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REPORT WRITING

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Surveys over the years show that engineers and other technical people in industry and government spend up to one-third of their working time on report writing. How well do they perform this job? If one is to judge from the amount of report writing courses being held in various countries, or from the remarks of senior management the answer must be "none too well".

The reason for this deficiency is complex. In some cases it is sheer inability to write (and some would say to think) clearly. Another reason is the curious belief that objectivity can only be established by writing impersonally in the passive voice. But more frequently the writer adopts vagueness in the belief that he is being diplomatic; no one can pin him down if he is oblique. Equally he may play it safe and indulge in euphemism and circumlocution so as not to hurt feelings and incriminate other people. As Cooper (1964) says:

"Truth in fact drains out of many a report as it works its way up the management ladder. The net result is bad English".

The purpose of this paper is to examine how technical and other reports may be written so that they are easy to read and understand. My brief is to paint a general picture; other speakers will deal with the details giving examples of good and bad writing.

Main Stages in Writing a Report

The main stages in writing a report are: (a) collection of material, (b) selection, (c) logical ordering, (d) interpretation and (e) presentation.

Collection of Material

There is no standard way of collecting material. How you go about it will depend very much on the circumstances. Sometimes you will use reference books and textbooks, sometimes periodicals and other reports and at other times you will have to carry out an experiment or a survey.

The important rules to remember when collecting information are:- (a) check the accuracy of your facts, (b) separate facts from opinions and assess the merit of the opinions, (c) separate facts from inferences and see if the inferences are well based.

If you are carrying out a survey be sure to collect all the information you require. Since collection of data is expensive the aim must be to perform the job correctly the first time; you rarely can afford a second bite at the cake. Similarly, you should try to avoid collecting and recording information you do not need. This is wasteful.

If numbers are to be presented in your report it is a good idea to rough out blank tables and graphs before any data are collected. Once these blanks are available it is easy to design a questionnaire which will give the data required. Unfortunately it is difficult to get people to prepare blank tables in advance. Some are unable to do so,

others won't try. As a result the collective process is very often not as efficient as it should be.

Selection of Material

When you have collected and classified your material you must make some selections for your report. The act of selection - much more than the initial investigation - should be concerned with the reader. This is a point that is often overlooked. You should be aware of the extent and nature of the knowledge of your readers, their interests, their status and authority and even your own authority. These will have a bearing on the choice of material, on the method of presentation and on the level at which the matter is discussed.

You should leave out items which are beyond the understanding of the readers, items which are too well known, items upon which you cannot speak with authority and items which will not help towards a decision on action.

Logical Ordering

Different people approach this problem in different ways. Experienced writers give a good deal of thought to the way they will structure their reports. The less experienced rarely do this. The latter usually start writing without any outline in mind hoping that a structure will emerge as the writing proceeds. A structure will, of course, emerge from this haphazard approach but it is not likely to be a very ordered one, nor one which lends itself easily to

improvement in subsequent drafts.

All good writers try to visualise a complete structure for a report before any writing is done at all. They try to picture the introduction, the chapter or main section headings and the order in which these headings will be arranged. Later they write down this outline and flesh it out by putting in more headings and subheadings. This then becomes the framework for the first draft.

Surprisingly, many of the books on writing pay little attention to the initial structuring of material. This is a pity. Most of the faults found in scientific writings are not misspellings, bad grammar or even bad sentence construction. They are nearly always bad structures. No coherent story is told.

Inexperienced writers find it difficult to visualise an abstract structure in advance and for them certain training procedures have to be developed. I get my research assistants to make a list, in any kind of order, of the main ideas which they wish to present. They are then asked to classify these into common groups each of which will form the substance of a section or chapter. The chapters are then arranged in logical order to give an overall structure for the work.

Possible Structures of a Report

In general a report should contain the following subjects in the order mentioned:- Introduction, Report proper, Conclusions, Recommendations, Future work, Appendix.

But not all reports would merit an appendix. There may be no future work. The most appropriate structure will depend on the current practice of the firm, or the experience of the writer, and on the purpose of the report.

For example, the putting of conclusions and recommendations at the beginning of the report before the main argument seems to some people to be putting the cart before the horse - illogical in the extreme. But to others who use this form, and many do, it is the obvious way of showing quickly the relevance and importance of the report.

The most frequent, most obvious and probably most successful arrangement is the following:- title page, table of contents, acknowledgements, summary, introduction, main text, conclusions and recommendations, references and appendices.

I do not propose discussing all of these items here. You can always look up the layout of title pages, tables of contents and acknowledgements in any published work. Some observations on the other items including footnotes, numbering and abbreviations, would perhaps be helpful.

Summary

The summary should be a survey of the ground covered in the report. It should not be regarded as part of the report, but written after the report is completed. Its writing is a good test of a report. If you can look back on your efforts which may have been piecemeal and state effectively what has been discussed in the report, it augers well.

A summary which is more than ten per cent of the length of the main text would generally be considered too long. In the ESRI we try to keep summaries to about five per cent. Writers often argue that they must have more space for their summaries - to do their work justice. This may be so but if a writer takes time it is surprising what he can fit into a small space. G.B. Shaw once remarked in a postscript to a long letter to a friend "I am sorry I have not had time to be brief". Although brief and factual the summary should not be in "telegraphese". It is the readers introduction to your report and you want that to be favourable. The order of presentation in the summary ought to correspond with that in the actual report.

Summaries should contain no material not mentioned in the report itself. Too often they contain afterthoughts or statements, to tidy things up, for which there is no evidence in the report proper.

Introduction

The best introduction is to state in your first sentence what the report is about. An example would be: "This report evaluates the options for the use of Bord na Mona's cutaway bogs". You can be even more positive and say: "This Report proposes the planting of trees on cutaway bogs". Editors of technical journals never weary of reminding their writers to state the object of their article or paper in the opening paragraph, so that the reader knows where he is going and can assess what he is reading.

The next step is to provide the necessary background such as the sequence of past events leading to the present problem which the reader will need and which he may not know or remember. You may need to mention the authority and terms of reference also. The final stage is to inform the reader how you propose to develop the subject under discussion.

Some writers prefer to leave the introduction until last. If you have your structure worked out it is much easier to write the main chapters or sections first, because they are usually descriptive. Having got these out of the way you can then go back and say in the introduction what the report is all about.

But regardless of when you write it, the introduction is usually the most difficult part of the report to construct. You are coming at it cold, and faced with the blank page you may be unable to start. You may know what you want to say but you cannot make up your mind how to say it. Confronted with this dilemma my advice is to start writing. Put down your thoughts in any order and go on writing until the ideas start flowing. When this happens you have broken the barrier. You can then go back, polish off and restructure what you have said.

The Body of the Report

The classification of the material in preparing the outline of the report will determine the sequence in which the different sections will be ordered. The list of headings already prepared should be fleshed out usually going from the

general to the particular. If you are describing a machine you should first describe the principles on which it works and then give details of the construction.

In writing up these sections you should stick as closely as possible to your original outline. Information that is outside the purpose of the report should be excluded. Many writers (as ideas come to them during the writing) get diverted from their intended structure and finish up giving a whole jumble of irrelevant material. This is fatal.

A question which always arises in writing up reports is the location of tables and diagrams - whether in the body of the report or in an appendix. In my opinion their location should depend on their contents.

Diagrams which are prepared to illustrate points or simplify concepts should go in the text where they belong. More complicated diagrams and maps should go in an appendix. Similarly, tables showing data directly relevant to your arguments should go in the text, while those containing background material are best put in an appendix. Actually, if the text refers fairly often to displays of any kind it is best to put these displays in the body of the report where they can be referred to easily by the reader.

Conclusion

The body of the report may contain some conclusions; the marshalling of the evidence may lead to a conclusion which is stated. The conclusion proper should summarise the discussion in the main sections and draw inference where

appropriate. The conclusion should not contain any new idea not previously introduced in the report. It should consist of firm qualified statements.

Recommendations

The natural process in an investigative report is to obtain some results from which you draw conclusions upon which you make recommendations. In many reports the conclusions and recommendations are listed together, but in others, particularly long reports, the recommendations are listed under a separate heading.

Recommendations can be the most tricky part of the report to write. The writer has to consider very carefully his relationship with the reader. The reader may consider that he is the person who should make the recommendations. In that case it would be unwise - and might even be impertinent - for the writer to suggest what action should be taken. Usually, however, the person who writes the report is expected to make recommendations based on the results of his investigations; it is up to the reader to act on these or otherwise. Action may very often depend on the tone of the recommendations - tentative, conciliatory, aggressive. The writer must decide which tone to use.

The Appendix

A convenient way of presenting detailed information, which would interrupt the smooth flow of the report, is to put in an appendix or in appendices if there are more than

one. The sort of material which is relegated to the appendix is experimental results, statistical data, maps, correspondence and worked examples. The merit of separating an appendix from the main body of the report is that the reader is under no obligation to read it. The appendix, however, is very often an important part of the report. Its contents are usually the material on which the conclusions are based and critical readers will wish to study these in order to see if proper inferences have been drawn.

If there is more than one appendix they should be designated as Appendix A, Appendix B, etc. Page numbering should be observed as if the appendix were part of the main text.

References

If you use other people's work, particularly written or published work, it is customary to make some reference to it, not only that credit may be given to the person whose work you are using, but so that your reader may refer to the quoted work for confirmation or further study. For this you must give precise details. These should include: author's name and initials, title of the work, publisher, date of publication, place of publication, edition and page numbers of citation (first and last).

The reference details will differ slightly in the case of books, journals or periodicals. Journals are usually assembled in volumes, so a volume number will be necessary. Although publishers publish periodicals it is not usual to

include the publisher's name when referencing a periodical. Unpublished material may also be acknowledged if it is felt appropriate to do so thus:

Murphy, P.J., 1986, The Economic Crisis, Paper read to the Dublin Economics Workshop, Trinity College, October.

If you reference as above, using author's name and date, you should put your references in alphabetical order so that readers can find them easily. In the past references denoted by some printers work, were very often placed at the foot of the page along with footnotes; nowadays references tend to be placed at the end of a chapter or at the end of the work and referred to in the text (e.g., Smith, 1987). Practice varies; every publisher has what is called "its own house style", not alone in regard to references but also in regard to footnotes and general lay out.

Referencing is dealt with very fully in Waldo (1960) i.e.,

Waldo, W.H., 1960, Better Report Writing, Reinhold, New York, 2nd ed, pp. 41-54.

Footnotes

A footnote might be described as a small appendix. Its insertion in the text would interrupt the smooth flow, but the writer may feel that he would like to make an elaboration. The footnote provides a convenient place to do it. Footnotes should be used sparingly and they should be brief. Those which take up half a page, as some do, are to be deplored.

As their name implies, footnotes should be found at the foot of the page, but in recent years they tend to be placed at the end of the chapter or at the end of the work. You should use a different printer's mark for a footnote than for a reference. If footnotes are placed at the foot of the page they are usually numbered 1,2,3 etc., on each page; if at the end of the chapter they are numbered 1,2,3, etc., in each chapter and if at the end of the work 1,2,3,4, etc., throughout the work. Practice varies, however, and inexperienced writers should look at the way it is done in some journal article or book.

Numbering

It is common practice in many organisations to emphasise the sub-division of a report by the use of numbers. My advice to inexperienced writers is to be careful with numbers and only use them where it is considered absolutely necessary. The numbering seen in some reports is quite confusing.

Tables and diagrams have to be numbered. If the report is short the textual tables and diagrams should be numbered consecutively, i.e., Table 1,2,3, etc., Figure 1,2,3, etc. If the report is divided into chapters, a decimal system of numbering should be employed. In Chapter 1 tables and diagrams should be numbered 1.1, 1.2, etc., and in Chapter 2 the numbers should go 2.1, 2.2, etc., and so on. Tables in appendices should be numbered similarly, Table A.1, A.2 and Figure A.1, A.2, Table B.1, B.2, Figure B.1, B.2 and so on.

In government reports paragraphs are usually numbered consecutively from 1 to n throughout the work. These numbers are put in when all the drafts of the report are completed. If put in at an earlier stage most of the numbers must be changed if a paragraph near the front is inserted or taken out later.

Abbreviations

It is usual to use abbreviations in the text of a report. The first time you use an abbreviation it should appear in brackets after the full title unless it is very well known such as ft. for feet, yd. for yard etc. if there are a good deal of abbreviations you should set them out in a glossary at the front of the work or in an appendix at the back. The reader very often cannot remember what an unfamiliar abbreviation stands for even though it has been explained earlier in the text. The glossary can easily be referred to.

STYLE

Style is defined by Lucas (1974) as "a good way of expressing oneself" or "the effective use of language, especially in prose, whether to make statements or to arouse emotions" It involves first of all the power to put facts with clarity and brevity but facts are usually none the worse for being put with as much force and interest as the subject permits.

Other speakers at this meeting will deal with different aspects of style in some detail. Here I will confine myself to the points which I think are most important.

(a) Sentence Length

Sentence length is one of the main factors which affects the readability of a report. Communication breaks down when you try to cram too many subordinate ideas into a sentence. It is easy to see how this happens. If you make a categorical statement you feel you must qualify it in some way. For example, a statement like "no fracturing of the metal will occur during heating" must be qualified with "provided the temperature remains constant". The temptation is to go on and explain why this is so by adding further subordinate clauses. At the end you will have a sentence which describes accurately the experiment under discussion but which is very difficult for the reader to take in. The rule is to add your qualifications in the form of short sentences rather than as subordinate clauses. If you do this readers will understand what you are saying.

You must not, of course, use a succession of short sentences, they give a "jerky prose". Good writers try to alternate long and short sentences so as to add variety.

(b) Abstract Words

For one reason or another, perhaps out of habit, many writers sprinkle their prose with abstract words like fundamental, exposition, preconceived, appreciable, consideration,

tendency, etc. These words and similar ones like, very, quite and rather, though appearing convincing when uttered, usually say nothing to the reader. Delete them from written sentences in which they occur and the sentences are stronger.

(c) Needless Words

Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences. This requires, *not* that the writer makes all his sentences short, or that he avoids all detail but that every word is make.tell.

Many expressions violate this rule:

There is no doubt but thatno doubt

used for fuel purposesused for fuel

in a hasty manner.....hastily

his subject is a strange one.....his subject is strange

(d) Active & Passive Voice

Where possible use the active voice. The passive voice has a legitimate use but it is less direct than the active voice and requires more words to say the same thing. For example "Newton discovered gravitation" is more emphatic than gravitation was discovered by Newton.

One of the main reasons for the use of the passive voice is the belief that it gives objectivity to a report. This belief is not justified. If a person has done a piece of research, and has written it up, the findings are either valid or invalid regardless of whether the writer hides behind such expressions as "it was discovered that", "it was further

noted" or admits responsibility by saying "I observed that" or "I further noted". These, incidentally, are not the only alternatives. A report sprinkled liberally with Is can be irritating and draw too much attention to the writer. The personal pronoun must be used sparingly. It has the advantage, however, that it discourages vagueness and emphasises a person's responsibility for what he writes.

Keeping Ideas Separate

Good writing has a columnar structure, each idea being a column which can stand on its own. With such writing you can shift paragraphs backwards or forwards without doing any damage to the work as a whole. Bad writing, in which ideas are mixed up, is like a house of cards. Remove a sentence or paragraph and the whole edifice collapses. Hence when writing you should try and keep each idea separate as you go along. If a thought about an earlier idea crops up at a later stage you should bring this thought back and put it where it belongs.

The Diplomatic Style

You may argue, of course, that in many cases you do not want to lay all your cards on the table - and this for a variety of reasons. You may not have formulated in your mind exactly what your relationship is with the reader and therefore what it is you are trying to do. Are you trying to convince him of the necessity for some particular action, or are you trying to avoid being pinned down? If you are trying

to convince your reader you should use the direct personal style. If you are trying to avoid being pinned down your language will be rich in such outworn phrases as "it should be understood that", "the performance compares favourably with", "the expense accounts should be significantly reduced." No one can be quite sure what you mean. Here is an example of what is known as the diplomatic style taken from Cooper (op. cit, pp. 134-145):

"Nothing has occurred to alter the view that the use of economic sanctions cannot be ruled out if other means of persuasion and pressure are seen to have failed".

This basically means that England may have to impose economic sanctions on, say, South Africa, but to soften that dreadful piece of news the author unmask his battery of negatives. The passage is correct English, but the aim of such writing is to make sure that nobody can pin anything on the writer. Its impact is vague rather than clear. This piece of writing is about politics but the same style, the same sort of expression can be found in many technical reports. They should be avoided in such documents.

Summing Up

Good style is a term applied to a variety of writing. All the great authors write differently but with a distinctive style. Good style is one which makes impact on the reader. The author's personality comes through. Poor style usually refers to writing which is involved, where there is little attempt at structure and usually where the

vocabulary range is limited.

There are no hard and fast rules for good writing. You can know all the rules of grammar and observe them all and still write in a dull convoluted fashion. As a writer you should aim to be clear and logical; the mark of good report writing is clarity and effectiveness. You are not likely to be a person whom other people read with pleasure if you have not some sense of rhythm, some feeling for words and some ability to provide balance and contrast in your sentence structure. You can develop your style by reading some author whose writing you admire and pausing now and then to see how he gets his particular effects. A perusal of the following works, some of which are referenced in the text will also be helpful.

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