

科技交流

——科技论文写作与学术会议发言(第2版)

Communicating in Science

Writing a Scientific Paper and Speaking at Scientific Meetings
(Second Edition)

Vernon Booth 著

20x20 400

15
6
0



清华大学出版社

Cambridge University Press

Communicating in Science

**Writing a scientific paper and speaking at
scientific meetings (second edition)**

科 技 交 流

——科技论文写作与学术会议发言

第 2 版

Vernon Booth

清 华 大 学 出 版 社
Cambridge University Press

DW 18/09
(京)新登字 158 号

Communicating in Science/Vernon Booth

© Cambridge University Press 1993

This edition of Communicating in Science 2e by V Booth is published by arrangement with the Syndicate of the Press of the University of Cambridge, Cambridge, England.

Licensed for sale in People's Republic of China only, not for sale elsewhere.

剑桥大学出版社授权清华大学出版社在中国境内独家出版发行本书影印本。

本书任何内容, 未经出版者书面同意, 不得用任何方式抄袭、节录或翻印。

本书封面贴有清华大学出版社激光防伪标签, 无标签者不得销售。

北京市版权局著作权合同登记号: 01-1999-0740

书 名: 科技交流——科技论文写作与学术会议发言

作 者: Vernon Booth

出版者: 清华大学出版社(北京清华大学校内, 邮编 100084)

[http:// www.tup.tsinghua.edu.cn](http://www.tup.tsinghua.edu.cn)

印刷者: 清华大学印刷厂

发行者: 新华书店总店北京发行所

开 本: 850×1168 1/32 印张: 2.875

版 次: 1999年5月第1版 1999年5月第1次印刷

书 号: ISBN 7-302-03554-7/H·278

印 数: 0001~4000

定 价: 8.80 元

Writing scientific papers and giving talks at meetings and conferences are essential parts of research scientists' work, and this short, straightforwardly written book will help workers in all scientific disciplines to present their results effectively. The first chapter is about writing a scientific paper and is a revision of an essay that won first prize in a competition organized by Koch-Light some years ago. Later chapters discuss the preparation of manuscripts, speaking at meetings and writing theses. One chapter is for scientists whose first language is not English. Another is addressed to those in North America. The last chapter gives information about dictionaries, style books and other literature.

Foreword

This final edition of 'Communicating' was assembled by Cambridge University Press from material prepared by Vernon Booth before his death in 1991. His family would like to thank the Press for thus making publication possible.

Balloons & instructions for the typist & the printer

Don't type these

tail

it

[Fig. 4 near here]

Entries in the margin that are ringed are said to be in a 'balloon'. If the balloon has a tail and a caret, the word(s) go into the text. If there is no tail, the balloon either contains clarification of blurred words, or it contains instructions. If the instructions are for the printer they may be typed and bounded by two [] rather than enclosed in a ring.

[Gk alpha]

To remove a word, cross it out boldly. To remove a small character, draw a tiny wiggle.

If you have crossed out a piece, then wish it to be kept, underline it with dots stet write 'stet' in the margin. Stet means let it stand.

stet

NP

run on

☐ ~~There~~ is no guarantee given that these ~~these~~ conventions are accepted or understood everywhere. Indicate that a new paragraph (NP) is needed as shown.

If no NP is needed, draw a snake and write 'run on'.

Explanation for the second edition

In one laboratory in Cambridge, if a person became unapproachable, we said he or she was giving birth. Paper labour can be a traumatic experience, but should not be. The writing of a paper, or a book, although indeed a task, should be a pleasant occupation. Books on scientific writing have been published, but scientists 'do not have time' to read them. So, in 1970, I wrote an essay, *Writing a Scientific Paper*, and submitted it for a competition organized by Koch-Light Ltd; the essay was awarded first prize, and issued as a booklet.

Later editions of the booklet grew longer and were published by the Biochemical Society. For the CUP version, various sections were expanded into chapters. This made the book longer, but the principal chapter remained short and kept its original title. The subtitle of the previous CUP edition was *writing and speaking*. This was felt to be misleading; so it has been changed. Numerous other changes have been made for this edition.

Chapters One and Two are intended primarily to help scientists, engineers and others to write papers for journals and to give short talks. However, nearly all the suggestions also apply to the writing of books and the delivery of full lectures.

The style, especially of the first chapter, is succinct, at times even terse. So much had to be written, in so small a space, that conciseness was highly desirable. Chapter One is not suitable for fast reading.

Parts of the book are written in the imperative, the simplest style. This is not intended to be categorical. True, certain parts are controversial; but life would be dull if we all agreed. There may be errors; most books have errors. But I ask you to read it (as an examinee once added) E. & O.E. (errors and omissions excepted).

Some of the words that are discussed are in 'quotes' or *italic*. A plethora of quotes and italic can be irritating; so, where the meaning

should be clear without them, they are not used, even at the risk of some loss of consistency.

Examples of a directive being discussed are referred to in brackets. Thus [1 (10)] means there is an illustrative example or more information in the line marked (10) in the margin of Chapter One.

You will see T. W. Fline mentioned in various places. This refers to **Those Whose First Language Is Not English**. Whenever we write or speak, we must think of these people.

The majority of papers submitted for publication are returned to authors for revision. Naturally, you would like each of your papers to be accepted without change. This book cannot guarantee your fulfilling that ambition, but perhaps it will help.

As you read this book, you may realize that I enjoyed writing it. I offer best wishes that you too will enjoy writing, preparing scripts and speaking.

I am grateful to many, many colleagues, as well as to several editors at CUP and in various countries, for help and suggestions.

Vernon Booth
January 1991

Glossary of some printers' terms

- balloon.** Ring drawn round instructions to the printer. [Page 46.]
- bold.** Heavy type as here. In a script, underline with a wavy line.
- braces.** Curly brackets { }.
- brackets.** Square brackets []. The term bracket is used in a general way to include **parentheses** (), **braces** { } and angle brackets < >. To an author brackets usually mean parentheses.
- caps, upper case.** CAPITAL LETTERS. In a script underline three times.
- copy.** The script. To avoid confusion, a **photocopy** should be so named.
- em rule.** Long dash (—). Length of cap M. [1 (33).] Many publishers use a spaced en rule (–).
- en rule.** Short dash (–). Half the length of em rule. [Page 21.]
- foliation.** Numbering of folios.
- folio.** (1) Sheet of script. (2) Page number. (3) Sheet of paper of any size folded once.
- full point.** Full stop, period.
- index.** (1) Alphabetical list of topics at the end of a book. Plural, indexes. (2) See **superior** below.
- inferior, subscript.** Small low digit(s) or other character(s). H_2SO_4 , 2n .
- ital, italic.** *Sloping type*. Spelt with lower-case 'i'. In a script, underline once.
- justified lines.** Lines of print made the same length by varying the spaces between words. See **window** below.
- leading.** Space between lines of type. Pronounced 'leading'.
- l.c., lower case.** Small letters, i.e. not caps.
- legend, caption.** Explanation to a figure. Term occasionally also used for explanation to a table. Ideally, legends should be understandable without reference to the text, and, to identify them they are often set in smaller type. Legends (or captions) to figures are usually placed below,

whereas those for tables are usually placed, more logically, above the display.

letter space. Space between letters.

numeral. Digit. See page 16 under Homonyms.

par. Paragraph. [1 (16).] **N.P.** New paragraph. [Page xii.] Indicate NP by □ or ┘.

parens. Parentheses (). [1 (18).]

quotes are often called 'inverted commas' though only the first is that; the second is an apostrophe or raised comma; 'single', "double".

reference marks. * † ‡ § || ¶ ** †† Use them in this order for footnotes.

reprint, offprint. A printed copy of a single article from a journal or book. If available before publication then known as a **preprint**.

rom, roman. Normal upright type, not italic or bold. Spelt with lower-case 'r'.

run on. Continue in same para. See last sentence, page xii.

sanserif, sans. Type without serifs. **THIS** is sans. H girder; O ring; S shape; T join; U tube; V groove. For text, sans is less legible than type with serifs. [8 (1).] See The typewriter's or word processor's type face (page 47).

sm. cap, small caps. Capital-style letters only slightly larger than l.c. Used for EMPHASIS, for HEADINGS and for some CONVENTIONS. In a script line, underline twice.

superior, superscript. Small high digit(s) or other character(s). mm³, 2ⁿ. Also called **index**; plural, indices.

widow or club line. Short line at the top of a page.

window. Wide, ugly gap between words in a line.

word space. Space between words.

Contents

<i>page</i>	<i>v</i>	<i>Foreword</i>
	<i>vi</i>	<i>Balloons & instructions for the typist & the printer</i>
	<i>vii</i>	<i>Explanation for the second edition</i>
	<i>ix</i>	<i>Glossary of some printers' terms</i>
	1	Chapter One: Writing a scientific paper
	28	Chapter Two: Before you lecture or talk to us, please read this
	41	Chapter Ex: Empty numbers
	44	Chapter Four: Preparation of the script and figures
	50	Chapter Five: Addressed to those for whom English is a foreign language
	54	Chapter Six: An appeal to North Americans
	64	Chapter Seven: Preparation of a doctoral dissertation or thesis
	69	Chapter Eight: Further reading
	75	<i>Index</i>

Chapter One

Writing a scientific paper

Before you write

Here are four suggestions about what you might do before writing a paper.

1. If notebooks are used, good notebook discipline is helpful. When an experiment is finished, try to record your conclusion in words, together with your findings and on the same page. Make tables. Draw graphs and stick them into the book. Keep a file in which to record summaries of results from many experiments, and group them by subject. Some experiments will each provide results for various summaries. Number each book and each right-hand page. Then, even after some years, an experiment can be found from the file as e.g. 9;43 (book 9; p. 43). Write the date at the top of the page.

Prompt recording of a summary for each experiment compels you to give critical thought to the experiment at the best time, and may move you to repeat a control test while you still have the materials. Clark (1960) makes an eloquent appeal for keeping adequate notes. Write every digit unmistakably. Think: 'I must so write my notes that another person can read them if I am ill, or worse'. Then you should understand them yourself when you come to write the paper.

- (1) 2. *Speaking makes you think out arguments*; and listeners' criticisms may prevent your publishing a clanger. Some institutes operate a regular tea club or occasional seminar at which researchers tell colleagues about their work. If your institute has no club, or the programme is filled, invite colleagues to your room to listen to you. Display diagrams. If you have no projector, use a felt-tip pen to draw diagrams and tables on the back of a roll of wallpaper. Hang the paper over a chair on the bench. Do – speak – slowly.
- (2) Nothing clarifies ideas in one's mind so much as explaining them to other people.

2 COMMUNICATING IN SCIENCE

3. The third suggested pre-writing activity is based on Woodford's (8 (3)) 'reservoirs'. Take 8 sheets of paper. Boldly label them

Title Summary Intro Mat Meth Results Disc Ref
Write ideas for your paper, whenever they come to you, as notes on the appropriate sheets (reservoirs). Use differently coloured sheets if possible. Carry a card everywhere – even to bed. Jot down ideas as they occur. Transfer the notes to the reservoirs and put a fresh card in your pocket or handbag. Rewrite a cluttered reservoir from time to time; if you wait too long, you may forget what some of your notes meant. Hold the reservoirs in a clothes peg (pin), not in a wire clip which may catch on other papers.

Some writers construct a skeleton, an outline scheme, before they start to write. Should you do this it is still advisable first to prepare the reservoirs. In particular, a skeleton for the Discussion may help you to muster your ideas in the best order and to avoid repetition.

4. Prepare tables and figures.

Honesty & accident

If the result of an experiment seems 'wrong', record it none the less, and watch for a repeat. Many a discovery has been made by accident: serendipity is alive and productive. However, people have been known to manipulate or 'doctor' their 'wrong' results. Manipulators may have regrets later.

When to begin writing

- (3) My research supervisor said 'Writing a paper is as important as experiments. Is it unreasonable, then, if it takes as long?' Oft-repeated advice is 'Set aside your paper for some weeks, then read it. You may be amazed at what you wrote.' You may even discover a passage you yourself cannot understand. If you follow this advice, and believe that supervisor, you must start writing early. Writing as the work proceeds reveals gaps in knowledge, gaps that should be filled while laboratory facilities are still available.

Arrangement of a scientific paper

The commonest arrangement for a research paper is that indicated by the order of the reservoirs mentioned above. Some investigations are suitable for results and discussion to be written together in narrative form. If you use this form, write your Conclusion as a separate section.

Where to start

Even though you have enough material, you may have postponed writing a projected paper. Perhaps you find it difficult to start. I do. You do not have to begin with the Introduction. Begin with the easiest section. This may be Methods, for you should know what you did. Use the 'reservoirs', and cross out the notes as you consume them.

Next, perhaps, you might start on the Results. Write the first draft 'in your own words' just as though you are telling a friend about your discoveries. Don't worry – yet – about grammar, aptest words & style. The immediate objective is to get going. You can polish the style later. This paragraph was so written, and the needless words and hackneyed phrases have not yet been polished out.

The Conclusion of a paper is so important that you should make its first draft in time to allow for re-draftings.

Stocktaking

Now take stock. The outline is complete, diagrams and tables are ready, the Discussion is planned, the Conclusion is drafted and Methods are written. Oh joy! the paper is half finished. A happy author writes better than a worried one.

Title & key words

Some searchers may read only a paper's Title and Summary. So both are supremely important parts. Compose trial versions of the title as early in your writing as you can; re-examine them later.

On your first reservoir sheet write key words for the Title. Let the Title's first word be a key word if possible; in lists of titles such a word is better than 'The'. Remove other waste words such as 'on', 'study', 'investigation' The Title should be short yet specific, not general: a reader, attracted by a title, may be disappointed to find that the paper is about only one specialized aspect of the subject promised. Have you experienced such a disappointment?

Many journals require a Headline or Running title as well as the Title. An ingenious paraphrase of the Title can supplement the latter. For example, the Latin name of a species might appear in the Title and the common name in the Running title.

If the journal needs key words, you can provide them from your reservoir.

Summary

If the editor permits, compose the Summary in numbered paragraphs. The first should state – briefly – what you did. Then come the main results. Lists of values may be indigestible for your readers; so use words, supplemented by a few key values. State your conclusion in the last paragraph. If you have no succinct conclusion, you might write ‘The effect of A upon B is discussed’.

- (4) If a summary is long, readers may look only at the first and last paragraphs. Although a well-written summary may be lifted by abstractors, a long summary will be shortened, perhaps by the omission of what you consider vital parts.

Write the Summary in the past tense, except perhaps the last paragraph.

Some journals print the Summary in small type. How odd!

Introduction to a paper

The Introduction should state the problem, and perhaps ask a question. The objective must be clear. If you modified your objective after you began the work, give the current version. Do you still think you asked the right question?

The quoting of numerous papers in the Introduction is no longer good practice. [If much has been published, and you think it warrants a review, write that separately and submit it to an editor.] Refer to papers that, taken together, show that a problem exists. If another paper gives many references, refer to that. However, beware of lifting references – from that paper – together with misquotations of information from the original papers. That has been done For example, one abstractor supposed that *Kaninchen* meant little dog; and Yamane’s work on the rabbit [*Kaninchen* means rabbit] has gone into the literature as being on the dog. For this and other cautionary tales, see Hartree (1976). Roland (1976) reports that J. Hlava, a Czech, wrote an article ‘On dysentery’ and added a Czech translation of the title: ‘O. Uplavici’. An abstractor cited the author as O. Uplavici; so an author who never lived went into the literature for 50 years.

In the last sentence of the Introduction, it is accepted practice to state the conclusion. A reader can better appreciate the evidence that follows if it is clear what conclusion is being supported. However, this version of the conclusion must be brief. Some authors repeat much of the Summary in the Introduction. That is not an acceptable practice.

Materials & Methods

If the description of materials is short it may be included in Methods. Avoid trade names if practicable, not to avoid advertising, but because they may not be understood abroad. [Do you know what Klampits or Barbistors are? or what Skellysolve means?] If you use a local name for polymethylmethacrylate or other compound, give the chemical name at first mention of the trade name.

Write what you did in operational order. Invert 'The urn was dated after restructuring' to 'The urn was reconstructed, then dated'. You should so describe the methods you used that others can repeat the experiments. You must be concise, yet you must not omit essential detail. If you used 'alcohol' say which alcohol. If you controlled, or even measured, the humidity and ventilation in an animal room, say so: they may be nearly as important as temperature. If you centrifuged a suspension, say whether supernatant or pellet was used for the next operation. Similarly, if you filtered a suspension, say which part was retained; it has not always been easy for a reader to conjecture.

If you used control experiments, permit no doubt about their nature. The reader may not be able to guess what you omitted for each control.

If your paper is about a new method, ask a visitor or a technician to test your description by applying the method in your absence. The result of the omission of one detail can be illuminating.

Results

Before you write about your Results it may be advisable to study Units and quantities (p. 25) and Tables (p. 24).

- Replicate observations should not usually be given. Instead, offer the mean and a measure of the variability if you can. The range is not satisfactory; if there are enough replicates for the range to be of use then there are enough for estimating the standard deviation (S.D.) of one observation, the standard error of the mean (S.E.M.) or the coefficient of variation (C.V.). Give the number of observations or the degrees of freedom within parentheses: 12.65 ± 0.22 ($n = 12$). Perhaps you can make a pooled estimate of the variance (or other statistic) from the whole study. You can then give individual uncluttered values.

Journals ask for tables and figures to be clear without reference to the text. This requires concise explanation in legends, an explanation of abbreviations, and care in the avoidance of repetition in the text and in other legends, as well as consistency between text and legends.

Discussion

The Discussion must not be so long as to deter a reader, yet it must contain logical argument. Do not repeat descriptions of other people's findings if they are in the Introduction; refer to that. Avoid summarizing your results in the Discussion. Mention them, take them as read or refer to a table or even to the Summary (quote a paragraph number, if used). Enlarge upon the significance of your new results and explain how they add to existing knowledge. You may have formulated your problem as a question in the Introduction. If you can now give the answer, that facilitates discussion.

Think critically, not only about other people's work but about your own. For example, ask yourself 'Can my hypothesis be refuted? Can my results have another explanation?' Maier (1933) told the students in one of two large groups that, were they unable to solve the problem given to them, they should try to ignore their first approach and seek an altogether different line. (The other group, the control, was not told.) This worked – in the 'told' group a larger proportion solved the problem than in the control group – yet it is difficult to achieve such 'lateral thinking', as de Bono (1967) calls the modern development. The following example shows how important is such 'no-prejudice rethinking'. Two authors published graphs to prove their thesis that xanthine oxidase and the Schardinger enzyme (aldehyde oxidase) are distinct enzymes. Later, their graphs were used by another author to confirm the opposite (now accepted) view that the enzymes are identical. Had those first authors given their results more thought, they too might have reversed their conclusion. The literature contains abundant examples of inconclusive thinking. Writers should take care not to add to them by publishing in haste.

W. Pauli wrote 'I don't mind your thinking slowly: I mind your publishing faster than you can think.' [Translated by Mackay (1977).]

Conclusion

If you are fortunate, your Message (or part of it) may survive in textbooks – although you may not be given a whole sentence! So the Conclusion needs precise wording. Your Conclusion may appear three times: in the Discussion, the Summary and the Introduction. Do not repeat the wording; paraphrase it. If the reader has not understood one version, another may help. Use the shortest version for the Summary.