

Foundations

PART I emphasizes the composing process, introducing the book's central focus. Chapter 2 discusses how to analyze a writing situation and how to discover, arrange, revise, and edit technical information. Chapter 3 suggests strategies for working on collaborative writing projects. Chapter 4 shows how to adapt reports for various audiences. Chapter 5 emphasizes elements of style at the paragraph, sentence, and language level. Chapters 6 and 7 are new for this edition. Chapter 6 explains what it means to be ethical and how to be ethical in your writing. Chapter 7 deals with the reality of globalization and offers advice on how to write for non-American readers.

Scenario

With your new engineering degree, you went to work for Southwest Coal Power (SCP), a company that builds coal-burning power plants. In the six months you've been with SCP, you've learned how new technologies are making the burning of coal cleaner and safer for the environment. SCP has contracted to build a new power plant in Roll, Arizona. Before SCP can build the plant, however, it must file an Environmental Impact Statement that details any environmental problems the plant may cause and ways that such problems would be mitigated. You have been assigned to the team writing the statement. The proposed plant will use a boiler called a "fluidized-bed boiler," and the head of the team has assigned you the task of explaining the boiler.

In your first attempt, you wrote a highly technical textbook description of the fluidized-bed boiler, and the head of the team didn't like it at all. "Think of your readers," he said. "They're not engineers. They're bureaucrats and politicians and concerned citizens. They won't understand most of this, and when people don't understand something, they get suspicious and hostile. Give me something a nonengineer would understand."

So now you are putting on paper some thoughts about your readers. They won't understand engineering terminology. They need some sort of analogy, maybe. You've seen the fluidized-bed boiler compared to a giant pressure cooker. That might work. And you have some good drawings that show the boiler in action, pretty easy to visualize, really.

What's the reader's point of view? They probably think coal is a dirty fuel and that the new power plant will endanger the environment. You can show them how this new kind of boiler "fluidizes" more than 90 percent of the sulfur and nitrogen pollutants out of coal. You begin to realize that thinking about your readers can be a good way to discover the content you need and even to organize it.

This chapter explains how audience analysis fits into the composing process and identifies the other steps of the process.

chapter 2

Composing

- ▶ Situational Analysis
 - Topic and Purpose
 - Audience and Persona

- ▶ Discovery
 - Brainstorming
 - Using Arrangement Patterns for Discovery
 - Other Successful Discovery Techniques

- ▶ Arrangement

- ▶ Drafting and Revising
 - The Rough Draft
 - Revision

- ▶ Editing
 - Checking Mechanics
 - Checking Documentation
 - Checking Graphics
 - Checking Document Design
 - Editing with Word Processing Programs

The composing process is similar to all high-level reasoning processes in that we don't understand it completely. As one authority points out, "There are more neurons in the human brain than stars in the Milky Way—educated estimates put the number of neurons at about 10^{12} or one trillion. Each of those cells can 'talk' to as many as 1,000 other cells, making 10^{15} connections."¹ Given that level of complexity and those kinds of numbers, no one can map out completely how any complex, high-level, problem-solving process works. And the composing process is precisely that: a complex, high-level, problem-solving process.

Since classical times we have understood some things about the composing process. Aristotle, for example, recognized the wisdom of taking one's audience into account. In recent years, empirical research has revealed additional useful facts about the process. What we tell you in this chapter is based on those classical concepts that have stood the test of time and modern research. We don't pretend to have all the answers, or even that all our answers are right for you. But we can say that the process we describe draws on the actual practices of experienced writers, and it works for them.

For most skilled and experienced writers, the composing process breaks up into roughly five parts. The first part involves **situational analysis**, that time when you're trying to bring a thought from nowhere to somewhere. It's a time when you think about such things as your audience, your topic, and your purpose. In the second stage, you "discover" the material you need to satisfy your purpose and your audience. That **discovery** process may go on completely within the trillion cells of your brain or, as is often the case in technical writing, in libraries, laboratories, and workplaces as well.

When the discovery stage is almost complete, you pass into a stage in which you **arrange** your material. That is, before writing a draft, you may rough out a plan for it or even a fairly complete outline.

With your arrangement in hand, you are ready for the fourth part of the composing process, the **drafting and revising** of your document. For many competent writers, drafting and revising are separate steps; for others, they are almost concurrent.

In the final stage of the writing process, you **edit** your work to satisfy the requirements of standard English and proper format.

Time spent on these five parts is usually not equal. Situational analysis, discovery, and arrangement for a complicated piece of work may take 80 percent or more of the time you spend on the project. For an easy piece of routine writing, these first three stages may take a few minutes, and drafting and revising may take up the bulk of the time. Some situations call for careful, scrupulous editing; others do not.

The process is often not linear. If the drafting bogs down, you may have to return to the situational analysis stage to resolve the problem. Drafting and revising may alternate as you write for a while, then stop to read and revise. But, in rough outline, what we have described for you is the competent writer's composing process. Throughout this book, we frequently deal with the process. We remind you again and again of the needs of your audience and provide ways to discover material to satisfy different purposes and topics. In the rest of this chapter we provide some strategies you can use to develop a competent writing process of your own. Because any part of the process can be done in cooperation with others, we provide information on how to write collaboratively (Chapter 3).

SITUATIONAL ANALYSIS

In this section we discuss situational analysis, dealing first with topic and purpose, and then with audience and persona.

Topic and Purpose

The topics and purposes of technical writing are found in the situations of technical writing. The topics are many. You may have a mechanism or process to explain—that is your topic. You may have to define a term or explain a procedure. You may have to report the results and conclusions of a scientific experiment or a comparison shopping study. New research has to be proposed. Work delays have to be explained. All these and many more are the topics of technical writing.

Although the topics of technical writing are varied, the purposes are more limited. Generally, your purpose is either to inform or to argue. Most topics can be handled in one of these two ways, depending on the situation. Often, you are simply informing. For example, the situation may call for you to describe a mechanism so that someone can understand it. As you will see in Chapter 9, Presenting Information, mechanism description will often call for you to divide the mechanism into its component parts and then describe these parts, perhaps as to size, shape, material, and purpose. As another example, you may have to define a term from your discipline. In your definition, you may tell what category the thing being defined belongs to and what distinguishes it from other members of the same category. You may give an example of the thing described.

On the other hand, when dealing with your mechanism or definition, you may be really mounting an argument. You may not be merely describing a mechanism; you may be attempting to demonstrate its superiority to other mechanisms of the same type. To do so, you'll need to argue, perhaps by showing how your mechanism is more economical and easier to maintain than other mechanisms. In the same way, you may not be simply defining a term; you may be arguing that your definition is more comprehensive or more correct than previous definitions of the same term.

Be sure to have your topic and purpose in hand before you proceed on in your writing project. It's good practice to write them down, something like this:

I will define alcoholism in a way that reflects recent research. Further, I will demonstrate that my definition, which includes the genetic causes of alcoholism as well as the environmental ones, is more complete and accurate than definitions that deal with environmental causes alone.

Will the topic and purpose change as you proceed with your project? That depends on the situation. Frequently, the situation will call for you to stick closely to a narrow topic and purpose: *We have to explain to our clients our progress (or lack of progress) in installing the air conditioning system in their new plant.* Or, in another typical situation, *We have to provide instructions for the bank tellers who will use the computer consoles we have installed at their stations.* Although the way you handle such topics and purposes is subject to change as you explore

them, the topics and purposes themselves really are not subject to change. On the other hand, the situation may call for you to explore a topic, perhaps the potential effect of the rising age of the American population on the restaurant business. Although you have defined your topic well enough to begin your exploration, the precise topic and the purpose may have to wait until you discover more information about your subject.

Audience and Persona

Writers make important decisions about content and style based on consideration of the audience and the persona the writer wants to project. **Persona** refers to the role the writer has, or assumes, when writing. It relates to, among other things, the position of the writer and his or her relationship to the audience and the situation. For example, a bank lending officer might assume one persona when writing to a loan applicant and a different persona when writing to a supervisor to justify a loan that has been made.

Professional people consider both audience and persona seriously when composing, as this quote from a hydrology consultant at an engineering firm indicates:

We write about a wide range of subject matters. Some things are familiar to a lay audience. Most people can understand a study about floods. They can understand a study that defines a 100-year flood plain. They can imagine, say, water covering a street familiar to them. But other subjects are very difficult to communicate. We work with three-dimensional models of water currents, for example, that are based upon very recondite hydrologic movements. We also have a wide audience range. Some of our reports are read by citizen groups. Sometimes we write for a client who has a technical problem of some sort and is only interested in what to do about it. And sometimes we write for audiences with high technical expertise like the Army Corps of Engineers. Audiences like the Army Corps expect a report to be written in a scientific journal style, and they even want the data so they can re-analyze it. A lot of times the audience is mixed. A regulatory agency may know little about the subject of one of our reports, but they may have a technically trained person on the staff who does. In any case, we must understand what it is that the client wants, and we must be aware of what he knows about the subject. We must convince clients that we know what we are doing. We depend upon return business and word-of-mouth reputation, and we must make a good impression the first time. Much of the technical reputation of this company rides on how we present ourselves in our technical reports.²

Here are some questions you need to ask about your audience and persona when you are preparing to write.

What Is the Level of Knowledge and Experience of Your Readers? In technical writing, the knowledge and experience your readers possess are key factors. Do your readers understand your professional and technical language? If they do, your task is easier than if they do not. When they do not, you have to be particularly alert to your word choice, choosing simpler terms when possible, defining terms when simpler choices are not possible. Awareness of your readers goes beyond word choice. There are whole concepts that a lay audience may not have. Geologists, for example, thoroughly understand the concept of plate tectonics and can assume that geologists in their audience understand it equally well. When addressing a lay audience, however, the geologist writer would be wise to assume little understanding of the concept. If the geologist wishes to use the concept, he or she will have to take time to explain it in a way that the audience can grasp.

What Is the Reader's Point of View? Point of view relates to the reader's purpose and concerns. Suppose that you are writing about a procedure. People may read about procedures for many reasons. In one case, the reader may wish to perform the procedure. In another, the reader may have to make a decision about whether to adopt the procedure. In yet another, readers may simply want generalized information about the procedure, perhaps because they find it interesting.

Each case calls for a different selection of content and a different style. Readers wishing to perform the procedure need a complete set of step-by-step instructions. The decision maker needs to know by what criteria the procedure has been evaluated and why, under these criteria, it is a better choice than other procedures. Those who read for interest want the general concept of the procedure explained in language they can understand.

What Is Your Relationship to the Reader? Are the readers your bosses, clients, subordinates, peers, or students? If you are a public employee, are you writing to a taxpayer who contributes to your salary? Writers in the workplace, when interviewed about how they write, reveal that they pay a good deal of attention to the effect of such relationships on tone, as these quotations demonstrate:³

- Writing to my boss, I try to pinpoint things a little more.
- When you have something as personal as a phone call or a conversation back and forth . . . I feel free to use "I" rather than "we."
- We always want them to realize they can call on us if they have any questions.
- This [referring to a statement] is a bit more on a personal level. . . . The other [statement] is much too formal.
- Just to say "Send his address" would, I think, be a little too authoritarian.

The roles writers find themselves in also affect their choice of content. Imagine the difference in approach between a Chevrolet sales representative trying to sell a fleet of Chevrolets to a company, and a young executive of the same company reporting to his or her superiors that the results of a feasibility study demonstrate Chevrolets to be the best purchase. In the first instance, the sales representative is likely to be more enthusiastic about Chevrolets than other makes. The decision makers would expect and understand such enthusiasm and would allow for it. In the second instance, the decision makers will expect a more balanced approach from the young executive.

What Is Your Reader's Attitude about What You Are Going to Say?

Audiences can be suspicious and hostile. They may be apathetic. Of course, they may be friendly and interested. Their attitude should affect how you approach them. If you have an unfriendly audience, you must take particular care to explain your position carefully in language that is understandable but not patronizing. You may need more examples than you would with a friendly audience. A friendly audience may be persuaded with less information. With a friendly audience, you may present your conclusions first and then support them. With an unfriendly audience, it's a sound idea to present your support first and then your conclusions.

Readers may have attitudes about the language you use. For example, public health officials have had a difficult time expressing how to avoid exposure to AIDS. Such advice, to be effective, must refer very explicitly to sexual practices. Newspapers have had to change their usual practice to allow such language to be printed, and some readers have found the language offensive. In most cases, the interest in AIDS prevention has won out over reader sensibilities, but the problem illustrates well the social context of audience analysis.

What Persona Do You Wish to Project? If you have read many scientific journals, you have probably noticed that they have a certain tone about them, a tone to which words such as *objective*, *formal*, and *restrained* readily apply. Scientists, to find acceptance in such journals, must adopt such a tone. A breezy, light journalistic style, though it might be just as clear, would not be acceptable. In the same way, bankers must present themselves in a careful, formal way. We're not likely to give our money for safekeeping into the hands of someone who comes on like a television used-car dealer. Young executives writing to their bosses are likely to be a bit deferential. The bosses, in turn, want to sound firm but reasonable and not authoritarian. What has come to be called "corporate culture" plays a role in the persona a writer may adopt. In writing, you must project the values and attitudes of the organization you work for. To do so, you may look over past correspondence and reports to see what practices have been used, what sort of tone writers in the organization have adopted.

Taking on a persona when you write is something like taking on a persona when you dress. The student who exchanges his blue jeans and running shoes

for a business suit and wing tips when he reports for a job interview is slipping out of one persona into another. The teacher who exchanges a comfortable sweater and skirt for a businesslike dress when she leaves the classroom to consult in industry is exchanging one persona for another. It's a common enough experience in life, and you should not be surprised to find such experiences in writing situations. Both dressing and writing have their own rhetorics. However, don't misinterpret anything we have said as a rationale for being obscure or jargony. You should be clear no matter what persona you adopt.

What Is the Influence of International Cultures? You can no longer be certain that you will be writing or speaking to a North American audience only. Because many organizations operate internationally, technical professionals often need to communicate with people from other countries. When they do so, they must take the culture of the country they are dealing with into account.

Anthropologists have defined culture in a number of ways:

- Culture is a shared system of meanings, derived from the environment in which people live and work.
- Culture is a mind-set, the response by people to their physical and human environment. It is the survival mechanism they develop and pass on consciously and unconsciously to succeeding generations.
- Culture is a transmitted system of values, ideas, and behaviors. It is a set of common understandings.

Thinking that people are the same everywhere would be a major error in analyzing your audience. Countries, and cultures within those countries, do differ. Cultures differ because of climate, topography, population density, natural resources available, religion, family structure, educational systems, and political systems. To understand a person, you must understand the culture through which that person interprets the world. Only when you know what approach and persona readers from other cultures expect from you will you be able to communicate with them. As you plan any document, always consider the culture of your readers. In Chapter 7, *Writing for International Readers*, we discuss specific cultural differences and ways to deal with them. We remind you of cultural differences in discussing style, graphics, correspondence, and oral reports.

DISCOVERY

At some point in your writing process you must “discover” the material you will use in your writing. Discovery is teasing out of your mind the information you will use and modify to meet the needs of your topic, purpose, audience, and persona. Discovery is making connections. It's putting together two pieces of information to create a third piece that didn't exist before the connection. A mind that is well stocked with information will probably be successful at discovery. Those trillion

neurons need something to work with; the more you read, observe, and experience, the better writer you are likely to be.

Of course, all the material you need may not be in your mind when you begin. Discovery includes using libraries, the Internet, and laboratories to fill in the gaps in your knowledge. You may also use interviews, on-site inspections, letters of inquiry, and the like to gather information. The techniques we discuss here will enable you to explore your own mind. (See also, Chapter 8, Gathering, Evaluating, and Documenting Information.)

Brainstorming

In brainstorming you uncritically jot down every idea about a subject that pops into your head, without thought of organization. The key to successful brainstorming is that you do not attempt to evaluate or arrange your material at the first stage. These processes come later. Evaluation or arrangement at the first critical stage may cause you to discard an idea that could prove valuable in the context of all the ideas that the brainstorming session produces. Also, avoiding evaluation at this point prevents the self-censorship that often blocks a writer.

Because brainstorming is a fairly painless process, it's frequently a good device to break down the normal resistance most of us have to hard thinking. It can result in your writing down a good deal more information than you ever thought you possessed. It can quickly reveal holes in your knowledge, which can be filled with information you gather later.

Using Arrangement Patterns for Discovery

Although you do not arrange your material in the discovery stage, you can use familiar arrangement patterns as aids in discovering your material. For example, suppose your purpose is to describe a procedure for a reader who wishes to perform the procedure. If you were familiar with writing instructions, as you will be after reading Chapter 18, Instructions, you would know that a set of instructions often lists and sometimes describes the tools that must be used to perform the procedure. Furthermore, instructions describe the steps of the procedure, normally in chronological order. Knowing what is normally required for a set of instructions, you can brainstorm your material in a more guided way.

You can begin by writing down the tools that will be needed for the procedure. Think about what you know about your audience. Are they experienced with the tools needed? If so, simply list the tools. If they are not experienced, jot down some information they'll need to use the tools properly.

When you are done with the tools, write down the steps of the procedure. Keep your readers in mind. Are there some steps so unfamiliar to your readers

that you need to provide additional information to help them perform the steps? If so, list what that information might be.

As in brainstorming, in very little time you can get information out where you can see it. Also, as in brainstorming, if there are gaps in your knowledge, you can discover them early enough to fill them.

Another task frequently encountered in technical writing is arguing to support an opinion. In discovering an argument, you can begin by stating that opinion clearly, perhaps something like "Women should get equal pay for equal work." Next, you can turn your attention to the subarguments that might support such an opinion. For example, first, you would have to establish that in many instances women are not getting equal pay for equal work, and, therefore, a problem really does exist. Then you might think of a philosophical argument: Ethically, women have a right to equal pay for equal work. You might think of an economic argument: Women's needs to support themselves and their families equal those of men. And so forth. As you think about subarguments, you will begin to think about the information you will need to support them. Some of it you may have; some you may need to research. The very form and needs of your argument serve as powerful tools to help you discover your material.

Other Successful Discovery Techniques

Most experienced writers develop their own discovery techniques. In the workplace, writers often use past documents of a similar nature to jog their minds. Many professional writers keep journals that they can mine for ideas and data. Scientists keep laboratory notebooks that can be invaluable when it's time to write up the research. In the workplace, people talk to each other to discover and refine ideas.

Asking questions, particularly from the reader's point of view, is a powerful discovery technique. Suppose you were describing the use of computers for word processing. What questions might the reader have? *Do I have to be an expert typist to use a word processor? What are the advantages of word processing? The disadvantages? How do I judge the effectiveness of a word processor? What do word processors cost? Will word processing make writing and revising easier?* As you ask and answer such questions, you are discovering your material.

When you have established your topic and purpose, analyzed your audience, and discovered your material, it's time to think about arrangement.

ARRANGEMENT

When you begin your arrangement, you should have a good deal of material to work with. You should have notes on your audience, purpose, and persona. Your

discovered material may take various forms. It may be a series of notes produced by brainstorming or other discovery techniques. You may have cards filled with notes taken during library research or notebooks filled with jottings made during laboratory research. You may have previous reports and correspondence on the topic you are writing about. You may have ideas for graphs and tables to use in presenting your material. In fact, you may have so much material that you do not know where to begin.

You can save yourself much initial chaos and frustration if you remember that certain kinds of reports (and sections of reports) have fairly standard arrangements (see Chapter 9, Presenting Information, and Chapter 10, Analyzing Information). The same arrangement patterns that helped you discover your material can now serve you as models of arrangement. For instance, you might divide your subject into a series of topics, as we have done with the chapters of this book. If you're describing a procedure and know that your readers wish to perform that procedure, you may use a standard instruction arrangement: introduction, tool list and description, and steps of the procedure in chronological order. If you are arranging an argument, you have your major opinion, often called the major thesis, and your subarguments, often called minor theses. You'll probably want to consider the strength of your minor theses when you arrange your argument. Generally, you want to start and finish your argument with strong minor theses. You'll place weaker minor theses in the middle of your argument.

Documents such as progress reports, proposals, and empirical research reports have fairly definite arrangements that we describe for you in Part III, Applications. Not all the arrangements described will fit your needs exactly. You must be creative and imaginative when using them. But they do exist. Use them when they are appropriate.

How thorough you are at this stage depends on such things as the complexity of the material you are working with and your own working habits. Simple material does not require complicated outlines. Perhaps nowhere else in the writing process does personality play such a prominent role as it does at the arrangement stage. Some people prepare fairly complete arrangement patterns; others do not.

Most experienced writers are usually thorough but informal in writing down their arrangement patterns. However, if you need a formal outline and need instruction in preparing one, see Outlining in Appendix B.

In technical writing, graphs and tables are important techniques for presenting material. It's not too early to think about them while you are arranging your material. For help in planning and selecting graphs and tables, see Chapter 12, Using Illustrations.

DRAFTING AND REVISING

When you have finished arranging your material, you are ready to draft and revise your report. Keep in mind that writing is not an easy mechanical job. But we do give you suggestions that should make a tough job easier.

The Rough Draft

Writing a rough draft is a very personal thing. Few writers do it exactly alike. As you have seen, most write from a plan of some sort; a few do not. Some write at a fever pitch; others write slowly. Some writers leave revision for an entirely separate step. Some revise for style and even edit for mechanics as they go along, working slowly, trying to get it right the first time. All we can do is describe in general the practices of most professional writers. Take our suggestions and apply them to your own practices. Use the ones that make the job easier for you and revise or discard the rest.

Probably our most important suggestion is to begin writing as soon after the prewriting stage as possible. Writing is hard work. Most people, even professionals, procrastinate. Almost anything can serve as an excuse to put the job off: one more book to read, a movie that has to be seen, anything. The following column by Art Buchwald describes the problem of getting started in a manner that most writers would agree is only mildly exaggerated.

MARTHA'S VINEYARD—There are many great places where you can't write a book, but as far as I'm concerned none compares to Martha's Vineyard.

This is how I managed not to write a book and I pass it on to fledgling authors as well as old-timers who have vowed to produce a great work of art this summer.

The first thing you need is lots of paper, a solid typewriter, preferably electric, and a quiet spot in the house overlooking the water.

You get up at 6 in the morning and go for a dip in the sea. Then you come back and make yourself a hearty breakfast.

By 7 A.M. You are ready to begin Page 1, Chapter 1. You insert a piece of paper in the typewriter and start to type "It was the best of times . . ." Then you look out the window and you see a sea gull diving for a fish. This is not an ordinary sea gull. It seems to have a broken wing and you get up from the desk to observe it on the off chance that somewhere in the book you may want to insert a scene of a sea gull with a broken wing trying to dive for a fish. (It would make a great shot when the book is sold to the movies and the lovers are in bed.)

It is now 8 A.M. and the sounds of people getting up distract you. There is no sense trying to work with everyone crashing around the house. So you write a letter to your editor telling him how well the book is going and that you're even more optimistic about this one than the last one which the publisher never advertised.

It is now 9 A.M. and you go into the kitchen and scream at your wife, "How am I going to get any work done around here if the kids are making all that racket? It doesn't mean anything in this family that I have to make a living."

Your wife kicks all the kids out of the house and you go back to your desk . . . You look out the window again and you see a sailboat in trouble. You take your binoculars and study the situation carefully. If it gets worse you may have to call the Coast Guard. But after a half-hour of struggling they seem to have things under control.

Then you remember you were supposed to receive a check from the *Saturday Review* so you walk to the post office, pause at the drugstore for newspapers, and stop at the hardware store for rubber cement to repair your daughter's raft.

You're back at your desk at 1 P.M. when you remember you haven't had lunch. So you fix yourself a tuna fish sandwich and read the newspapers.

It is now 2:30 P.M. and you are about to hit the keys when Bill Styron calls. He announces they have just received a load of lobsters at Menemsha and he's driving over to get some before they're all gone. Well, you say to yourself, you can always write a book on the Vineyard, but how often can you get fresh lobster?

So you agree to go with Styron for just an hour.

Two hours later with the thought of fresh lobster as inspiration, you sit down at the typewriter. The doorbell rings and Norma Brustein is standing there in her tennis togs looking for a fourth for doubles.

You don't want to hurt Norma's feelings so you get your racket and for the next hour play a fierce game of tennis, which is the only opportunity you have had all day of taking your mind off your book.

It is now 6 P.M. and the kids are back in the house, so there is no sense trying to get work done any more for that day.

So you put the cover on the typewriter with a secure feeling that no matter how ambitious you are about working there will always be somebody on the Vineyard ready and eager to save you. [Reprinted by permission of Art Buchwald.]

But you must begin, and the sooner the better. Find a quiet place to work, one with few distractions. Choose a time of day when you feel like working, and go to work.

Where should you begin? Usually, it's a good strategy to begin not with the beginning but with the section that you think will be the easiest to write. If you do so, the whole task will seem less overwhelming. As you write one section, ideas for handling others will pop into your mind. When you finish an easy section, go on to a tougher one. In effect, you are writing a series of short, easily handled reports rather than one long one. Think of a 1,500-word report as three short, connected, 500-word reports. You will be amazed at how much easier this attitude makes the job. We should point out that some writers do prefer to begin with their introductions and even to write their summaries, conclusions, and recommendations (if any) first. They feel this sets their purpose, plan, and final goals firmly in their minds. If you like to work that way, fine. Do remember, though, to check such elements after you have written the discussion to see whether they still fit.

How fast should you write? Again, this is a personal thing, but most professional writers write rapidly. We advise you not to worry overmuch about phraseology or spelling in a rough draft. Proceed as swiftly as you can to get your ideas on paper. Later, you can smooth out your phrasing and check your spelling, either with your dictionary or your word processor's spelling checker. However, if you do get stalled, reading over what you have written and tinkering with it a bit is a good way to get the flow going again. In fact, two researchers of the writing process found that their subjects spent up to a third of their time pausing. Generally, the pauses occurred at the ends of paragraphs or when the writer was searching for examples to illustrate an abstraction.⁴

Do not write for more than two hours at a stretch. This time span is one reason you want to begin writing a long, important report at least a week before it is due. A report written in one long five- or six-hour stretch reflects the writer's exhaustion. Break at a point where you are sure of the next paragraph or two. When you come back to the writing, read over the previous few paragraphs to help you collect your thoughts and then begin at once.

Make your rough draft very full. You will find it easier to delete material later than to add it. Nonprofessional writers often write thin discussions because they think in terms of the writing time span rather than the reading time span. They have been writing on a subject for perhaps an hour and have grown a little bored with it. They feel that if they add details for another half-hour they will bore

the reader. Remember this: At 250 words a minute, average readers can read an hour's writing output in several minutes. Spending less time with the material than the writer must, readers will not get bored. Rather than wanting less detail, they may want more. Don't infer from this advice that you should pad your report. Brevity is a virtue in professional reports. But the report should include enough detail to demonstrate to the reader that you know what you're talking about. The path between conciseness on one hand and completeness on the other is often something of a tightrope.

As you write your rough draft, indicate where your references will go. Be alert for paragraphs full of numbers and statistics, and consider presenting such information in tables and graphs. Be alert for places where you will need headings and other transitional devices to guide your readers through the report. (See Chapter 11, Document Design.)

Whether your planning has been detailed or casual, keep in mind that writing is a creative process. Discovery does not stop when you begin to write. The reverse is usually true. For most people, writing stimulates discovery. Writing clarifies your thoughts, refines your ideas, and leads you to new connections. Therefore, be flexible. Be willing to revise your plan to accommodate new insights as they occur.

Revision

Some writers revise while they are writing. For them, revision as a separate step is little more than minor editing, checking for misspellings and awkward phrases. For other writers—particularly those who write in a headlong flight—revising is truly rewriting, and sometimes even rearranging, the rough draft. Naturally, there are many gradations between these two extremes. Whether you revise while you write or in a separate step, you should be concerned about arrangement, content, logic, style, graphics, and document design. In some situations you may want to show your work to others and seek their advice.

Arrangement and Content In checking your arrangement and content, try to put yourself in your reader's place. Does your discussion take too much for granted? Are questions left unanswered that the reader will want answered? Are links of thought missing? Have you provided smooth transitions from section to section, paragraph to paragraph? Do some paragraphs need to be split, others combined? Is some vital thought buried deep in the discussion when it should be put into a prominent position at the beginning or end? Have you avoided irrelevant material or unwanted repetitions?

In checking content, be sure that you have been specific enough. Have you quantified when necessary? Have you stated that "In 2000, 52 percent of the workers took at least twelve days of sick leave" rather than "In a previous year, a majority of the workers took a large amount of sick leave"? Have you given

enough examples, facts, and numbers to support your generalizations? Conversely, have you generalized enough to unify your ideas and to put them into the sharpest possible focus? Have you adapted your material to your audience?

Is your information accurate? Don't rely on even a good memory for facts and figures that you are not totally sure of. Follow up any gut feeling you have that anything you have written seems inaccurate, even if it means a trip back to the library or laboratory. Check and double-check your math and equations. You can destroy an argument (or a piece of machinery) with a misplaced decimal point.

Logic Be rigorous in your logic. Can you really claim that A caused B? Have you sufficiently taken into account other contributing factors? Examine your discussion for every conceivable weakness of arrangement and content, and be ready to pull it apart. All writers find it difficult to be harshly critical of their own work, but a critical eye is essential.

Style After you have revised your draft for arrangement and content, read it over for style. (We treat this as a separate step, which it is. But, of course, if you find a clumsy sentence while revising for arrangement and content, rewrite it immediately.) Use Chapter 5, *Achieving a Readable Style*, to help you. Rewrite unneeded passive voice sentences. Cut out words that add nothing to your thought. Cross out the pretentious words and substitute simpler ones. If you find a cliché, try to express the same idea in different words. Simplify; cut out the artificiality and the jargon. Be sure the diction and sentence structures are suitable to the occasion and the audience. Remember that you are trying to write understandably, not impressively. The final product should carry your ideas to the reader's brain by the shortest, simplest path.

Graphics Much technical information is presented in tables and graphs. When dealing with content that has visual components, you should probably present at least some of that content graphically. When you have numerous statistics, particularly statistics that you are comparing to each other, you probably should display them in tables or graphs. (For help in such matters, see Chapter 12, *Using Illustrations*.)

Document Design Good document design—the use of tables of contents, headings, the right typeface, proper spacing, and so forth—is integral to good technical writing. We offer detailed guidance in this area in Chapter 11, *Document Design*, and in *Report Format* in Appendix B.

Sharing Your Work In actual workplace situations, writers often share their drafts with colleagues and ask for their opinions. Often, someone who is not as close to the material as the writer can spot flaws far more quickly than the writer can. As you'll see when we discuss revising and editing with word

processing programs, you may also share your work with your personal computer.

When you are writing instructions, it's an excellent idea to share an early draft with people who are similar in aptitude and knowledge to the people for whom the instructions are intended. See whether they can follow the instructions. Ask them to tell you where they had trouble carrying out your instructions or where poor vocabulary choice or insufficient content threw them off track.

EDITING

Editing is a separate step that follows drafting and revising. It's the next-to-final step before you release your report to its intended audience. When you're drafting and revising a manuscript, you may have to backtrack to the discovery or the arranging stage of the process. But when you are editing, it's either because you are satisfied with your draft or because you have run out of time. In the editing stage, you make sure your report is as mechanically perfect as possible, that it meets the requirements of standard English and whatever format requirements your situation calls for. If you are working for a large organization or the government, you may have to concern yourself with things such as stylebook specifications, distribution lists, and code numbers.

Checking Mechanics

Begin by checking your mechanics. Are you a poor speller? Check every word that looks the least bit doubtful. Some particularly poor spellers read their draft backwards to be sure that they catch all misspelled words. Develop a healthy sense of doubt and use a good dictionary or the spelling checker of your word processing program. Do you have trouble with subject-verb agreement? Be particularly alert for such errors. In Appendix A we have provided you with a handbook that covers some of the more common mechanical problems. A word processor can help by allowing you to check for some of the errors a computer program is able to detect.

Checking Documentation

When you are satisfied with your mechanics, check your documentation. Be sure that all notes and numbers match. Be sure that you have used the same style throughout for your notes. For help in documentation, see Documentation in Appendix B.

Checking Graphics

Check your graphics for accuracy, and be sure you have mentioned them at the appropriate place in the report. Are your graphics well placed? If they are

numbered, be sure that their numbers and the numbers you use in referring to them match.

Checking Document Design

In your drafting and revision, you should have made sure that your design makes your document readable and accessible for your readers. When editing, check for more mundane but nevertheless important things. For instance, is your table of contents complete? Is it accurate? Does it match the headings you have used? Do your headers or footers accurately portray your material?

When you are satisfied that you have done all that needs to be done, print your final draft, then proofread it one more time before you turn it over to your audience. The author of a report is responsible for all errors.

Editing with Word Processing Programs

To help the writer with editing, spelling checkers and grammar and style checkers are available in word processing programs.

SpellingCheckers You may have a spelling checker in your word processing program or one that you have bought separately. Spelling checkers work by looking up every word of your text in the dictionary that is a part of the program. Most spelling checkers have no sense of grammar or usage. They will stop on a word spelled correctly if that word does not happen to be in the program's dictionary, as is true of many technical terms. More important, they will not stop at a word that is in the program's dictionary when that word is used incorrectly in context. A spelling checker won't catch errors like these:

The *student's* all came to class today.
They wanted to *here* your speech.
They wanted to hear *you* speech.

(For a list of words that sound alike but have different spellings and meanings, such as *weather* and *whether*, see the entry for Spelling Error in the Handbook.) Use a spelling checker first, but then make sure to proofread as well.

Grammar and Style Checkers You can get programs that check your work for grammar, punctuation, and style. Some will flag sentences in the passive voice, long sentences, wordy phrases, double words (such as *and and*), unpaired quotation marks, and other problems. Some also flag subject–verb agreement problems, incorrect possessives, and other grammatical faults. Some give your text a “readability rating” according to one or more formulas.

Grammar and style checkers can be helpful. They can make you more aware of your writing style. If you tend to write in the passive voice, they'll press

you to change to active voice. If you tend to use wordy phrases or unnecessarily long words, they'll give you shorter, crisper alternatives.

Use grammar and style checkers with great caution, however. Some current text-analysis programs are too rule-bound to be flexible, and some of the rules may be of doubtful validity. Consider the advice grammar and style checkers give you in light of the purpose and audience for your document. Not every passive voice sentence should be rewritten as an active sentence. Not every sentence of more than twenty-two words is too long. Grammar and style checkers work only at the sentence and word level, but the most serious problems with many documents are in their content and overall organization. If you change words and sentences here and there without considering larger issues of content and arrangement, you may actually be making your document less useful and understandable.

PLANNING AND REVISION CHECKLISTS

The following questions are a summary of the key points in this chapter, and they provide a checklist you can use when you are composing.

Situational Analysis

- What is your topic?
- Why are you writing about this topic? What is your purpose (or purposes)?
- What are your readers' educational levels? What are their knowledge and experience in the subject matter area?
- What will your readers do with the information? What is their purpose?
- Do your readers have any expectations as to style and tone (serious, light, formal)?
- What is your relationship to your readers? How will this relationship affect your approach to them?
- What are your readers' attitudes about what you are going to say?
- Do you have an international audience whose culture may differ from that of the United States?

Discovery

- What discovery approach can you use? Brainstorming? Using arrangement patterns? Other?
- Are there documents similar to the one you are planning that would help you?
- Do you have notes or journal entries available?
- What questions are your readers likely to want answered?
- Do you have all the information you need? If not, where can you find it? People? Library? Laboratory research? World Wide Web?
- What tables, graphs, diagrams, or other graphic aids will you likely need?

Arrangement

- Are there standard arrangement patterns that would help you—for example, instructions, argument, proposals?
- Will you need to modify any such standard pattern to suit your needs?
- Do you need a formal outline?
- When completed, does your organizational plan fit your topic, material, purpose, and audience?
- What headings and subheadings will you use to reveal your organization and content to your readers?
- Is everything in your plan relevant to your topic, purpose, and audience?
- If you have a formal outline, does it follow outlining conventions? Are entries grammatically parallel? Is each section divided into at least two parts? Have you used correct capitalization? Are entries substantive?

Drafting

- Do you have a comfortable place to work?
- Where in your organizational plan can you begin confidently?
- Where will your graphical elements be placed?

Revision

- Have you stated clearly and specifically the purpose of the report?
- Have you put into the report everything required? Do you have sufficient supporting evidence? Have you stated the implications of your information clearly?
- Are all your facts and numbers accurate?
- Have you answered the questions your readers are likely to have?
- Does the report contain anything that you would do well to cut out?
- Does your organization suit the needs of your content and your audience?
- Are your paragraphs clear, well organized, and of reasonable length? Are there suitable transitions from one point to the next?
- Is your prose style clear and readable?
- Is your tone appropriate to your audience?
- Have you satisfied the needs of an international audience?
- Are your graphs and tables clear and accurate? Are they well placed?
- Is your document readable, accessible, and visually effective?
- Are there people you should share your draft with—for example, members of the target audience—before going on to a final draft?

Editing

- Have you checked thoroughly for misspellings and other mechanical errors?

- Have you included all the formal elements that your report needs?
- Are design elements such as headings, margins, spacing, typefaces, and documentation consistent throughout the draft?
- Are your headings and titles clear, properly worded, and parallel? Do your headings in the text match those in the table of contents?
- Is your documentation system the one required? Have you documented wherever appropriate? Do the numbers in the text match those in the notes?
- Have you keyed the tables and figures into your text, and have you sufficiently discussed them?
- Are all parts and pages of the manuscript in the correct order?
- Will the format of the typed or printed report be functional, clear, and attractive?
- Does your manuscript satisfy stylebook specifications governing it?
- Have you included required notices, distribution lists, and identifying code numbers?
- Do you have written permission to reproduce extended quotations or other matter under copyright? (Permission is necessary only when your work is to be published or copy-righted.)
- While you were composing the manuscript, did you have any doubts or misgivings that you should now check out?
- Have you edited your manuscript for matters both large and small?
- What remains to be done (such as proofreading the final copy)?

EXERCISES

1. Describe accurately and completely your current writing process. Be prepared to discuss your description in class.
2. Interview someone who has to write frequently (such as one of your professors). Ask about the person's writing process. Base your questions on the process described in this chapter; that is, ask about situational analysis and arranging, drafting, revising, and editing techniques. Take good notes during the interview, and write a report describing the interviewee's writing process.
3. Choose some technical or semitechnical topic you can write about with little research—perhaps a topic related to a hobby or some school subject you enjoy. Decide on a purpose and audience for writing about that topic. For example, you could instruct high school seniors in some laboratory technique. You could explain some technical concept or term to someone who doesn't understand it—to one of your parents, perhaps. Analyze your audience and persona, following the suggestions in this chapter. With your purpose, audience, and persona in mind, brainstorm your topic. After you complete the brainstorming, examine and evaluate what you have. Reexamine your topic and purpose to see whether information you have thought of during the brainstorming has changed them. Keeping your specific topic, purpose,

audience, and persona in mind, arrange your brainstorming notes into a rough outline. Do not worry overmuch about outline format, such as roman numerals, parallel headings, and so forth.

4. Turn the informal outline you constructed for Exercise 3 into a formal outline (see Outlining in Appendix B).
5. Write a rough draft of the report you planned in Exercises 3 and 4. Allow several classmates to read it and comment on it. Revise and edit the rough draft into a final, well-written and well-typed draft. Submit all your outlines and drafts to your instructor.
6. On page 19, we describe culture as a “transmitted system of values, ideas, and behavior. It is a set of common understandings.” In groups of six or seven, discuss and describe the values, ideas, behavior, and common understandings that govern your culture. Are there disparities of opinion within the group about these matters? Prepare two lists: one composed of the group’s agreements and another composed of the disparities of opinion within the group. Be prepared to present and talk about both lists in a full class discussion.