

Scientific Writing: From Concept to Publication

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Dr. Robert Trigiano

- Editor-in-Chief for Critical Reviews in Plant Sciences (11 years) -- this is the 8th highest impact journal among 143 plant science journals
- Editor of ten scientific text/reference books since 1996. Author of over 110 refereed journal articles
- Author of over 120 Refereed articles, and 50 book chapters in various books
- Associate or Senior Editor for Journal Amer. Soc. Hort. Sci, HortScience, Plant Cell Reports, Plant Disease and Plant Cell, Tissue and Organ Culture since 1990
- Taught the course "From Concept to Publication" at Universities in Germany, Brazil, Madagascar, and People's Republic of China
- Shepherded numerous graduate students through the process of publishing their theses and dissertations in journals and other outlets
- Consulting Editor for CRC Press
- Member of several Editorial Boards
- Author and recipient of numerous grants
- Fellow ASHS



THANK YOU CAULA BEYL

Dean and Professor
College of Agricultural Science and Natural
Resources
The University of Tennessee

Some materials were provided from our
graduate level course for Scientific Writing
and grantsmanship



Dean Beyl



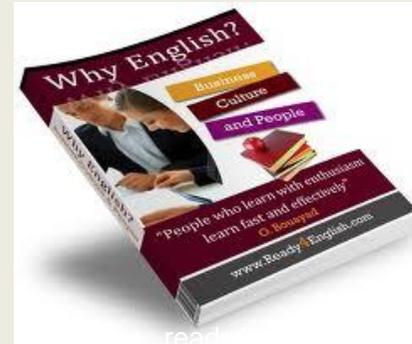
What are Some of the Products of a University?

- Undergraduate and Graduate Students
- Papers or Research Articles
- Patents
- Copyrights
- Intellectual Property (IP)



Why a Workshop in Scientific Writing in English?

- English has become the international language for science and business
- Scientific meetings (including abstracts and proceedings) are usually conducted in English
- Many journals are now written in English. Some journals continue the practice of also including a summary in another language. E.g. Canadian journals published by the government must have a summary in French.
- Are there other language venues for publication? Yes! However, these outlets seldom have the impact (factor) of English-language journals.
- Most International positions demand English writing competence



In this workshop, we will go from...

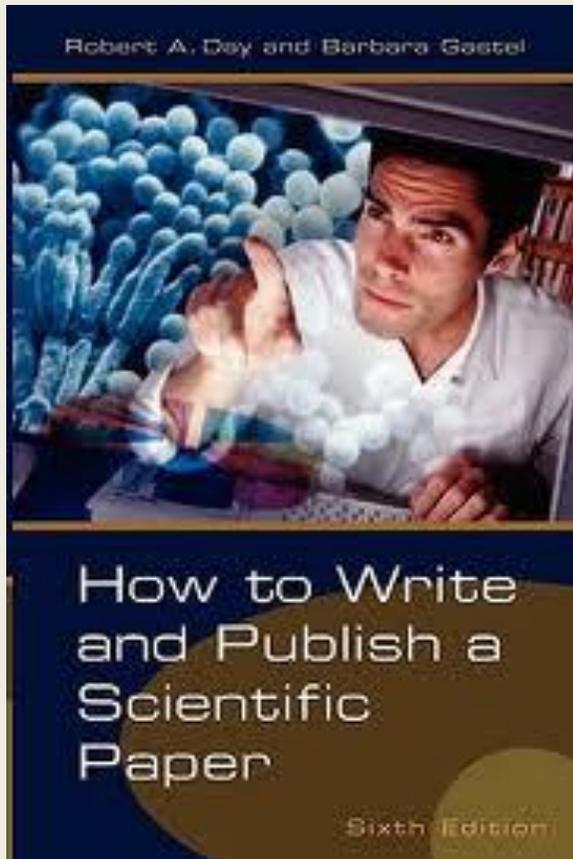
Scientific
Writing
really
helped me!

- ✓ **Getting ready to write**
- ✓ **Writing a scientific paper**
- ✓ **Submission and the editorial/
review process**



teachscienceandmath.com

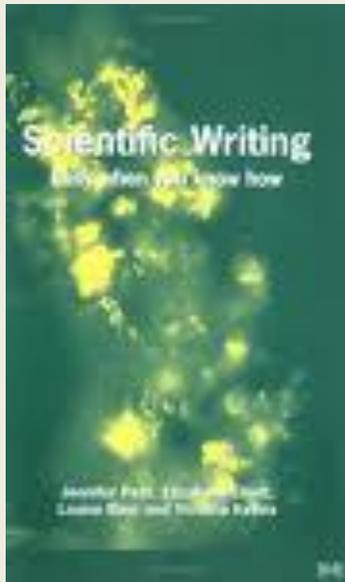
A Helpful Textbook



tower.com

Text: Day, Robert A. and Barbara Gastel. 2006. **How to Write and Publish a Scientific Paper.** Greenwood Press, (6th edition; ISBN 0313330409)

Another Useful Textbook



Scientific Writing: Easy when you know how.
Peat, J., E. Elliot, L. Baur and V. Kenna. 2002.
BMJ Books, London

[goodreads.com](https://www.goodreads.com)

RESEARCH ETHICS



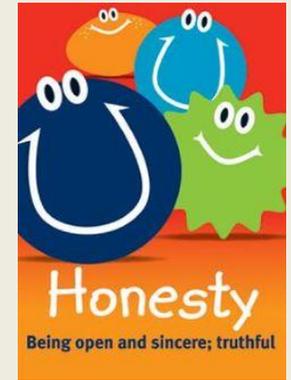
<https://www.youtube.com/playlist?list=PL65B059BC12E75502>

ETHICS

A system of moral principles: the ethics of a culture.

that branch of philosophy dealing with values relating to human conduct, with respect to the rightness and wrongness of certain actions and to the goodness and badness of the motives and ends of such actions

<http://dictionary.reference.com/browse/ethics>

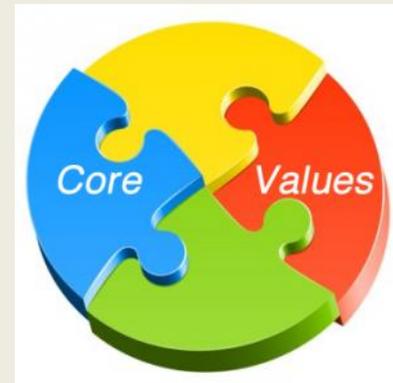


www.pinterest.com

MORALS

Principles or habits with respect to right or wrong conduct

<http://dictionary.reference.com/browse/morals>



beyond5s.com

VALUES

A person's principles or standards of behavior; one's judgment of what is important in life.

https://www.google.com/?gws_rd=ssl#q=Definition+of+values



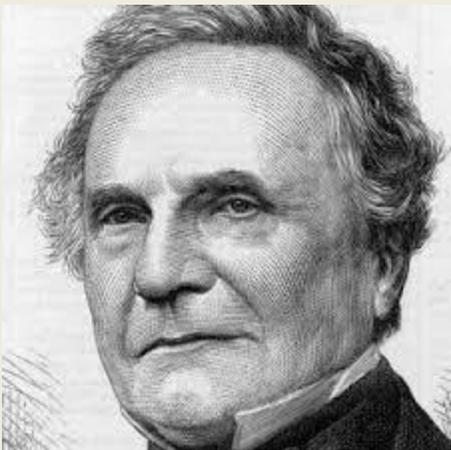
Defining Ethics in Science

- Science is a search for reality and truth in the universe
- Some activities that lie outside ethical circle
- Attempted destruction of a scientific reputation
 - Assimilation by a senior person of data and conclusions from a junior professional staff member and graduate student without their consent or knowledge
 - “Scientific streetwalking” or making the data fit the needs of those who funded the research
 - Premature disclosure of others’ work

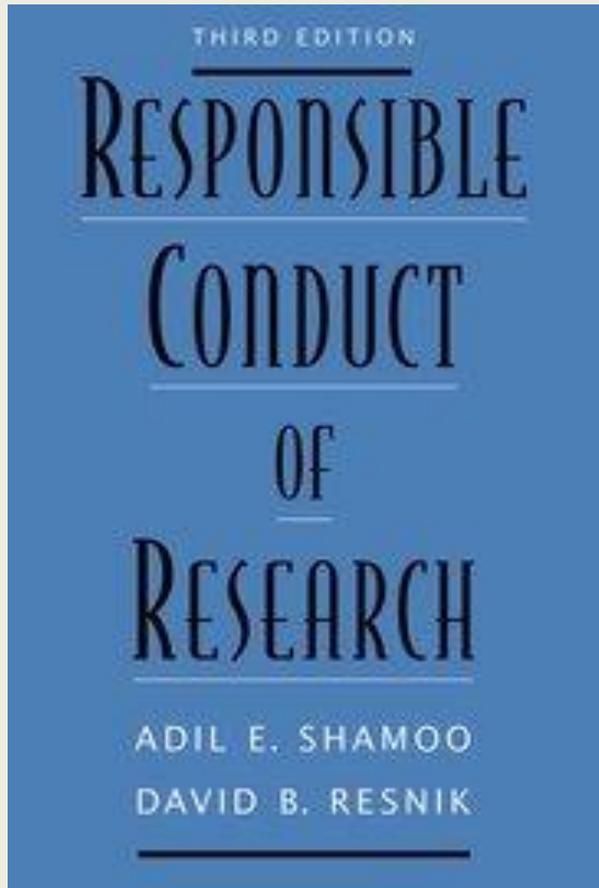


Concerns about ethics 150 years ago

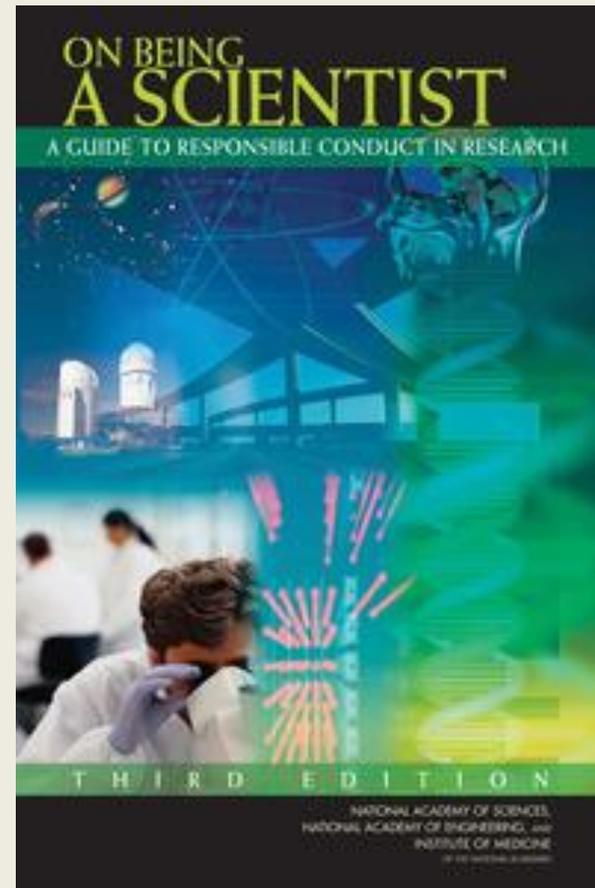
- Charles Babbage wrote “Reflections on the Decline of Science in England” in 1830.
- He coined these descriptive terms...
 - Trimming – forcing data to fit a mean by dropping or adding data points (finagling data).
 - Cooking – making many measurements, but only using those that fit what you are trying to prove (massaging the data or fudging).
 - Forging – recording fictitious results.



Informative Books



<https://global.oup.com/academic/product/responsible-conduct-of-research-9780199376025?cc=us&lang=en&>



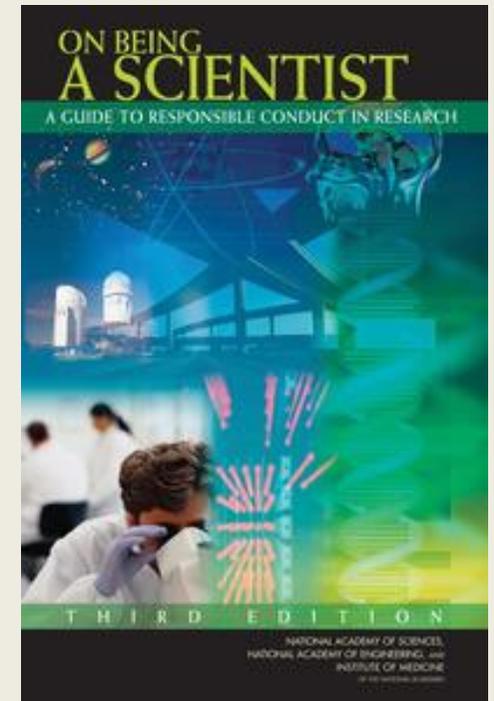
<http://www.nap.edu/catalog/4917/on-being-a-scientist-responsible-conduct-in-research-second-edition>

Some Terminology

“Research is based on the same ethical values that apply in everyday life, including **honesty, fairness, objectivity, openness, trustworthiness, and respect for others.**”

“A “scientific standard” refers to the application on these values in the context of research.” For examples:

- “Openness in sharing materials”
- “Fairness in reviewing grant proposals”
and journal submissions
- “Respect for one’s colleagues and students”
- “Honesty in reporting research results”



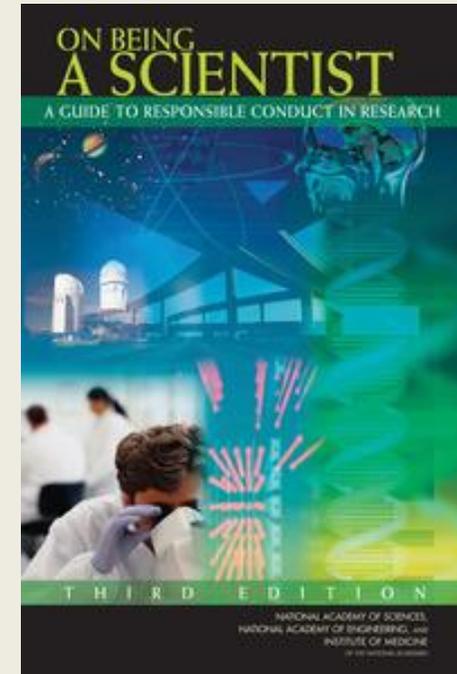
Scientific Misconduct

“Three deadly sins”

The most serious violations of standards are

- FABRICATION
- FALSIFICATION
- PLAGIARISM

In proposing, performing, reviewing or reporting research results





girlsjustwannahaveguns.com

Examples of Use and Abuse of Data

- **Massaging** – performing extensive transformations or maneuvers to make inconclusive data appear conclusive.
- **Extrapolating** – developing curves or predicting future trends based on too few data points.
- **Smoothing** - discarding all points which do not fit a predetermined curve.
- **Slanting** - emphasizing only data trends which fit the pattern, ignoring the ones that do not.
- **Fudging or Falsification** -- inventing data points and observations to augment the work.
- **Manufacturing or Fabrication**- creating new data sets *de novo* without actually doing the work.

TOPICS IN ETHICS

- Plagiarism*
- Negligence
- Deliberate Dishonesty
- Peer Review
- Collaborating and Mentoring



<http://mej.com.au/our-services/medical-negligence/>

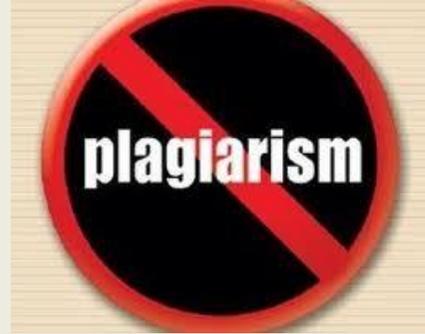
*Some of materials on Plagiarism are adapted from a lecture by Fernandez and Bolorizadeh, UT (Sept. 2011)

Plagiarism Defined

Plagiarism, as defined in the 1995 *Random House Compact Unabridged Dictionary*, is the "use or close imitation of the Language and thoughts of **another** author **AND** the representation of them as one's own original work." [\[1\]](#) Within [academia](#), plagiarism by students, professors, or researchers is considered [academic dishonesty](#), [academic fraud](#) or [scientific misconduct](#) and offenders are subject to academic censure, up to and including [expulsion](#).



Plagiarism Detection Software



Examiner.com



plagiarismsoftware.net



helpychalk.blogspot.com



pinterest.com



scanmyessay.com

Cultural Differences (Values)



looneytunes09.wordpress.com

In many part of the world, people believe that once something is published, it belongs to everyone and may be freely used. Many cultures do not recognize individual contributions, but instead feel that the society is more important. These cultures may or may not recognize individual forms of ownership such as patents, copyrights and trademarks.

Other cultures are more or less opposite and hold the accomplishments of the individual more highly. These accomplishments belong to the individual and not the community. Patents, copyrights and trademarks are important.

Plagiarism = Theft of Scientific Ideas

(In some cultures, it is considered flattery)

For plagiarism to exist, the offending author must do **BOTH** of the following:

1. Use the ideas/writing/etc. of another person

AND

2. Claim the work as their own (does not cite the originator!)



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Self – Plagiarism – Is it possible? Amer. J. Bot.

Wording from a published article is used in another article by the same authors in a different journal.

Most common when a group has a theme of research that utilizes similar or same methodologies or subjects.



American Journal of Botany

PCR amplifications were completed in 10 μ l reaction mixtures containing 1 μ l DNA template (4ng/ μ l genomic DNA), 2.5mM MgCl₂, 1X GeneAmp PCR Buffer II (Applied Biosystems, Foster City, California), 0.2mM dNTPs, 0.25 μ M primer (forward and reverse), 5% dimethyl sulfide (DMSO; Fisher Scientific, Pittsburgh, PA, USA), 0.4U AmpliTaq Gold DNA Polymerase (Applied Biosystems, Foster City, California), and sterile water. PCR reactions were completed using the following touchdown thermal cycler conditions: 1 cycle at 94°C for 3 min; 15 cycles at 94°C for 40sec, 63°C for 40 sec 72°C for 30 sec and decreased by 0.5°C at each subsequent cycle; 15 cycles at 94°C for 40 sec, 55°C for 40 sec, 72°C for 30 sec; 72°C 4 min, 4°C for 15 min (Don et al.1991). Allelic products were separated via electrophoresis on the QIAxcel Capillary Electrophoresis System (Qiagen, Valencia, California USA).

Almost verbatim from Trigiano et al. (2012). Therefore, for most of the paragraph, we can use methods according to Trigiano et al. (2012) to avoid self-plagiarism



What is a Copyright?

- The right of exclusive ownership by the author or creator of a work (written or otherwise)
- Limited copies may be made for the purposes of criticism, comment, news, and teaching
- All work published after March 1, 1989, is copyrighted whether marked or not
- Copyright laws apply to cyberspace work as well as printed
- Always document the source of material!
- Most journals demand that you transfer your copyright from you to the journal



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Self-Plagiarism

Self-Plagiarism is really a question of copyright and who owns it!

Typically, the journal, not the individual author(s), holds the rights to the article

YES!



Case Studies



Case Study – CRC Review Articles

Case Study – Tree Gene and Genomics

Case Study – ASHS Journal

CRITICAL REVIEWS IN PLANT SCIENCES

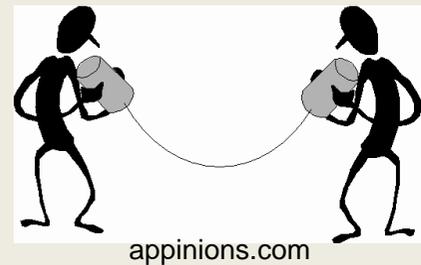
Very long review was written and accepted in 2009. There were four authors of which the “senior” and corresponding author was last.

Two years latter, the authors of one of the papers that was cited contacted the Editors-in-Chief of CRPS and stated that a paragraph in the review was directly copied from his paper published in 2007.

Editors contacted the corresponding author of the 2009 review and queried about the origin of this paragraph.

The corresponding author stated (with great embarrassment) that his post-doc had written this section, but he would take full responsibility for the problem.

The Editors put the corresponding author in touch with the author of the 2007 paper and they worked-out the problem.



Tree Gene and Genomics

Original We also found that the loss of *C. florida* from eastern forests has reduced the rate of soil and forest floor Ca mineralization, which may have negative effects on many associated flora and fauna.

88% Loss of flowering dogwoods from eastern forests has reduced the rate of soil and forest floor calcium mineralization, which may have negative effects on many associated flora and fauna (Holzmueller, 2006).

J. AMERICAN SOCIETY OF HORTICULTURAL SCIENCE

Manuscript submitted by authors in the People's Republic of China.

During the review process, the review team discovered that the authors of the paper had “borrowed” PCR data and a blot figure from another paper without citation. In fact, it was presented as their own work. None of the authors of the present paper were authors on the plagiarized paper.

This rises to the level of plagiarism as we defined previously. First, they presented materials as their own, and second, they did not cite the other paper as the source. (Typically, figures can never be used in a third party, refereed journal articles, even with permission because it is understood that all work in the submitted article is **original**.)

The corresponding author stated that his student was at fault and that he had disciplined them.

The Editorial found that all authors were equally responsible and “**banned**” all authors from publication in ASHS venues for two years.

Was this a cultural problem?



Ways to Avoid Plagiarism



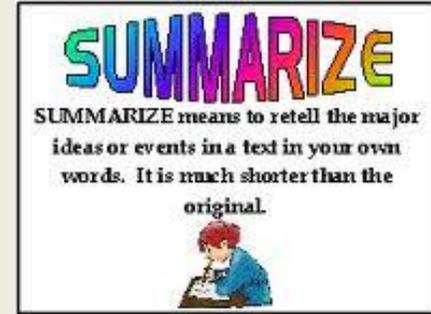
[la_quotation_marks.gif](#)

Quote -- word for word appearing exactly as in the reference. Must use quotation marks. “The physical structure was dilapidated.”
Must include the citation or reference (source)

Paraphrasing – reducing the length of reference, including the ideas, but not using the exact wording. Does not use quotation marks, but you must cite the reference

Both the Quote and Paraphrasing Are Not Used Very Often
in Scientific Writing





Ways to Avoid Plagiarism

Summarize – distills or reduces an entire paragraph or a paper to its most salient or main idea(s). Must include citation. For example, published SSRs for *Aspergillus flavus* were inadequate to define the population (Smith, 2010).

Another example: Jones (1922) found that compost-inhabiting fungi were highly cellulolytic.

Summarization is the Most Common Method of Reporting Prior Literature in Scientific Writing.

Ways to Avoid Plagiarism

Cite

Cite

Cite

CITE



avondatabases.com

Ways to Avoid Plagiarism

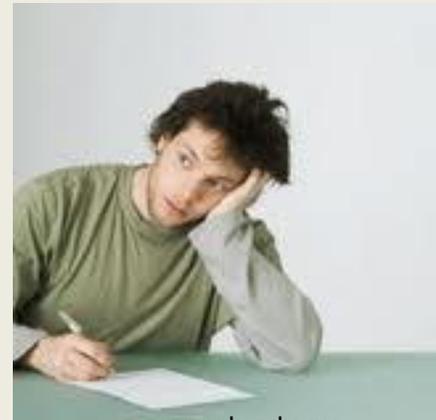
SUMMARIZE FINDINGS (GENERAL)

**USE YOUR OWN WORDS TO REPHRASE
SPECIFIC PASSAGES AND THOUGHTS**



Scientific Writing

- Rare Talent or Learned Skill?
- Proficiency is necessary to:
 - Attain the degree that grants you entry to professional status
 - Communicate findings to your peers for publication and technical reports
 - Garner money to do research
 - Ensures “reproducibility”



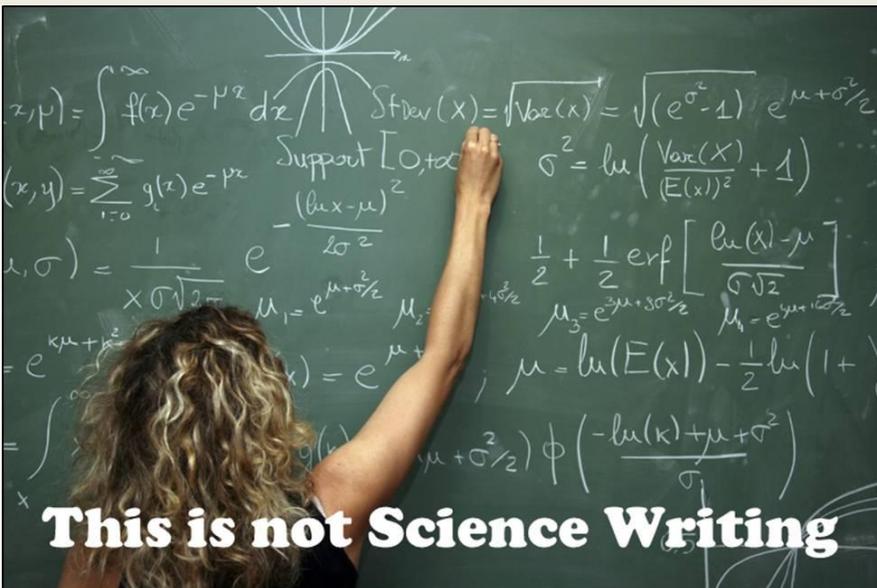
"a naturalist's life would be a happy one if he had only to observe and never to write"



Charles Darwin

What exactly is scientific writing?

- There are many vague conceptions about scientific writing based on scientific folklore, rules that scientists remember, and examples that scientists read.
- There are about 40,000 scientific journals in the world today that publish scientific writing.



Myth...

- *Scientific writing is a mystical science.*

Scientific writing is not a science, it is a craft or a skill that is developed through practice.



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fantasysportstrophies.com

Myth...

- *Scientific writing is not really that important*

If someone does Nobel quality research but never publishes it, what value does it have...

- 10 years later?
- after she/he dies?

Impact...

Considering its value then, why do graduate students spend four years learning to do research, but only 3 months (if they are lucky) to learn how to publish it?



Myths...Scientists can't write; if they could, they wouldn't be scientists!

- Misconception that if you are good at analytical skills you are not good at verbal skills.

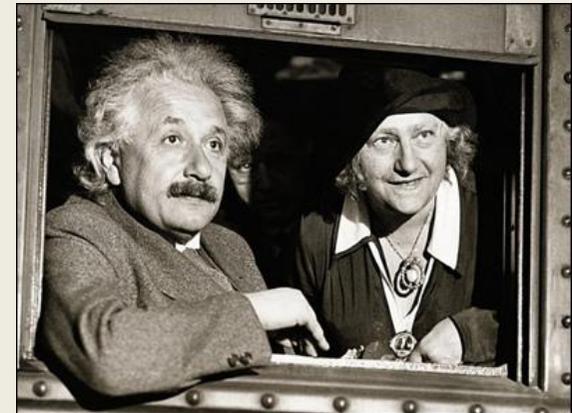
Not true!



- The skills that make a good scientist (logical organization, imagination, hard work) do not automatically preclude good scientific writing.
- It is a **perspiration** skill not an **inspiration** skill!

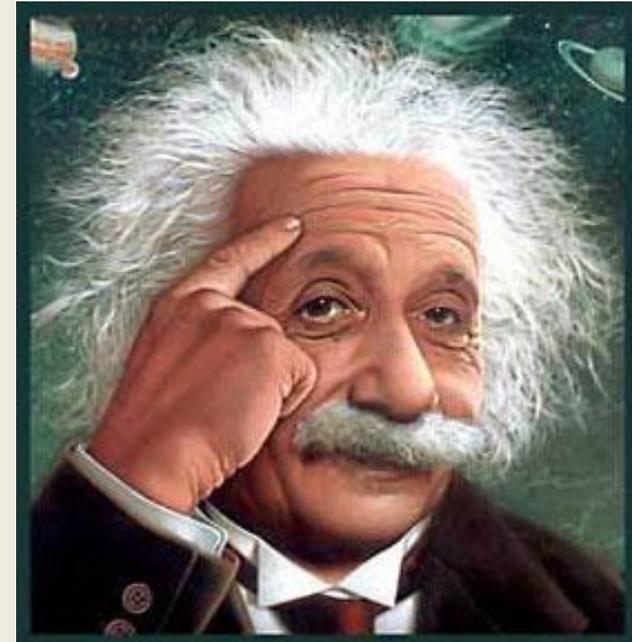
However Many Scientists Have Trouble Explaining Their Work

Albert Einstein's wife, Elsa--a stranger to science -- once implored her husband to explain his research to her: "Couldn't you tell me a little about your work? People talk a lot about it, and I appear so stupid when I say I know nothing."



Einstein's Response

Einstein struggled briefly to simplify his ideas but then got flippant. Inform them that "you know all about it but can't tell them, as it is a great secret!" he advised his wife



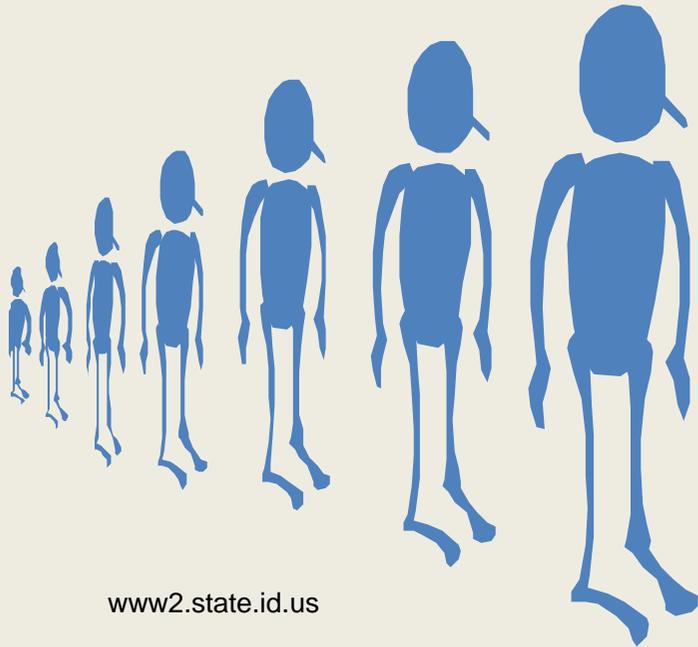
Myth...Scientific writing is easy for scientists



clipartguide.com

- Scientific writing is not necessarily easy. Who promised it was? Everyone can acquire the skills to do it.
- Quote by Red Smith, sportswriter:
"Writing is easy. You just stare at the typewriter until drops of **blood** appear on your forehead!"

Who is your role model?



www2.state.id.us

- Just as people copy other people, scientists copy other scientists.
- Many published papers are weak, poorly structured, the language is imprecise and unclear and the illustrations do not mesh with the words

GOOD ADVICE!

*Think a volume,
write a page,
and for every page of thine,
publish but a single line*

Le Bolde



What is a scientific paper?

It is a **first disclosure** that...

- Assesses observations
- Provides enough information to be able to repeat experiments from the information in it
- Provides a system of peer exposure and review to evaluate intellectual processes and outputs of scientists



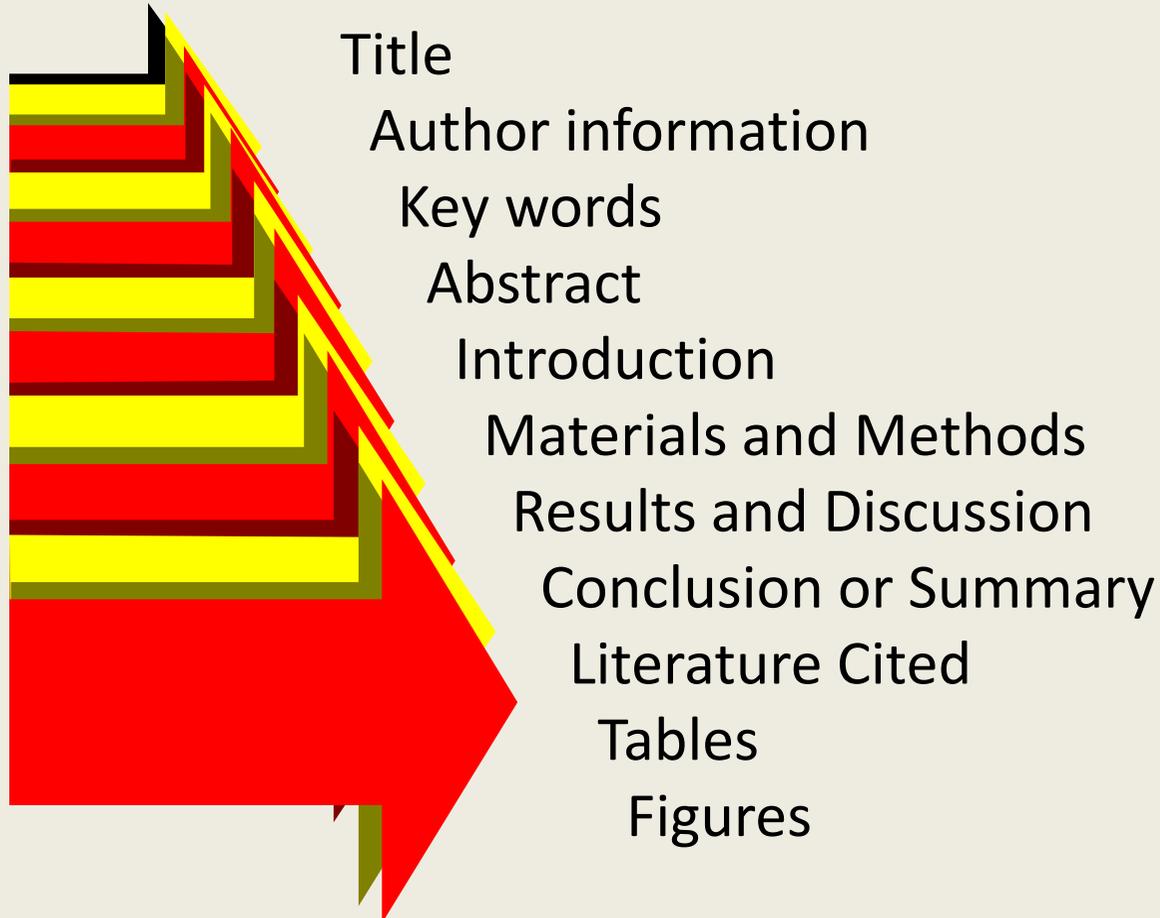
Types of Scientific Papers

- Scientific Papers
 - Methods papers
 - Results papers
- Review papers
- Short communications or notes
- Meeting proceedings
- Abstracts and expanded abstracts



kaboodle.com

What are the Parts of a Scientific Paper?



IMRaD Format Answers Questions



What problem was studied? (Introduction)



How was the problem studied? (Materials and Methods)

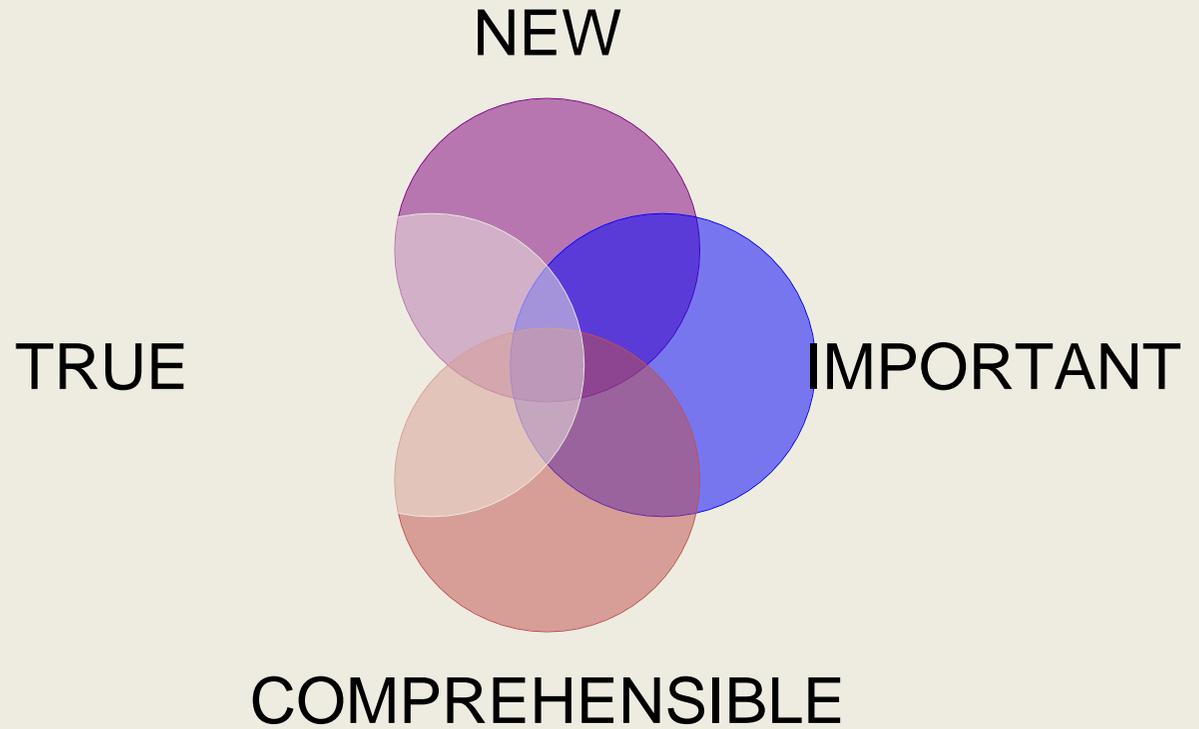


What were the findings? (Results)



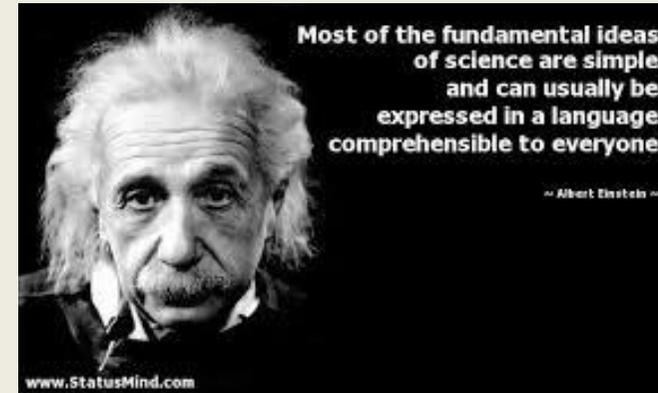
What do these findings mean? (Discussion)

**Four
attributes of
a good
scientific
paper**



COMPREHENSIBLE

- Old style used to be flowery phrases and lengthy descriptions, but today's journals cannot afford verbosity.
- A scientific paper is not literature, it is **captive** writing, most writers will read it in spite of how it is written to get to the information. A paper, once organized, should write itself. So in a sense you are not really an author, just a conductor.
- Communication in scientific papers is a **monologue** not a dialogue between writer and reader. The author has total responsibility for clear, concise communications.



statusmind.com

Violations of Comprehensible

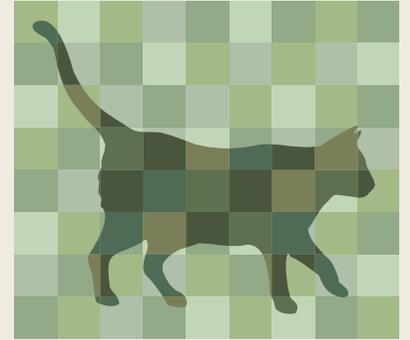
- **Obfuscation**

- Obscuring the meaning of the message by wrapping it in many layers of impressive verbiage.
- Most graduate students write in a natural, very direct, clear style when they first begin, but 3-4 years of reading scientific journals results in their writing becoming obfuscated.
- Is it deliberate? Do researchers really want more clarity in writing? !! Not if their intention is to hide their confusion about a conclusion.



Cleanupcityofstaugustineblogspot.com

Obfuscation Mini-Quiz



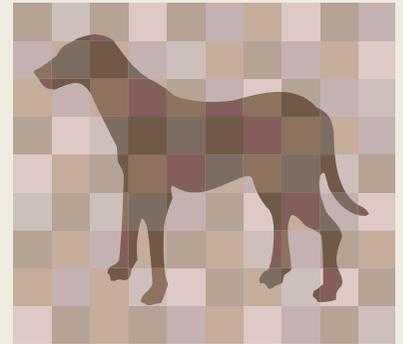
"An incredibly insatiable desire to understand that which was going on led to the demise of this particular *Felis catus*."

Obfuscation Mini-Quiz



"A sedimentary conglomerate in motion down a declivity gains no addition of mossy material."

Obfuscation Mini-Quiz



"Even with the most sophisticated experimental protocol, it is exceedingly unlikely that the capacity to perform novel feats of legerdemain can be instilled in a superannuated canine."

What kind of writer will you be?

BASICALLY, THERE ARE FOUR TYPES OF WRITERS

1. TRIGGER HAPPY TYPE

Data hot off the press-> rush into publication

2. NEVER FINISHED TYPE

Always one more experiment to do

3. PROCRASTINATOR

Will start next week, or next semester, or next summer, or next year....

4. THE GOOD WRITER

Submits to one journal at a time
Keeps length and therefore cost down
Plans paper as carefully as the research
Paper is a self-contained unit and is homogeneous
If rejected, tries, tries again.



Do You Trust Your Spell Checker?

“statisically”

- “The amount of plant material resulting from the three treatments was not **sadistically** different.”

“humidity”

- “Cotton responds to both soil moisture and relative **humility**.”



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“acceptable”



“I hope you will find this manuscript **exceptable.**”

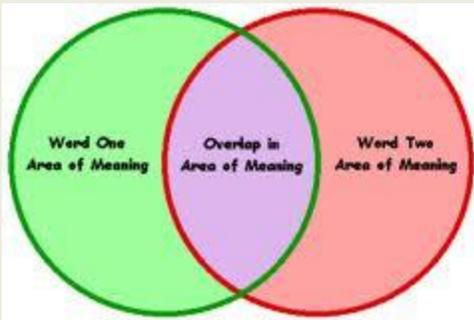
“bear”



“Please **bare**
with me!”



Only use a word if you are sure you know its meaning



Inthesaltshaker.com

Malapropisms and homophones are words that sound similar to the one intended, but are ludicrously wrong in context.

Examples

- "Don't" is a **contraption (contraction)**.
- The vendor is the **soul (sole)** source for that software.



The End of the Introduction

Why English for scientific writing?

Research ethics in Science

What is scientific writing?

What makes a good writer?

The meaning of homophones, malapropisms and spell checker



boston.com