

Technical Report Style and Technical Report Writing Techniques

Excerpts From NASA Document NASA TM-105419
Available online at <http://grcpublishing.grc.nasa.gov/editing/chp2.CFM>

Report Style

There is no satisfactory explanation of style, no infallible guide to good writing, no assurance that a person who thinks clearly will be able to write clearly, no key that unlocks a door, no inflexible rules by which the young writer may shape his course. He will often find himself steering by stars that are disturbingly in motion.

As this quotation from Strunk and White ([ref. 1](#)) indicates, this chapter deals with an elusive but important aspect of report writing—style. Although difficult to define, style establishes the readability of reports. In effect, the style of the report sells the report. If your style of writing and presentation is not acceptable to your intended readers, they may not read your report.

A writing style is acquired only with diligent study and practice in writing. This chapter comments on general report requirements that must be met by any writing style. It then makes specific suggestions for developing your own writing style and for preparing figures and tables.

Requirements of Reports

Regardless of the specific style used to prepare technical reports, four general requirements must be met to produce good reports: [clarity](#), [conciseness](#), [continuity](#), and [objectivity](#).

Clarity

The purpose of a technical report is to transmit conclusions and their supporting evidence. To do this, your report must convey your *exact* meaning to the reader. The text must be clear and unambiguous, mathematical symbols must be fully defined, and the figures and tables must be easily understood.

Clarity must be met from the readers' point of view. What may be clear to you as the author may not be clear to your readers. Remember, you are intimately familiar with the work, but they are not. You must continually reexamine your rough drafts with a reader's critical eye. Readers will not tolerate confusion. They must never become uncertain about what you are discussing, why you are discussing it, or what your plan of presentation is. They will rebel if forced into these mental gymnastics. If there is any discontinuity without proper explanation, the average reader will lay aside the report for later reading. Once this happens, the chances are slight that it will ever be read. You usually have just one chance to sell the reader on the report's objectives. And that requires a presentation that is logical, simple, and systematic.

Conciseness

Most of your intended readers are busy. Therefore your reports should be concisely written. That is, your story should be told with the [fewest possible words and illustrations](#). Help your readers by omitting everything irrelevant to the results and conclusions. Do not be disappointed if a report that describes a lengthy program is only a few pages long: Report quality is often inversely related to report length. Your readers will be interested in your conclusions and the supporting evidence and will want to get these as quickly as possible. They will not be particularly interested in any problems you had in getting the results. Explaining such problems usually just hides the important aspects of the report.

On the other hand, do not condense reports at the expense of your readers' understanding. Give enough information to enable them to understand clearly *what* you are describing and *why* you are describing it. Include enough background information to make the context clear. Do not assume that they will remember details of a previous report—or have even read it. Include all details needed to understand the current report. In short, make your reports brief but comprehensible.

Continuity

Reports should tell a complete story as logically and interestingly as possible. This requires continuity between succeeding sentences, paragraphs, and sections and between the written text and the figures and tables. Transitional words, phrases, sentences, or even paragraphs may be needed to lead your readers through the story. But overusing transitions can slow the pace of your narrative.

Carefully choose the places at which you refer to [figures](#) and [tables](#) to limit distraction. Making these references at the beginning or end of a discussion is usually preferable.

Objectivity

Technical reports should be objective and show restraint. Be honest with your readers. They will become suspicious if they detect hidden meanings or any type of subterfuge, and you will then have little chance of convincing them of your conclusions. They expect you to evaluate the data honestly. Do not try to hide deficiencies in your research. No technical report is better than the research on which it is based. Tell your readers frankly what your assumptions were, what your probable errors are, and what you may not understand about the results.

In addition to being honest, be tactful. If you are faced with the problem of presenting technical results that may conflict with previous results or with the personal prejudices of some readers, refrain from making dogmatic statements and avoid sounding egotistical. Your readers will be persuaded by facts, but they may become irritated if you attempt to impress them with your cleverness or to claim credit for accomplishments. Write to *express*, not to *impress*.

Writing Style

Technical writers usually use a more formal writing style than do nontechnical writers. A degree of formality is required because the personal style of a technical writer must be secondary to the clear and objective transmission of information. Any injection of personality that obscures the exact meaning is undesirable. But this does not mean that technical writing has to be dull and rigidly stereotyped. All writers should strive to make their writing enjoyable to read. Therefore attempt to develop a writing style that is both clear and interesting.

Writing Naturally

Imperative in developing a good writing style is writing naturally. Many technical reports are stilted and overly formal, examples of the "Official Style" discussed by Lanham ([ref. 4](#)). Authors usually do not speak that way, but they feel that technical reports must be written in that style. A stilted style is difficult to read and detracts from the contents.

To avoid a stilted style, write in a way that comes easily, using words and phrases that come naturally to you. Do not try to impress readers with your vocabulary, but be certain that the words you use convey your exact meaning. Your readers will be interested in what you have to say and not in how eloquently you say it. Avoid long, complicated terms if shorter and more familiar ones are available. But be careful not to use [jargon](#) because it may be misinterpreted.

Guiding the Reader

To achieve clarity and continuity in a report, you must carefully direct your readers' attention throughout the report. Many successful writers do this by using the three classic principles of presentation:

1. Tell readers what you plan to tell them (Introduction).
2. Then tell them (main text).

3. Finally tell them what you told them (Summary of Results or Conclusions).

State your purpose or objective clearly and follow it with a concise description of the method you will use in presenting the subsequent discussion. Then proceed with your presentation, making certain that it is consistent in every respect with your plan. Finally summarize your conclusions and recommendations.

Getting to the Point

Technical reports are not mystery novels; get to the point as directly as possible. Do not lead your readers in and out of blind alleys before taking them to the final destination. Omit information that does not directly relate to the conclusions. Remember, readers are interested primarily in conclusions and supporting evidence.

If you must include some information or discussion that may be of interest but is not directly pertinent to your conclusions, put it in an [appendix](#). Using an appendix allows you to bring up points that may be of interest to some of your readers without distracting the reader who is interested solely in your conclusions.

Emphasizing Major Ideas

Because the purpose of technical reports is to transmit ideas, emphasize your major ideas so that they cannot be missed. To do this, clearly subordinate any supporting information to the major ideas. The report [outline](#) is particularly useful here because it establishes the major and supporting points for each section of the report. Your major ideas can also be emphasized by briefly stating them at the beginning of each section and then summarizing them at the end of the section. Emphasis can also be aided by careful use of headings.

Separating Fact From Opinion

Reports should clearly differentiate between facts and opinions. Many authors are remiss in doing this, overlapping discussions of their experimental results and the conclusions they have drawn. Carefully alert your readers when fact ends and opinion begins.

The statement of your opinions is an instance where the use of the first person is desirable. For example, if you follow the presentation of some specific results with "It is believed that . . .," your readers cannot be sure if this is your opinion or a generally accepted belief. To avoid this confusion, [use the first-person pronoun](#) to say, for example, "From these results I conclude that . . ."

Data Presentation

Because most technical reports rely on [figures](#) and [tables](#) for the presentation of data, the form and quality of the figures and tables are important in establishing the style and readability of the report. Good judgment should be used in selecting both the data to be presented and the method of presentation. Use only figures and tables that add to the value of your report. Present the data as simply and straightforwardly as possible so that your readers can easily grasp the significant points. Present data in the text, or in a figure, or in a table—but never in more than one way. Before beginning to write the report, carefully select the data to include. Most carefully prepared programs yield more data than are needed to support the conclusions. Including all your data in the report is unnecessary. Use only data that are directly pertinent to your conclusions, and do not try to impress readers with how much data you have collected. Quantity is no substitute for quality in presenting technical results.

Once you have selected the data to be included in your report, decide how they can best be presented. Should they be tabulated or plotted? To answer this question, consider your readers' needs. Do they need to know exact values? If so, tabulate your results. If relative trends are more important, use graphs. Both the figures and tables should be as self-explanatory as possible and arranged logically to tell the main points of your story without reference to the text.

Figures

The figures used in technical reports generally are of three types—[graphs](#), [drawings](#), and [photographs](#). Figures are numbered with Arabic numerals in the order of their mention, unless the mention is clearly incidental. In the final report they are either inserted in the text near (preferably following) their first mention or grouped together at the back. Sketches are lettered consecutively ((a), (b), (c), etc.) if they are referred to more than once. Under no circumstances should the arrangement of black and white figures or the parts of one figure be out of sequence.

Figures arranged in a group are in sequence from top to bottom or from left to right. Exceptions are sometimes made for color figures to reduce the number of pages printed in color.

Prepare figures with consideration for their appearance in the final printed document. The size of the printed figure including the legend (title) cannot exceed the dimensions of the report image area (7 1/8 by 9 1/8 in. in NASA reports). Within these limits various sizes, proportions, and arrangements of figures are possible. (A large, complex figure may be reproduced on facing pages.)

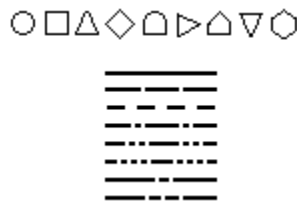
All figures must have legends; if a figure has parts ((a), (b), (c), etc.), it must have corresponding sublegends. Use similar wording in the legends of related figures. After you have assembled the rough draft of the report, thumb through the figures and tables, reading merely the title of each to make certain that the format and the nomenclature are consistent. Conditions applying to the entire figure or to a part are normally stated as part of the legend or sublegend. But when the same conditions apply, for example, to every graph in a report, they are best stated once in the text.

Graphs

Graphs should be clear and simple with as few data curves as possible. It is usually best to have no more than six types of lines or data points on a graph—four is better. Try to avoid interlaced or unrelated curves. As few words (labels) as possible should be inserted directly on the figure. Equations should be placed in the text, lengthy tabular material should be presented in a separate numbered table, and explanations and conditions should be added to the legends or placed in the text.

Choose coordinates that will give your readers a physical feel for the variables being presented. Clearly label what is plotted and the units used. Whenever possible plot all parts of any one figure or related figures on scales with the same increments. Label main and auxiliary scales with a word description of the concept or quantity, its symbol, and its unit. For example, "Axial distance, x , cm" is more immediately descriptive than " x , cm." Add auxiliary scales at the left and bottom of the figure if there are four or fewer scales. Place additional scales at the right or top. For ease in interpolation divide scales into logical, consistent increments. For example, when both U.S. customary and SI units are used, each scale must stand alone. Do not simply convert the values on one scale into the other system of units. Such a scale is useless to the reader.

Use the same data symbols and lines to represent the same conditions consistently throughout the graphs of your report. The following data symbols and types of lines are commonly used:



Do not use the symbols + and x on figures with grid, and avoid solid or partly solid symbols if symbols overlap. The curves and data points may be identified by keys or labels. Keys are preferred when several curves must be distinguished or when several conditions are associated with each curve. Keys generally follow the format for tabular material and should be consistent throughout a set of figures.

Drawings

When you use drawings or sketches to illustrate test equipment, try to keep them simple. Include only those features of the equipment that are essential to your readers' understanding, and avoid unnecessary detail.

Tables

Tables are often included in technical reports to present data in an exact, highly concentrated form. But because tabulated data are so concentrated, many readers have difficulty grasping their significance. Tables are therefore the least preferred method of transmitting results to readers and should be used only when absolutely necessary. When you use tables, make them as brief and simple as possible. Otherwise your readers may not bother studying the detailed columns of figures, and you will have wasted your time in presenting the data. "Whenever a table, or columns within a table, can readily be put into words, do it" ([ref. 2](#)).

Tables are numbered in the order of their mention, in Roman numerals except when a report contains 20 or more tables. Then Arabic numerals are used. Similar data at different conditions are organized into parts ((a), (b), (c), etc.) of the same table with subtitles. Numbered tables must have titles.

Present tabulated material in an organized manner. Like elements should read *down* not across. Variables are usually given in columns topped by boxheads, with the constants given in the first, or stub, column. Boxheads should be brief; if necessary, they may be amplified by footnotes. Boxheads usually contain a word description of a concept or quantity, its symbol, and its unit, separated by commas; symbols must be defined when they are used. Arrange tabulated data in a logical order that your readers can easily recognize. Usually this arrangement is an ascending or descending order of value for the prime parameter. The order is necessary to clarify trends. You can also help your readers see relations and comparisons of data by carefully wording the boxheads and the stub column. Put items to be compared in adjacent columns. Generally numbers in columns are more easily compared than numbers in rows. Another type of table is the leaderwork table, in which dissimilar data are listed in rows with leader dots connecting each parameter with the corresponding value.

Give conditions that apply to an entire table in a headnote. Indicate footnote citations by lower-case letters (superscripts) ordered across the table from left to right and top to bottom.

References

1. Strunk, William, Jr.; and White, E.B.: *The Elements of Style*. Third Edition, The Macmillan Co., 1979. Available online from Columbia University, 1918, <http://www.bartleby.com/141/index.htm> accessed May 18, 2000.
2. Day, Robert A.: *How to Write and Publish a Scientific Paper*. ISI Press, Philadelphia, Pennsylvania, 1979.
3. Chandler, Harry E.: *Technical Writers Handbook*. American Society for Metals, 1983.
4. Lanham, Richard A.: *Revising Business Prose*. Charles Scribner's Sons, 1981.
5. Ebbitt, Wilma R.; and Ebbitt, David R.: *Writer's Guide and Index to English*. Seventh ed., Scott, Foresman and Co., 1982.
6. Elsbree, Langdon; Altizer, Nell G.; Kelly, Paul V.: *The Heath Handbook of Composition*. D.C. Heath & Co., 1981.
7. NASA Thesaurus. Volume I—Hierarchical Listing, NASA/SP-1998-7501/VOL1, 1998. Online version, last modified 1998, <http://www.sti.nasa.gov/98Thesaurus/vol1.pdf> accessed May 18, 2000.
8. Webster's Tenth New Collegiate Dictionary. Merriam-Webster, Inc., Springfield, Massachusetts, 1996.
9. United States Government Printing Office Style Manual. Washington, 1984.
10. Research Publications Processing Guide. NASA Lewis Research Center, 1992.
11. Guidelines for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information. NPG 2200.2A, 1997. Available online, last modified Sept. 3, 1997, http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PG_2200_002A_&page_name=main accessed May 3, 2002.