

Scientific Writing Papers or Theses

Tony Key, Department of Physics

Scientific Writing Papers or Theses

CONSTRAINTS
STRUCTURE
STYLE
RANDOM NOTES AND TIPS

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Scientific Writing Papers or Theses

CONSTRAINTS

Audience
Format
Mechanics

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STRUCTURE

Title

Identify field of study
Separate from others in that field

Poor

Interaction Free Measurements

Better

Quantum Mechanical Interaction Free Measurements

Best

Interaction Free Quantum Measurements of an Object in a Light Beam

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STRUCTURE contd..

Abstract (Summary)

Two main types:

Descriptive

orients reader to the
kind of information in the paper

Informative

(also called an executive summary)

a synopsis of work, presenting main results -
Subject, scope, objective, results, conclusions.

**A paper/thesis is not a mystery novel -
state results at the beginning!**
Abstract stands on its own

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A Good Model

The shape of the Eiffel Tower

Joseph Gallant

Kent State University, 4314 Mahoning Avenue, NW, Warren, Ohio 44483-1998

(Received 2 April 2001; accepted 12 September 2001)

The distinctive shape of the Eiffel Tower is based on simple physics and is designed so that the maximum torque created by the wind is balanced by the torque due to the Tower's weight. We use this idea to generate an equation for the shape of the Tower. The solution depends only on the width of the base and the maximum wind pressure. We parametrize the wind pressure and reproduce the shape of the Tower. We also discuss some of the Tower's interesting history and characteristics.

American Journal of Physics -- February 2002 -- Volume 70, Issue 2, pp. 160-162

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STRUCTURE contd..

Main Sections

Sections and sub-sections

make for readability

Use a logical flow

Titles of sections and sub-sections

should be descriptive and logical

Format dependent on journal

II.2 EQUIPMENT**5. Calculation of Observables****D. Discussion**

Flag following sections

Provide transitions between sections

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STRUCTURE contd..

Illustrations

illustrations should stand on their own
 figures generally better than tables
 tables better for high precision numbers

number equations
 (within section is convenient,
 but depends on journal)

flow charts sometimes useful

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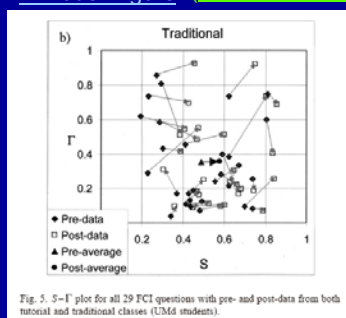
A Model Figure (Avoid at all Costs!)

Fig. 5. S-T plot for all 29 FCI questions with pre- and post-data from both traditional and traditional classes (UMd students).

Concentration analysis: A quantitative assessment of student states. Lei Bao, Edward F. Redish, *American Journal of Physics*, 69(S1), S45-S53, 2001.

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STRUCTURE contd..

Conclusion

sum up, restate results
 (no new ones!)

analyze results

don't repeat sections

of the Introduction

give future perspectives

give recommendations

search for a graceful termination

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STRUCTURE contd..

Back Matter**References**

Format dependent on journal. Two main types:

11. R.K. Thornton and D.R. Sokoloff, "Learning motion concepts using real-time microcomputer-based laboratory tools", *Am. J. Phys* 58(9), 858-867 (1990).

Costin, F., Greenough, W.T. and Menges, R.J. (1971) Student ratings of college teaching: reliability, validity, and usefulness. *Review of Educational Research*, 41, 511-535.

Appendices

Written for secondary audience (often technical). Necessary for completeness and to avoid interrupting the flow of the text
 Often unnecessary in papers, but useful in theses.

Acknowledgements

Funding agencies, mentors, originators of ideas, collaborators, (family).

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STYLE**Clarity**

- KISS; avoid complexity; avoid ambiguity

Conciseness

- omit unnecessary words, phrases, sentences

Precision

- use the correct word

- avoid excessive use of synonyms.

Familiar

- avoid Jargon; remember your audience.

Forthright

- avoid pretentious words, clichés

- use concrete nouns rather than abstract nouns

- use verbs rather than nouns

- avoid passive verbs

- be suspicious of sentences starting with "it".

- Be specific rather than general.

Fluidity

- vary rhythm

- vary length of sentences and paragraphs;

- vary openers

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Redundancy :

alternative choices
 basic fundamentals
 consensus of opinion
 currently underway
 as to whether
 clearly demonstrates
 for the foreseeable future.

Replace with one word:

due to the fact that
 in order to
 in the near future
 great deal of
 made the decision
 has the potential to...

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Omit:

it is worth noting that...
 the fact that
 in the course of ..
 it is obvious that ..
 it is worth pointing out that ...
 very
 quite
 relatively (usually!)

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Simplify:

component
 utilize
 elevated
 facilitate
 prior to

Distinguish:

like/as
 which/that
 alternative/alternate
 allusion/illusion
 principal/principle
 continual/continuous
 its/it's
 comprise/compose

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Passive to Active:

the voltage was displayed on the oscilloscope
 readings were taken
 it was determined that...

Comparatives:

if you use, make it clear what is compared to what

Only: as close to modified word as possible.

The sun only rises in the East

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Comma:

use around parenthetical expressions
 including nonrestrictive clauses (two!)

A, B, and/or C
6 March 1939

Semi-colon:

[joins two or more grammatically complete clauses
 not joined by a conjunction (and, for, or, as)
 may introduce a quotation
 separates more than does a colon
 separates parts of a list already separated by commas]

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STYLE contd ...

GRAMMAR AND USE OF WORDS

Colon:

introduces a list
 closely relates a clause to the
 preceding one, especially if the
 second amplifies the first
 has more power than a comma

Dash:

similar in use to the colon,
 but not advised in formal writing.

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RANDOM NOTES AND TIPS

Read and study published papers in your field

Start with a detailed and logically sequenced outline.

Write the abstract last.

Remember that the first sentences
(of paper, thesis, sections)
are very important.

One idea to one sentence

One set of ideas to each paragraph

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RANDOM NOTES AND TIPS

Short sentences are generally better than long ones.

Redundancy is a *needless* repetition of details;
BUT sometimes important content needs repetition.

Put yourself in the place of the audience;
what questions might they have, and have you answered them?

Write first, polish after.

Then proof-read again and again.

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References

Michael Alley, *The Craft of Scientific Writing*
(Springer-Verlag, New York, 1996)

W. Strunk Jr., and E.B. White, *The Elements of Style*
3rd Ed., (Macmillan Co, New York 1979).

Rev.Mod.Phys. Manuscript preparation -
<http://rmp.aps.org/manprep.html>

AIP Style Manual -
<http://www.aip.org/pubservs/style/4thed/toc.html>

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