

Lecture 3: Scientific writing

3.1 Introduction

3.2 How to write a scientific report?

3.3 Scientific style conventions



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Timetable

Week	Date	Topic	Who and where
1	6 Oct 3-4pm	Introduction	All in GU01
2	13 Oct 3-5pm	Listening, presentation and reading skills	All in GU01
3	20 Oct 3-5pm	Writing skills	All in GU01
4	27 Oct 3-5pm	Library skills Presentation practice	WCM/HDR in 107 AM in GU01
5	3 Nov 3-5pm	Library skills Presentation practice	AM in 107 WCM/HDR in GU01

Note: library skills session to be given by Sue Egleton in Main Library

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3.1 Introduction: Scientific writing

- Aim: to transfer knowledge accurately and concisely
- It is an ESSENTIAL scientific skill
- It is difficult and needs constant practice (start now!)
- It has style conventions that need to be learnt
- It is very creative and helps to generate/form ideas
- It can be fun! (being positive about writing helps!)
- If a report is worth writing then it is worth writing well!

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Useful books on style and usage

- W. Strunk Jr., E.B. White, and R. Angell, 2000: *The Elements of Style*. Pearson Allyn & Bacon, 105pp.
- J. Grossman 1993: *The Chicago Manual of Style: The Essential Guide for Writers, Editors, and Publishers*. Chicago University Press, 921pp.
- C. Turk and J. Kirkman 1989: *Effective Writing: Improving Scientific, Technical and Business Communication*. Routledge and Sons, 277pp.
- R. W. Burchfield (Editor) H.W. Fowler 1998 *The New Fowler's Modern English Usage* (3rd Ed). Oxford University Press, 878pp.
- J.O.E. Clark, 1990: *Harraps English Usage*. Harraps Publishers Ltd, 444pp.
- Anonymous, 1998: *Chambers Super-mini Grammar*. Chambers Harrap Publishers Ltd, 352 pp.

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How to write PLAIN ENGLISH ...

- Keep It Short and Simple! (clear, concise, accurate)
- Identify and simplify your main message
- Structure your report into logical sections
- Use simple short words and avoid technical jargon
- Remove ALL useless words, sentences, paragraphs
- Use active verbs and avoid nominalization
- Keep sentences short (less than 30 words)
- Write short paragraphs each based on a single idea

www.plainenglish.co.uk

Plain
English
Campaign



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Making things clearer - lucid writing

- Remove useless words (verbal camouflage/dead wood)
- Avoid long unfamiliar words – short ones are good
- Avoid acronyms e.g. write model instead of GCM
- Rewrite ambiguous phrases e.g. light blue cheese dressing
- Avoid gratuitous variation – repeat the same phrases
- Choose new technical terms and symbols carefully
- Introduce the subject early e.g. at the start of the paragraph
- Rewrite titles and headings to be clear and informative
- Use roadmaps and signposts

Professor Michael E. McIntyre's pages on lucidity:
<http://www.atm.damtp.cam.ac.uk/people/mem/>

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Example of acronym sickness

In section 4 the RDF-LGR technique (SPW) is used to estimate the rate at which small-scale features in the PV field are produced. The RDF-LGR calculation can be interpreted as an estimate of the contribution of the dissipation to the MLM mass budget. This estimate is compared to the actual contribution of SSD to the MLM mass budget. The agreement is good in a number of respects. The RDF-LGR results are also compared to the results obtained from the same model data by PWP using the CA-CG technique.

Try not to use too many acronyms
Define all acronyms at first use!

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Examples: Road maps and signposts

Roadmap

This dissertation examines the hypothesis that the mesospheric two-day wave results from a local baroclinic instability. The hypothesis is presented in detail in chapter 2. The hypothesis leads to several predictions, in particular that the amplitude of the wave will be sensitive to the frictional drag resulting from small-scale gravity waves. Experiments designed to test these predictions are described in chapter 3.



Signpost

The following derivation assumes that the flow is in geostrophic balance. The possible breakdown of geostrophic balance will be discussed in the next section.



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Writing exercise 1

- Cover up bottom half of sheet! Don't peep!
- Read the top paragraph
- What makes it difficult to understand?
- How can you improve it?

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Types of abstract (Turk and Kirkman 1989: Effective Writing

What's wrong with this abstract?

The report describes an apparatus built to measure the resistance to the flow of heat through various thermal-insulating reactor-vessel jackets, under conditions simulating those obtaining in practice. The effects of a variety of thick, and thin-film materials were studied, and the decrease in thermal resistivity of foam due to ageing was quantified. The relative resistance of thicker foamed polymers and glass fibre blankets is shown and the cause of enhanced resistivity of glass-fibre combinations is suggested.

What's better about this one?

Thermal-insulating reactor-vessel jackets were tested on an experimental 50 litre vessel, kept at 500K internally, and atmospheric temperature externally. Foamed polymers and glass-fibre in layers of 5 cm gave resistivities of about 2.7. Thin films of aluminium foil and PVC gave resistivities of about 1.3. With foam, ageing reduced resistivity by about 7% per year. Thicker glass-fibre blankets, up to 15 cm, were about 17% better than the same thickness of foamed polymers. We think this is because the multiple irregular surfaces within the glass-fibre blanket trap more air.

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3.2 How to write a scientific report

1. Brainstorm – jot down lots of ideas
2. Filter the ideas to find main points – the MESSAGE
3. Construct a story line: e.g. scientific questions → answers
4. Select and prepare the **CONTENT** (best plots, tables, etc.) (FLESH)
5. Plan a clear **STRUCTURE** – think of section headings (SKELETON)
6. Start writing a section (e.g. abstract)
7. Sketch the ideas that will be in each of the paragraphs
8. Print out a draft report – double-spaced with wide margins
9. Revise carefully – remove dead wood, rewrite, check facts

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How to cope with writer's block

- Don't worry – we all get it!
- Practice by writing regularly (a bit each day)
- Write anything you like for a few sentences (stretch exercise)
- Don't try and be perfect – you can revise later
- Write naturally as though talking to the reader
- Avoid outside distractions
- Imitate the style of good papers you have read
- Know when to stop – avoid being overly perfectionist



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3.3 Scientific writing style

Scientific writing has its own specific style unlike that used elsewhere. It is concise, accurate, and rather impersonal. A more in-your-face emotional style (e.g. journalistic style) is inappropriate. So also is a chatty verbal style, ain't it?!

There are stylistic rules for

- Text
- References
- Equations
- Figures
- Tables

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Tips on grammar

- Use short simple sentences: Subject verb object.
- Use the passive voice e.g. An experiment was performed ...
- Present evidence impassively but write active punchy sentences
- Keep the verb near the subject (e.g. Figure 5 shows ...)
- Be direct with verbs e.g. the model replicates ... rather than the model is replicating
- Use tenses consistently (e.g. past, present, future)
- Write in English – don't translate from other languages
- Remember readers may not be native English speakers
- Use Tools → Spelling and Grammar in Word on ALL text

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Tips on punctuation

- Avoid punctuation if you don't know the rules!
- Learn the rules
www.met.rdg.ac.uk/cag/course
- Avoid underlines
– not used in publications

Punctuation	
"	Quotation
'	Apostrophe
?	Question
.	Period
,	Comma
-	Hyphen
()	Parenthesis
/	Slash
!	Exclamation
&	Ampersand
:	Colon
;	Semi-colon

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Brief summary of punctuation

- The comma “,” is used to separate parts of a sentence; it can also be used instead of parentheses for including, in some sense incidental, remarks. Commas are also used before *which* and after words like *however*. It is NOT used to splice together lots of different ideas e.g. idea1, idea2, idea3 ... (comma splice)
- Incidental remarks can be made (a bit) stronger by using parentheses, and can be made very strong – if really necessary – by enclosing them inside dash symbols. However, too many of them scream at the reader almost as annoyingly as exclamation marks!
- The semi-colon “;” is used to separate grammatically independent but logically dependent parts of the sentence from one another; in other words, ideas that are related to one another such as items in lists: item1; item2; item3; etc. Semi-colons should not be used where a period would suffice.
- The colon is used to introduce a new clause such as a list of items or a quotation like: “that's all for now folks”.

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Capitalisation – Hart's rules

- Proper nouns e.g. names of people/places
- Prefixes and titles e.g. Sir Gilbert Walker
- Geopolitical entities e.g. South Africa but southern Africa
- Proper names of periods (Middle Ages)
- Proper names of institutions (Church of England)

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References: giving credit when it is due

- Don't copy verbatim from other sources!
- Reference all sources you use
- Seek copyright permission for figures
- Don't forget yourself: “In this study, ...”
- Examples:
 - Dido (2003) showed that ...
 - ... also found in previous studies (Badboyz et al. 2003)
 - ... (Marley 1977; Sonny and Cher 1985)
 - ... similar to those shown in Fig. 1 of Pink (2003b)
 - In figure caption: Figure 1. ... [from Smith et al. (2001)].

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Example of reference list entries

Andrews, D. G., and M. E. McIntyre, 1978: An exact theory of nonlinear waves on a Lagrangian-mean flow. *J. Fluid Mech.*, 89, 609-646.

Bell, J. S., 1987: *Speakable and Unspeakeable in Quantum Mechanics*. Cambridge University Press. 212pp.

Gregory, A. R., 1999: Numerical simulations of winter stratospheric dynamics. PhD Thesis, University of Reading, UK.

South Bank University, 1998: Referencing electronic sources [WWW]. <http://www.sbu.ac.uk/lis/helpsheets/lrc2.html> (20 August 1999).

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Writing exercise

- Pair up into partners
- Read your partner's talk title and abstract
- Is the title informative?
- What are the main points?
- Weaknesses? Grammar?
- Dead wood – unnecessary words?

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Mathematical equations and symbols

- Punctuate equations in the same way as normal text
- Never begin a sentence with an equation or a symbol
- Use standard notation where possible
- Define all symbols and use them consistently
- Include a glossary if you use many symbols
- Use notation sparingly – use words to explain
- Place short equations inline, e.g. $E = mc^2$ for space.
- Centre longer equations on separate lines like this:

$$\frac{\partial T}{\partial t} = -u \cdot \nabla T + Q \quad (1)$$

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More on mathematics

- Number all equations **referred** to in the text
- Refer to equations like this:
 - “Equation (2) defines ...”
 - “As can be simulated using (3) ...”
 - “inequality (2.1) leads to the bounds in (3.3)”
- Use bold face for vectors/matrices e.g. **u**, **M**
- Nest parentheses in this order <{[()]}>
- Avoid abbreviations like w.r.t, iff, etc.

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Tables

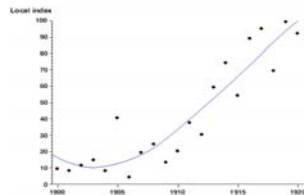
State	Deformed (km ²)	Isolated (km ²)	Edge effect (km ²)	Total (km ²)
Acre	2,812	1978	4,511	7,141
Amnash	182	0	368	550
Amman	2,302	76	6,488	8,866
Marashih	8,426	706	13,120	22,252
Mata Gessho	21,134	776	25,418	47,328
Parat	30,449	2,248	49,791	82,488
Randonia	6,281	991	17,744	25,016
Roraima	196	4	812	1,012
Tucumã	8,888	327	6,584	15,799
Total	78,268	5,115	124,846	208,229

- ← Good example:
- clear
 - no vertical lines
 - just 3 horizontal lines
 - well-labelled

- Poor example: →
- covered in lines
 - complicated
 - multi-coloured

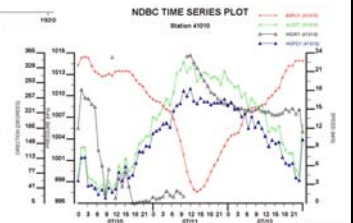
Small, cluttered table with multiple columns and rows, including headers like 'Redevelopment work' and 'Construction projects and activities'.

Figures



- ← Good example:
- clear
 - good labels
 - not cluttered

- Poor example: →
- cluttered
 - confusing
 - poorly labelled
 - multi-coloured
 - distracting title



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3.4 Exercises

- Visit the links on the module web site:
www.met.rdg.ac.uk/courses
- WCM/HDR obtain ATHENS password for library session next week (room 107 main lib)
- AM students prepare your oral talks
5 minutes + 2 minutes for questions
plastic overhead OR
powerpoint file on floppy disk