Writing for Publication

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These slides, selected from the complete presentation, are available at http://www.lanl.gov/home/kmh/
Overview

• Technical/scientific writing
• Preparation
• Article organization
• Figures and tables
• Writing the manuscript
• Revision and Style
• Word choice and usage
• Grammar and punctuation
• Common problems in technical writing
• Writing aids
Technical writing

• Goals in technical writing
  ► make complex technical information understandable
  ► make it easy for the reader to read and extract information
  ► achieve clarity, conciseness, and coherence

• Good technical/scientific writing
  ► is a skill
  ► can be learned and mastered
  ► takes a lot of time and hard work
Writers’ aids

Good references are essential

• Dictionaries and thesauruses
  ► *Wordsmyth Dictionary and Thesaurus*; [www.wordsmyth.net](http://www.wordsmyth.net)

• Technical writing; grammar, usage, and punctuation
  ► *Handbook of Technical Writing* (St. Martin’s, New York, 2003); highly recommended
  ► *Mayfield Handbook of Technical and Scientific Writing*; very helpful; [mit.imoat.net/handbook/](http://mit.imoat.net/handbook/)
  ► *Online Writing Lab (OWL)*; [owl.english.purdue.edu/handouts/](http://owl.english.purdue.edu/handouts/)

• Web is an invaluable resource
  ► search for suggested keywords at specific sites
  for example: [Google](http://www.google.com) wordiness site:owl.english.purdue.edu/handouts/
English as a Second Language (ESL)

- Those who learn English as a Second Language (ESL) face special challenges
- Each language has its own rules and characteristics; there is a natural tendency to carry them over into English
  - some common usage problems are
    - transitive verbs: *This technique allows to ...*
    - nonexistent words: *modelizations*
    - missing articles: *a, an, the*
    - misused pronouns: *It means that ...* → *That means that ...*
- Learn about coping with ESL problems in
  - *Handbook of Technical Writing*
  - *Mayfield Handbook*
  - *Online Writing Lab (OWL)*
  - *An Outline of Scientific Writing*
Reader’s approach to reading an article

• For lack of time, most readers will not read the whole article

• Typical order in which they will read the article
  1. title (& author list)
  2. abstract (& keywords)
  3. figures and their captions
  4. skim text and section headings
  5. conclusion
  6. equations
  7. portions of main text in more detail

• Consequently, make sure that elements at the top of the list are well crafted
Title

• The title is the most visible part of article
• Goals for the title
  ► informative about what is in the paper
  ► no longer than about 12 words
  ► distinctive
• The title is
  ► not a replacement for the abstract
  ► usually not a sentence
• Do not start with A or The
• Avoid all but the best-known acronyms
Abstract and keywords

• Abstract
  ► concise, clear, and informative summary of work in paper
  ► single paragraph
  ► not too long (< 200-250 words)
  ► avoid lengthy background
  ► many readers only read the title and abstract

• Keywords or citation indices
  ► select these very carefully
  ► researchers will search databases for keywords
Figures

• Figures and their captions help tell the story
  ► ideally, they should describe results independently from text

• Anticipate how graphs and images will appear in published article
  ► how big will they be? one column or two?
  ► make sure
    • lines and axes are thick enough
    • symbols and fonts are large enough
    • dependent on size of final graph and proportion
  ► use color to distinguish lines only if published paper will be in color
  ► use solid, dashed, and dotted lines, and various data symbols
  ► caption should describe the figure and provide link to text
The writing process

• Planning
  ► identify objective, audience, and scope

• Organization
  ► logical development
  ► outline

• First draft
  ► write rough draft
  ► refine by revising

• Revision – recursive process
  ► goal of revision is completeness, accuracy, and coherence
  ► edit for style, word choice, and grammar

• Find the best approach for you
Planning

• Start writing process with a plan
• Identify purpose of article
  ► solve a problem
  ► convey new information
  ► express a point of view
  ► persuade reader of something
• Identify audience
  ► to whom do you want to tell your story?
  ► why would they want to read your article?
  ► level of expertise
• Determine scope of presentation
  ► depends on purpose and audience
Outline

• Before beginning to write, create an outline
  ► will be used as the skeleton for the manuscript
    • provides organization and structure
    • establishes overall logic of presentation
  ► try to include every topic you want to mention

• The following techniques can help you get started:
  ► define the essence of your message in a few core ideas
  ► write down key points first, then secondary ideas, …
  ► give informal talk to friends or colleagues
  ► maintain momentum – don’t stop prematurely
Writing the first draft

• Base first draft on outline
  ► outline provides organization
    • topics and subtopics of outline become sections and subsections
    • paragraphs emanate from subtopics and sub-subtopics
  ► skip Abstract, Introduction, and Conclusions
    • these are often easier to write after everything else
Writing the first draft – tactics

Useful techniques for beginning to write:

• Write first draft very quickly (and roughly)
  ► don’t worry too much about spelling and style
  ► start with sections that are easiest to write
  ► write in stream-of-consciousness mode

• Writing conditions
  ► set aside blocks of time to write, perhaps an hour or two
  ► establish goal for writing in each session
  ► make sure your environment is conducive to writing

• First draft is not ready to show anyone until after first revision
Revision

• Revision is a critical step in writing a well-written manuscript
  ► where good writing happens
  ► usually takes many passes through manuscript

• Review content and organization
  ► does it say what you want?
    • include all the data, graphs, etc.?
  ► is it easy to read and follow logic of presentation?
  ► is it accurate, complete, and truthful?

• Check for style and proper English
  ► clarity, conciseness, and coherence
  ► sentence construction
  ► word choice and usage
  ► grammar, punctuation, and spelling
Revision – tactics

Some useful strategies for revising a manuscript

• Print it out! although, some authors prefer to revise on computer monitor

• General approach
  ► see manuscript as a whole
  ► rearrange sections and paragraphs to improve development
  ► identify what is missing and add new text
  ► read several times; each time looking for particular type of problem
  ► make cursory notations in text or margin, correct later
    • use standard proofreading marks, especially if for someone else
    • use 1½ to 2 times line spacing to allow insertion of notes, new text

• Create new version often and keep old versions until finished
Good technical writing style

• Style is how you say things in your writing
• Goal of technical writing is clarity, conciseness, and coherence
• Use straightforward and simple sentence construction
• Choose words carefully
  • aim for conciseness and clarity; avoid wordiness
  • avoid colloquialism, slang, and shoptalk
Good technical writing style

- Strive for text that is readable and easy to follow
  - maintain overall organization
  - use transition elements throughout
- Use correct word usage, grammar, punctuation, and spelling
  - most common problems will be described in following sections
- Read and reread Strunk and White
Transition elements

• Transition elements are crucial for keeping the reader on track
  ▶ purpose is to link together different parts of article
• Effective transitions are needed at all levels of article structure
  ▶ article
    • Introduction connects with previous work and lays out organization
    • Conclusion summarizes what has been presented
  ▶ section
    • begin each section with short introduction to establish its relationship to previous section and the overall context
  ▶ paragraph
    • use topic sentence and logical development within each paragraph
    • establish links between paragraphs
  ▶ sentence
    • use compound sentences with transition or subordinating conjunctions
Paragraphs

• The paragraph is the unit of composition

• Organizing principles
  
  ► unity
  
  • focus on a central topic
  
  • topic sentence
    – placed first, second, or last in paragraph

  ► development
  
  • advance the topic through logical argument

  ► coherence
  
  • sentences should hang together

  • transition elements link sentences
    – connecting phrases (On the other hand, …; Therefore, …)
    – repetition of keywords

• Paragraphs should not be too long (or too short)
Sentences

- Sentence structure should generally be simple
  - to promote clarity and readability
  - use subject-verb-object construction
  - avoid complicated structure to explain complex ideas

- Use
  - strong verbs
  - active voice
  - first person, when appropriate

- Keep sentence length moderate

- Equations are part of a sentence; punctuate accordingly
  - equation numbers are always presented in parentheses, e.g., Eq. (9)
Sentences – compound

• Deviation from simple sentence construction can be helpful
• Compound sentences can be used to
  ► make transitions
    • *The x-ray tube had a large focal spot; therefore, we used a collimator to constrain the beam.*
    • *The radiographs had excellent image quality, but we still could not detect the lesion.*
  ► indicate subordination of ideas
    • *Because the input signals were too strong, the data were corrupted.*
    • *The microscope, which we borrowed from the biology department, allowed us to visualize the defect.*
Verbs – tense

• Use *present tense* as a general rule
  - although it may seem unnatural to write about the past in the present tense, it is usually desirable

• Other tenses may be used
  - *past and future* may be used in *Introduction* – to refer to previous work and what will be presented
  - *past* may be used in *Discussion* – to refer back to body of text: or in describing materials used – to refer to set up of experiment
  - *future* may be used in *Conclusion* – to refer to future work
  - do not to switch tenses too often
First person

- Write in first person, when appropriate
  - person indicates the writer’s relation to the material presented
    - writing in first person shows direct involvement; is more immediate
    - writing in second or third person indicates impersonal relation
  - use first person, singular if one author; plural for two or more
    - plural first person may be used for a single author to include reader
      - I conclude that ...
      - We can conclude that ...
  - use first person when writing about
    - your choices, opinions, expectations
    - your measurements, calculations, conclusions
- Writing in first person tends to promote active voice
  - No: The results are calculated using Monte Carlo.
  - Yes: We calculate our results using Monte Carlo.
Word choice

• Chose words carefully to convey precise meaning
  ► pick powerful words with definite meanings
  ► avoid
    • ambiguity
    • ornate or erudite words
    • wordiness and redundancy
    • informal English usage
    • idioms, unnecessary jargon, shoptalk
Measurement units

• Measurement units are usually abbreviated
  • mm  millimeter; length
  • s   second; time
  • HU  Hounsfield units; x-ray CT amplitude
  • Hz  Hertz = second$^{-1}$; frequency
  • pt. points; length in type setting

• Generally include space after number and do not italicize units
  • No: 2.47 mm; No: 2.47mm; Yes: 2.47 mm
  • But: 54ºC

• See AIP Style Manual for list of abbreviations of physical-units
Cursory list of common problems

Some of the most common problems in technical writing:

- Passive voice
  - active voice improves clarity
    - **Passive:** It was hypothesized by Bethe in 1937 that ...
    - **Active:** In 1937 Bethe hypothesized that ...

- Nominalization (weak verb + noun)
  - instead, use a strong verb
    - **No:** We perform a calculation using Eq. (8) to obtain the results shown in Fig. 2.
    - **Yes:** We calculate the results shown in Fig. 2 using Eq. (8).
Common problems

• Wordiness
  ▶ eliminate unnecessary words to achieve conciseness
  ▶ watch out for wordy clichés, e.g., *for the reason that* → *because*

• Comma missing after introductory phrase or clause
  • *No:* *To test our hypothesis we calculate ...* ;
  • *Yes:* *To test our hypothesis, we calculate ...*

• Compound modifiers (adjectives) without hyphens
  ▶ use hyphens to connect modifying words that go together
  • *No:* *... the high spatial frequency components are attenuated ...* ;
  • *Yes:* *... the high-spatial-frequency components are attenuated ...*
Common problems

• Missing or inappropriate articles (*a, an, the*)
• Treating countable nouns as uncountable
  • *No*: less problems ... ;  
    *Yes*: fewer problems ...
  • *No*: so much artifacts ... ;  
    *Yes*: so many artifacts ...
• Transitive verbs without a direct object
  • *We evaluate Eq. (6) to obtain the result show in Fig. 2.*
  • *No*: The algorithm allows to calculate ... ;  
    (object missing)
    *Yes*: The algorithm allows us to calculate ...

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Common problems

• Inappropriate use of words
  ► *in order to* – should not generally be used, except to avoid ambiguity
    • **No**: *In order to control ...* ;  **Yes**: *To control ...*
  ► *which, that, who*
    • use *that* before a restrictive phrase (without comma)
      – *The approach that proved to work best ...*
    • use *which* to begin a nonrestrictive phrase, with comma before and after
      – *Our approach, which we adopted from Andrews, proved to work well.*
    • use *who* when referring to a person or people
      – *People who follow Wagner’s suggestion ...*
Common problems

• Inappropriate use of words
  • *due to* – do not use in place of *because of*
    • **No:** The computer failed due to ... ;
    • **Yes:** The computer failed because of ...
  • *data* is a plural countable noun, especially in technical writing;
    also *spectra, criteria, phenomena, momenta, radii, ...*
  • *This*, at beginning of sentence with no following noun, often
    indicates ambiguous reference
    • **No:** This means that ... ;
    • **Yes:** This result means that ...

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Common problems

• Inappropriate use of jargon
  ► appropriate use of jargon depends on expertise of intended audience

• Too many acronyms
  ► acronyms should be defined at first use, with few exceptions

• Inappropriate use of punctuation
  ► correct punctuation enhances readability
    (,) comma – pauses the flow of a sentence to prevent ambiguity
    (e.g., series, introductory phrase, nonessential phrase)
    (:) colon – initiates series
    (;) semicolon – initiates independent clause
    (–) dash – sets off phrases with emphasis
    ( ) parenthesis – encloses nonessential words and phrases
Summary

• Organization of material is key
• Good technical writing style is learned by
  ► reading well-written journal articles
  ► paying attention to the details
  ► using writing guides and dictionaries, especially when in doubt
  ► having your writing critically edited by technical editor and/or colleagues
• Find the approach to writing that works best for you
Online writing guides

  • recommended; complete guide to technical writing from MIT; concise explanation of most aspects of technical writing; ESL pointers

► Online Writing Lab (OWL);  http://owl.english.purdue.edu/handouts/
  • guide to effective writing at college level; grammar and punctuation with exercises; English as a Second Language (ESL)

► Supporting material for book Handbook of Technical Writing, Alred et al.;  http://bcs.bedfordstmartins.com/alredtech/

  • NASA Report; hypertext or PDF; rules for technical writing

► AIP Style Manual;  http://public.lanl.gov/kmh/AIP_Style_4thed.html
  • American Institute of Physics gives stylistic guidance, especially relevant to physics articles
Online writing aids

- *Merriam-Webster Dictionary and Thesaurus*;  http://www.m-w.com
  - usable, gives etymology and pronunciation of words
  - very usable, although definitions are brief; identifies parts of speech
- *Bartleby Classic Online Books*;  http://www.bartleby.com
  - a wonderful collection of writers’ aids: the American Heritage Dictionary, Roget’s Thesaurus, quotations, and more:
    - *Elements of Style*;  http://www.bartleby.com/141/
      - classic handbook, written by William Strunk in 1918
    - *King's English*;  http://www.bartleby.com/116/
      - by H. W. Fowler (1908), another classic
Books

  - highly recommended; complete handbook on technical writing; entries arranged in alphabetical order; excellent index; ESL guidance; includes succinct guide to the writing process
  - supporting material at http://bcs.bedfordstmartins.com/alredtech/

  - may be especially useful to ESL writers

  - discusses all types of technical communication; includes list of 27 guidelines for style and usage