzanine conclusion. What dynamics were at work below the surface that were merely registered on the statistical dial upstairs? What specifically was the factor or factors within the program that caused the null hypothesis to be rejected? These are fundamental questions, the answers to which will uncover facts that may lie very close to the discovery of new substantive knowledge. That is the purpose of all research.

The Importance of the Study.

Within the dissertation or research report, the researcher frequently sets forth the reason for undertaking the study. In the proposal, this section may be very important. Some studies
seem to go far out into the rarified atmosphere beyond contact with everyday reality and beyond any relationship to the practical world. Of such research efforts one inwardly, if not audibly, asks, "Of what use is it? What practical value does the study have?"

In the 1970s, contemplating the space exploration flights to the moon, the average citizen frequently asked, "What good is it? What's the use of it all? How will all this expenditure of money in space flights benefit anyone down here?" Perhaps those engaged in space research did not set forth clearly and succinctly enough the reasons why the missions were undertaken. Only now are we beginning to appreciate the practical value of those early missions.
The Rationale for the Order in Which the Topics in This Text Are Presented

This chapter inaugurates a rationale for the succeeding chapters of this text. You will find a one-to-one correspondence between the discussions in this text and the sequence of topics that appear in a research proposal or research report. In any document, the first order of business is to present the problem and its setting. Generally, the document opens with a statement of the problem for research. This is followed by the subproblems. The hypotheses concerning the subproblems are then stated. Some authors prefer to arrange the subproblems and then the corresponding hypotheses in parallel fashion. What is important is that no matter how you present these items, your order of presentation should be logically sequential.

Once the problem and its component parts have been articulated, the rest of the items comprising the setting of the problem are presented, generally beginning with a statement of the delimitations, followed by the definitions of terms, the assumptions, and a statement with reference to the importance of the study.

In a proposal or research report, these items usually comprise the first chapter. The report then generally continues with a discussion of the investigations that others have done, normally entitled "The Review of the Related Literature." This is the topic that we will discuss in the next chapter.

Practical Application

In the previous Practical Application for this chapter, you stated you main problem for research. This was the beginning step in creating a research proposal. Now you will add the rest of the "setting" of the problem: defining the subproblems and delimitations, defining the terms, and stating the assumptions and hypotheses. The main problem and the subproblems should each have one hypothesis.

To show you how your proposal should look, the first section of an actual proposal that was submitted to an academic research committee follows this Practical Application. The candidate was seeking approval of the proposal as a draft of the final document to be presented for an advanced degree. Note the comments and directives jotted in the margin.

Stating the Subproblems

On a separate sheet of paper, copy your research problem statement. Allow considerable space between the lines. Now do the following, after inspecting the problem carefully:

1. Box off within the problem those areas that must receive in-depth treatment if the problem is to be fully explored. Number each of the boxed-in areas consecutively.
2. Enclose within dotted lines those specified words within your statement of the problem that indicate your intention to interpret the data.
3. Below the problem, which has been thus treated, write in complete sentences the several subproblems for your study.

Completing the Problem Statement and its Setting

Now having stated the problem and the subproblems, you are ready to finish the entire first section of your proposal. Turn to the following sample proposal and study it carefully. Note especially the running comments in the right-hand column. These comments will guide you with respect to important points to be observed. Note carefully the use of the headings in presenting the material in a clear, logical form.

Now do the following:

• Write the hypotheses. Read again what has been said about hypotheses in this chapter. Study the way in which the author of the sample proposal posited his hypotheses. They are precisely parallel with his subproblems.
• Write the delimitations. Review again what was said in the text. Study the way in which the author has ruled out in the sample proposal those areas that, although contiguous to his research effort, his study will not consider.
• Write the definitions of terms. Before writing your definitions reread the section earlier
in the chapter. It may help to number 1, 2, 3 the parts of the definition as we did in the text or to "box in " the several parts of your definition, labeling each as "term," "genera," or "differentia." Study the handling of the definitions section in the same proposal. (Take out the numerals in the final draft of the proposal.)

- **Write the assumptions.** Reread the text material and study the section of the sample proposal dealing with assumptions.
- **Write the section dealing with the importance of the study.** In a short, succinct statement, point out to the reader the importance of your study. Generally, you will not need more than two or three well-written paragraphs. Edit out all but essentials. Study the section that establishes the importance of the study in the sample proposal.

Using now the sample proposal as a format, type your proposal, using the style and format shown.

You now have the first section of your research proposal completed. After you have your proposal typed, compare the appearance of your page with that of the sample proposal. Do they resemble each other? They should.

### A Sample Research Proposal

On the pages that follow is a reprint of part of the text for a research project submitted to the faculty of the School of Education of The American University, Washington, D.C. The proposal is presented here to give the student a clearer concept of precisely what a proposal is, the form it should take, and a suggested arrangement of its several parts. The proposal is shortened, since it is unnecessary and uneconomical to present the entire document. Other portions are presented in chapters 4 and 7.

Every proposal is essentially the same whether it is an outline for a thesis or dissertation or an application for a grant to underwrite an independent research endeavor. Notice the degree of fullness and the precise care with which the details are spelled out.

The greater the investment of time, money, and effort, the fuller and more specific the proposal should be. Certainly there are variations to the format presented here. No brief is made for the form of this proposal over any other equally logical presentation.

Underlying the sample proposal was a substratum of reasoning similar to this: Everyone desires to succeed. People are more likely to succeed if they are engaged in work they like to do. Therefore, a person's interest can in part be a key to the probability of vocational success. One must do what one is interested in doing. Interests are identified objectively by measuring the degree of like or dislike with which a person reacts to a vicarious activity.

Of the several general inventories, the *Strong Vocational Interest Blank* has been one of the most widely used and intensively studied. Interest scales have been developed on the Strong inventory for 54 occupational groups. No scale has ever been developed for cartographers, however, on any other interest-measuring instrument.

Cartographers, and the nature of their professional activities as mapmakers, are little known to the general public. Furthermore, the annual production of cartographers is only one percent of the annual requirement.

If, therefore, some way could be found to match people who have interests kindred to those of cartographers with the vocational opportunities for which there is a 99 percent demand, we may have come to grips with a very practical problem: supplying a professional group with needed personnel and guiding individuals with the particular skills and aptitudes for cartography into a satisfying and rewarding profession. Here is the researcher's problem. Here is even a broader problem for an entire profession. It is to seek a possible solution to this problem through research that this proposal addresses itself.

One further word should be said about the form in which the proposal is presented here. As we have said earlier, the typescript is *a verbatim reprint of the proposal as it was presented by the student.* Its value to the user of this book will lie in both (1) seeing its original form, and (2)
seeing how, excellent as it is, even this proposal might have been improved.

Two conventions have, therefore, been employed in this presentation: (1) the usual proofreading marks to indicate editorial changes, and (2) a running commentary in the right-hand margin, pointing out both the excellent features of the proposal and those areas in which improvement might have made the proposal even more effective.

The proposal is not meant to be slavishly emulated. It is presented in the hope that it will crystallize the material presented in the text in a specific document that demonstrates in concrete form the features of a practical and successful proposal dealing with a very pragmatic and substantial problem.

<table>
<thead>
<tr>
<th>THE PROBLEM AND ITS SETTING</th>
<th>COMMENTS ON ITEMS WITHIN THE PROPOSAL</th>
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<tbody>
<tr>
<td></td>
<td>Note the use of the headings to indicate the organization and outline of the proposal. (Refer to the discussion of this matter in Chapter 12.)</td>
</tr>
<tr>
<td></td>
<td>The phrase &quot;existing discrete&quot; is useless verbiage. If they are &quot;discrete interests,&quot; they do &quot;exist.&quot;</td>
</tr>
<tr>
<td></td>
<td>Note the underscoring, indicating italics, for published titles.</td>
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<tr>
<td></td>
<td>Note also that only the words are italicized. It is impossible to italicize spaces. Hence, the fine is broken and not solid as so often written.</td>
</tr>
<tr>
<td>The Statement of the Problem</td>
<td>The numbering here is superfluous. The ¶ sidehead makes it clearly apparent that this is the first subproblem. No need, therefore, to number it 1.</td>
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</tbody>
</table>

The Subproblems
1. The first subproblem. The first subproblem is to determine whether male cartographers employed by the Federal government have a discrete pattern of interests different from those of men in general as measured by the Strong Vocational Interest Blank.

2. The second subproblem. The second subproblem is to construct a scoring key for the Strong Vocational Interest Blank to differentiate the interest of those of also from the interests of tiate (the interest of) cartographers from (those of) men in general and (also from the interests of) other occupational groups.

3. The third subproblem. The third subproblem is to analyze (to) and, Here the researcher is not thinking what he is saying. What he says is that he wants to differentiate cartographers. That is not so. He wants to differentiate the interests of cartographers. The edited additions bring the thought into correct perspective.

Note the correction in syntax. A correlative connects two like
interpreted the treated data so as to evaluate the discovered interests in terms of their discreteness in recruiting cartographers.

The Hypotheses
The first hypothesis is that male cartographers employed by the Federal Government have a discrete pattern of interests different from those of men in general.

The second hypothesis is that the Strong Vocational Interest Blank can identify the existing discrete interests of cartographers differentially from (those of) men in general and (those of) other occupational groups.

The third hypothesis is that the development of an interest scale can aid the recruitment of cartographers into Federal employment.

The Delimitations
The study will not attempt to predict success of cartographers.

The study will not determine nor evaluate the preparation and training of cartographers.

The study will be limited to male cartographers who have attained, within the U .S. Civil Service classification system, full performance ratings of GS-09 or higher in Occupation Series 1370.

The study will not evaluate (any cartographers who may be also) uniformed military personnel.

The Definitions of Terms

Cartographer. A cartographer(1) is a professional(2) employee who engages(3) in the production of maps, including construction of projections, design, drafting (or scribing), and preparation through the negative stage for the reproduction of maps, charts, and related graphic materials.

Discrete interests. Discrete interests are those empirically derived qualities or traits common to an occupational population that serve to make them distinct from the general population or universe.

Note that the three subproblems add up to the totality of the problem.

Note the spacing between the freestanding sidehead and the first line of text. Such spacing causes the heading to stand out prominently for ease of reading. Crowding is the worst typing fault of most students.

Note the position of the hypothesis section. It immediately follows the subproblems. It facilitates seeing the one-to-one correspondence between the subproblem and the hypothesis pertaining to that subproblem.

“Edited-in” words express precisely what the writer of the proposal means.

This hypothesis goes beyond the limits of the problem. The researcher does not intend to investigate the actual recruitment of cartographers, yet, unless he does he cannot know whether his hypothesis will be supported or not.

Delimitations indicate the peripheral areas lying contiguous to the problem which the researcher expressly rules out of the area of his investigation.

Again, the researcher is not saying what he means precisely. The interpolation clarifies what he intends to say.

Note that the word to be defined is given in the ¶ sidehead. Then follows a complete definition comprising the three parts discussed in chapter 3. The small numbers over the first definition indicate 1 = the term to be defined, 2 = the genera, 3 = the differentia.

Again the definition is formal in that it begins with the term to be defined (discrete interests); it states the genera to which the term belongs (empirically derived qualities or traits), and then the differentia (e.g., common to an occupational population).
Abbreviations

SVIB is the abbreviation used for the Strong Vocational Interest Blank.
USATOPOCOM is an acronym for the U.S. Army Topographic Command.
CIMR is an abbreviation used for the Center for Interest Measurement Research.
SD is the abbreviation used for standard deviation.

Assumptions

The first assumption. The first assumption is that the need for cartographers in Federal service will continue.
The second assumption. The second assumption is that the revised Strong Vocational Interest Blank will continue in use as a vocational guidance tool.
The third assumption. The third assumption is that the recent revolutionary advances in the cartographic state of the art will not alter the interests of persons in the employment of the Federal Government as cartographers.
The fourth assumption. The fourth assumption is that the criterion group consisting of the population of cartographers employed by the USATOPOCOM at Washington, D.C.; Providence, Rhode Island; Louisville, Kentucky; Kansas City, Missouri; and San Antonio, Texas, is representative of the universe of Federally employed cartographers.

The Importance or the Study

Cartographers and the nature of their work is little known in American society. The total annual production of graduates, at the bachelor's level, with competence in the broader field of survey engineering within which cartography is subsumed, is currently less than one percent of the annual requirement. The addition of a cartographer scale to the occupations routinely reported for the Strong Vocational Interest Blank would

This section was not discussed in the text, but it is perfectly appropriate. Whatever makes reading easier and aids in giving the problem an appropriate setting is worth including in this part of the proposal.

Note that the assumptions are set up with appropriate paragraph subheads. Perhaps this is one feature that might have enhanced the presentation of the hypotheses Had they been set up, as, for example, The first hypothesis each section would have been parallel in formal.

As we said earlier, clarity is most important in the writing and structuring of a proposal. The writer of this proposal has presented his material in a delightfully clear manner.

Note that the writer repeatedly gives evidence of working with care and precision. He does not try to cut corners. Here he spells out fully the name of the state, rather than employing abbreviations.

This section gives the reader of the proposal a practical rationale for undertaking the study It shows a utilitarian connection between the problem for research and the exigencies of real life.

Here the researcher points out that chance produces less than one percent of graduates required for the demand of the cartographic profession. If he can identify potential candidates for the profession in terms of their discrete interests on the SVIB, it may attract serious and capable students into courses
potentially bring to the attention of everyone involved with the existing vocational guidance system the opportunities within the field of map-making and serve to attract serious and capable students into the appropriate preparatory college programs.

that might prepare and lead them toward cartography as a life’s work.

**Significant and Influential Research**

"But worse than any loss of limb is the failing mind, which forgets the names of slaves, and cannot recognize the face of the old friend who dined with him last night, nor those of the children whom he has begotten and brought up." - Juvenal

Such, in varying degrees of severity, were the normal expectations of aging. In discussing the aging mind, psychology texts of a generation or two ago invariably focused on mental deterioration. This was probably the belief responsible for retirement-age policies. The deterioration of mental faculties - the "on set of senescence" - was as commonly and tacitly accepted as normal for the individual as were the needs for food, companionship, and shelter. Physical and mental deterioration were merely a fact of life and were not open to question.

Recent research has dealt a devastating blow to this belief. A recent study offers solid evidence that people lose their mental skills when they stop using them. Many older people who retire just "let down." The daily pressure of occupational demands is off, retirees grow lackadaisical, interest sags, and the "old age" syndrome sets in.

But the research of Professor K. Warner Schaie, of Pennsylvania State University, in collaboration with Professor Sherry Willis, which covered a 28-year period and involved 4,000 people, has produced data that suggest that skills that had been allowed to deteriorate could be reacquired. Deficiencies differ from individual to individual. But many individuals show significant improvement after diagnosis and a series of tutorial sessions designed to rekindle interests, provide mental challenges, and make demands on the use of problem solving, numerical, and verbal skills. More dramatically, 40 percent of the group studied regained the level of skill proficiency they had nearly 15 years earlier.

An active life style, flexibility, and support of family and friends have been shown to contribute to regaining and maintaining mental sharpness. Up to the age of 60, most individuals are relatively safe. There is practically no decline in their mental abilities. But with many adults retiring at an earlier age and a rapidly growing senior citizen population, this research is certainly significant. Perhaps mental stimulation in the form of continuing education and social involvement is one of the best means of avoiding the "old age" syndrome. Research seems to indicate this is so.


**The Computer as a Tool of Research: Online Informational Databases**

Through a microcomputer, you can reach out worldwide and access information from thousands of sources on every conceivable subject. And you can use your telephone line to do it.

In the discussion of the computer as a tool of research in chapter 2, we mentioned briefly the databank and its accessibility through the use of the personal computer. One has only to look at a copy of *The North American Online Directory* to realize the vastness of the universe of information
available to the owner of a microcomputer. The latest edition of the Cuadra Associates' *Directory of Online Data Bases* lists over 2,200 separate databases, produced by over 1,000 companies and marketed by more than 300 online services.

Do these figures overwhelm you? If so, they should also enlarge your vision. All this information is systematically available to any microcomputer owner who has the proper hardware and who can afford the fees and rental time associated with garnering the facts he or she seeks. Many universities subscribe to online databases and make these available to graduate students at no charge.

What do you need to dip into this well of facts and figures and to pipe the desired information through your computer and onto your monitor screen? Aside from your microcomputer and monitor, you need a modem and a telephone.

Your computer generates *digital* signals. The telephone line operates on *analog* signals. If your computer is to "talk" to another computer over a telephone line, it needs to convert its digital signals to analog signals that are compatible with telephonic transmission characteristics. The modem is the converter that does this. Conversely, when the distant computer replies to yours, it converts its digital signals to analog ones. For your computer to accept this information, however, it must be reconverted to digital data. The conversion from digital to analog is called *modulation*, and, conversely, the conversion from analog back to digital is called *demodulation*. Take the initial letters of each term and you have *mo* + *dem*. Figure 3.4 illustrates the entire process.

There are many different commercial software applications to help your computer transmit and receive data, and there are several distinct types of modems. It would be well for you to talk to a computer specialist before you go any further with modems and online information planning.

How do you locate available databases? Here is a partial list of database directories and their respective publishers:


*Directory of Online Databases.* Cuadra Associates, 2001 Wiltshire Boulevard, Suite 305, Santa Monica, CA 90403. Two complete issues and two supplements each year.


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**Figure 3.4 - Flow of information to and from the remote computer**


Periodicals

Computer Data Report. Quarterly. Information USA, 12400 Beall Mountain Road, Potomac, MO 20854.


General Reading about Online Databases


Date, C.J. Database: A Primer, Reading, MA: Addison-Wesley, 1990.


For Further Reading


*In the periodical and separately published literature. a phenomenal void occurs in the discussion of the research problem. Most of such discussions are found in texts of research methodology. This will explain the predominance of such references in this bibliography.

Charles, D.C. "Early Research in Educational Psychology." Educational Psychologist 23 (Summer


