TECHNICAL WRITING TIPS, GUIDELINES, AND RESOURCES

(PLUS MORE INFO ON PROJECT)

ME 482 – Fall 2016

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THE GOALS AND INTENTIONS OF THIS LECTURE…

- Provide complimentary information compared to "How to write a lab report" documents.
  - Resources
  - Pointers/pitfalls
  - Other useful information
- Provide some easy-to-implement strategies to improve facilely
- The intention is to prepare you for your paper review, lab report/extended abstracts, and written project.

- *First – project and paper review information*

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PROJECT AND PAPER REVIEWS

- See project information handout (already posted).
- Project proposal (5% of total project grade) – DUE 9/26 (M)
  - Brief project proposal to ensure that you have chosen an appropriate topic.
    - Send to me by email using file name and email subject protocol we discussed (ME482_assignment_name)
    - It must include evidence from multiple sources ($\geq$3) that the disease you have chosen results in measurable (i.e. quantitative NOT qualitative) changes in mechanical properties.
    - You should get all 5%. If it is not done well or the topic and plan need some tweaking, I will return it and ask you to do it again with the possibility of getting full credit.
- Paper reviews (20% of total project grade)
  - To help get you started on the literature review and get you reading papers in depth
  - Handout (will be posted, but also discussed today)
  - 2 paper reviews for 3 hr students; 3 for 4 hr students
- Project outline (10% of total project grade)

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DUE DATES

(**NOT** INCLUDING LAB-RELATED OR HW ASSIGNMENTS)

- Project proposal (5% of total project grade)
  - DUE 9/26 (M)
- Review papers (20% of total project grade)
  - Paper review 1 – DUE 10/17 (M)
  - Paper review 2 – DUE 10/31 (M)
  - Paper review 3 – DUE 11/28 (M) **– 4 hour students only**
- Review project outline (10% of total project grade)
  - DUE 11/14 (M)
- Presentation (25% of total project grade)
  - Some during the final exam period, others likely during class/lab time
- Written Report (40%)
  - DUE 12/12 - at the final exam

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PAPER REVIEWS ARE TO HELP YOU START YOU ON THE FINAL PROJECT…AMONG OTHER THINGS

Guidelines for paper summaries

The purpose of the assignment is for you to

(1) Become familiar with some of the current literature on tissue mechanics;
(2) Practice critically evaluating technical articles;
(3) Get more experience in technical writing and presentation;
(4) Prepare for your written/oral final project.

In your written summary you should address the following questions:

(1) What were the significant findings in the paper? You should be able to boil these down to 2-4.
(2) What was the evidence supporting the findings?
(3) What are the 'holes' in the paper? What was not convincing or was left to be done? What is the next step or question to answer?

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PAPER REVIEWS ARE TO HELP YOU START YOU ON THE FINAL PROJECT…AMONG OTHER THINGS

Format (12pt font, 1.5 spacing)

- INTRODUCTION (1- 1.5 pages max): An introductory paragraph or extended abstract that motivates the study and summarizes the paper. Be sure to include a brief statement of the major findings. 5 pts
- MAJOR FINDINGS (1.5 - 2 pages max unless you include lots of large figures): Expand on their major findings you outlined in the introduction by talking about the most important data presented and the on discussion of the findings. You can use figures from the paper as long as you reference them. 7 pts
- CRITICAL ASSESSMENT (1- 2 pages max): Use some critical thinking. Does the evidence support what are stated as the major findings? Why or why not? Were the methods sound? Did they do experiments/modeling that revealed what they claimed? Have they done the right experiments? Why or why not? Are there any flaws in the logic? If so, what are they? What would be the follow up study? 8 pts

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PAPER REVIEWS ARE TO HELP YOU START YOU ON THE FINAL PROJECT…AMONG OTHER THINGS

Submission process and other requirements

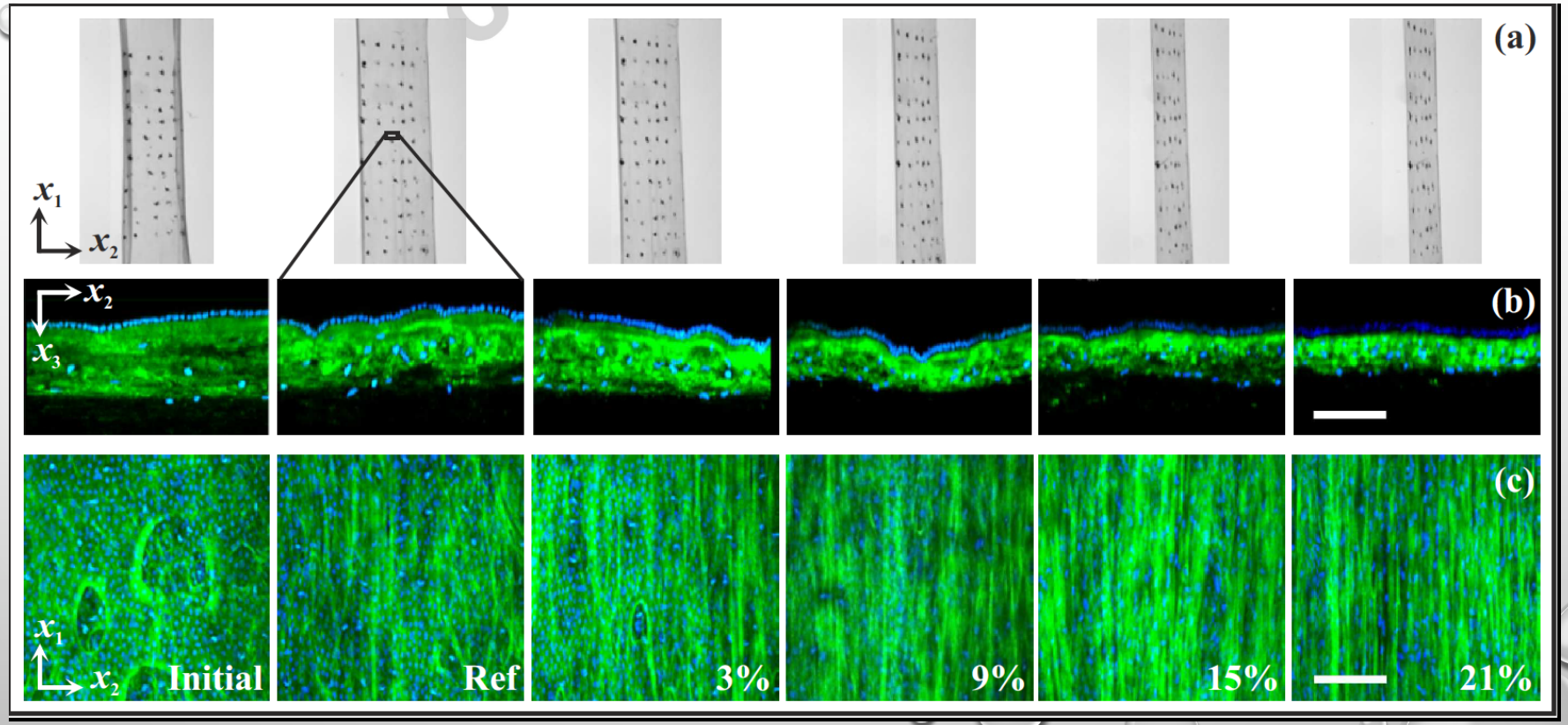
- You must submit an electronic copy to Compass and hard copy and/or electronic copy by email (ajwj@illinois.edu). Please also submit the paper being reviewed.
- Chose papers for your review that are important for your project.
- 4 hr students must submit 3 reviews; 3 hr students must submit only 2. The due dates will be given in class and/or on Piazza, and also posted on the class calendar.
- If you are working on the project with a partner, you may not review the same paper.

Additional notes:

- See technical writing lecture for tips on including figures from pdf in your word documents.
- Common writing bugs: www.cs.columbia.edu/~hgs/etc/writing-bugs.html
- Wisconsin Writing Handbook: writing.wisc.edu/Handbook
- Writing guidelines for engineering and science students (this also has a website for technical presentations): www.writing.engr.psu.edu/writing.html

YOU SEE A NICE FIGURE IN A PAPER YOU WANT TO INCLUDE IN REVIEW OR PROJECT?

Be sure to cite it, but here is how you can include it…



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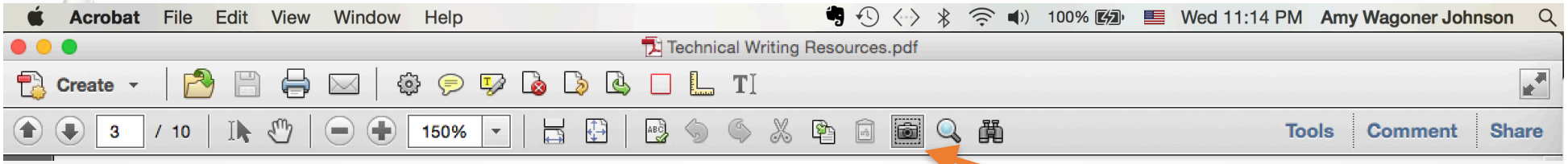
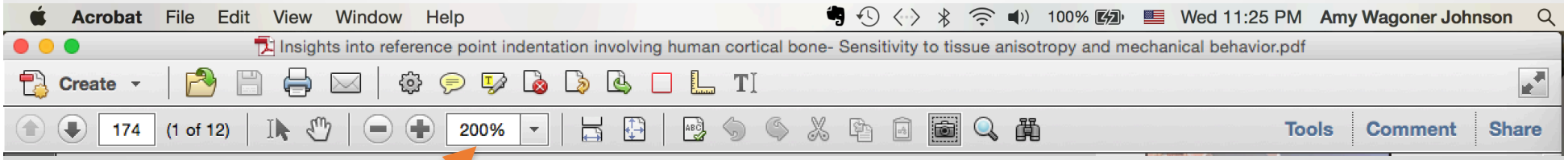
Mauri, J. Biomech, 2015

USE SCREEN CAPTURE TO INCLUDE FIGURE FROM ANOTHER PAPER IN YOUR DOCUMENT



PAY ATTENTION TO THE ZOOM YOU USE



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THEN RESIZE TO WHAT YOU WANT – QUALITY IS MUCH BETTER

JOURNAL OF THE MECHANICAL BEHAVIOR OF BIOMEDICAL MATERIALS 37 (2014) 174–185

Available online at www.sciencedirect.com

ScienceDirect

Zoom at 100%

JOURNAL OF THE MECHANICAL BEHAVIOR OF BIOMEDICAL MATERIALS 37 (2014) 174–185

Available online at www.sciencedirect.com

ScienceDirect

ELSEVIER

www.elsevier.com/locate/jmbbm

Zoom at 200%

Research Paper

Insights into reference point indentation involving human cortical bone: Sensitivity to tissue anisotropy and mechanical behavior

CrossMark

Submission process and other requirements

- You must submit an electronic copy to Compass and hard copy and/or electronic copy (ajwj@illinois.edu). Please also submit the paper being reviewed.
- Chose papers for your review that are important for your project.
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- If you are working on the project with a partner, you may not review the same paper.

SEARCH TOOLS

- Google Scholar
- Scopus
- Web of Science
- Pubmed
- Also see library resources (next slides)

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REFERENCE MANAGERS

- Zotero
- Endnote
- RefWorks
- **Mendeley - I use this** quick demo
- More…
- Many have desktop and/or web-based versions

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LIBRARY RESOURCES

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RELATED LIBRARY RESOURCES

Friday, September 9, 2016

3:00 pm - 4:00 pm	Managing Your Citations with Zotero

Tuesday, September 13, 2016

10:00 am - 11:00 am	Data Rescue
2:00 pm - 3:00 pm	Getting Organized with Mendeley

Wednesday, September 14, 2016

10:00 am - 11:00 am	Organize Your Life: Productivity Tools and Personal Information Management
11:00 am - 12:00 pm	Revamping Your Research Plan: Citation Chasing, Keyword Searching, and More
1:00 pm - 2:00 pm	The Power of Presentations: Enhancing your Slides for Teaching and Engagement

Thursday, September 15, 2016

1:00 pm - 2:00 pm	Building Digital Exhibitions with Omeka
3:00 pm - 4:00 pm	A Library for Everyone: Getting the Most Out of Your Library

Tuesday, September 20, 2016

10:00 am - 11:00 am	Creating Data Documentation
1:00 pm - 2:00 pm	Managing Your Citations with Zotero
3:00 pm - 4:00 pm	Ways of the Web: Filter Bubbles, Search Engines, and You

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RELATED LIBRARY RESOURCES

Tuesday, September 27, 2016

10:00 am - 11:00 am	Preparing for Data Sharing
2:00 pm - 3:00 pm	Choosing a Citation Manager

Wednesday, September 28, 2016

10:00 am - 11:00 am	Managing Your Citations with Zotero
1:00 pm - 3:00 pm	GIS for Research II: GIS Research, Data Management, and Visualization

Friday, September 30, 2016

11:00 am - 12:00 pm	Getting Organized with Mendeley

Tuesday, October 4, 2016

10:00 am - 11:00 am	Drowning in Citations and PDFs? EndNote Can Help!
11:00 am - 12:00 pm	Introduction to Infographics Using Piktochart
12:00 pm - 1:00 pm	Data Rescue
1:00 pm - 2:00 pm	Google for Scholars

Friday, October 7, 2016

11:00 am - 12:00 pm	Frame Your Research Visually: An Introduction to Prezi
1:00 pm - 2:30 pm	Smart and Simple Data Management
2:00 pm - 3:00 pm	Sharing Research with Story Maps

Monday, October 10, 2016

3:00 pm - 4:00 pm	Creating and Incorporating Visual Media into Your Research

Tuesday, October 11, 2016

10:00 am - 11:00 am	Getting Organized with Mendeley
12:00 pm - 1:00 pm	Choosing a Citation Manager
2:00 pm - 3:00 pm	Revamping Your Research Plan: Citation Chasing, Keyword Searching, and More

Wednesday, October 12, 2016

1:00 pm - 2:30 pm	Smart and Simple Data Management

Thursday, October 13, 2016

2:00 pm - 3:00 pm	Managing Your Citations with Zotero

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REFERENCES AND RESOURCES USED IN THE REST OF THIS PRESENTATION

Elements of Style for Writing Scientific Journal Articles

Stephen M. Griffies NOAA/Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA and Associate Editor, *Ocean Modelling*
William A. Perrie Fisheries and Oceans Canada, Bedford Institute of Oceanography, Dartmouth, NS, Canada and Editor-in-Chief, *Ocean Modelling*
Gaëlle Hull Elsevier, Oxford, UK

December 2013

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Publishing Connect
Partnering with the Global Research Community

Writing a Scientific Paper: From Clutter to Clarity

Gregory S. Patience, Daria C. Boffito, Paul A. Patience
Department of Chemical Engineering, Polytechnique Montréal, C.P. 6079, Succ. CV Montréal, H3C 3A7 Québec, Canada

Abstract

Preparing a manuscript is a time-intensive activity: organizing the technical content, preparing graphs and tables, writing, proofreading, and correcting syntax. Wordiness is a major impediment to communication: this document advocates writing concisely. We identify best practices for preparing graphs and tables. Together with conventions for significant figures, we tabulate typical grammatical errors and extraneous expressions. Write your paper well so that reviewers concentrate on the content.

Keywords: Syntax, Graphs, Tables, Grammar

Sentence Structure of Technical Writing

Nicole Kelley
Program in Writing and Humanistic Studies @ MIT
2.671, Fall 2006

Lecture materials derived from *The Craft of Scientific Writing* © Michael Alley and "The Science of Scientific Writing" by Gopen and Swan

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Source: http://www.dansimons.com/resources/writing_tips.html

Musings on Writing

SOME COMMON PROBLEMS WITH TECHNICAL WRITING

- Unnecessary:
  - Complexity
  - Redundancy
  - Wordiness
- Use of:
  - Vague pronouns
  - Imprecise adverbs
  - Weak verbs

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UNNECESSARY COMPLEXITY/ELEVATED LANGUAGE

Category	Example	Substitute
nouns	utilization functionality	use feature
verbs	facilitate finalize	cause end
adjectives	aforementioned individualized	mentioned individual
adverbs	firstly, secondly, heretofore	first, second previous

"…ascertain correct assumptions…"

"…conclusions would only partially endure experimentation."

"The approach entailed manipulating…"

"…optimal placement would exist…"

"Much debate transpired before these notions…"

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UNNECESSARY REDUNDANCY

- ***Combine overlapping sentences where possible***

Ex. 1: Water quality in Hawk River declined in March. This decline occurred because of the heavy rainfall that month. All the extra water overloaded Tomlin county's water treatment plant.

Ex. 2: Water quality in Hawk River declined in March because heavy rainfalls overloaded Tomlin County water treatment plant.

Eliminate redundant words or phrases

- *due to the fact that* → *because* or *since*
- *immediately apparent* → *apparent*
- *in the case that* → *in case*
- *and also* → *and*
- *in order to determine* → *to determine*
- *to try and determine* → *to determine*

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UNNECESSARY WORDINESS

(already) existing	never (before)
at (the) present (time)	none (at all)
(basic) fundamentals	now (at this time)
(completely) eliminate	period (of time)
(continue to) remain	(private) industry
currently (being)	(separate) entities
(currently) underway	start(out)
(empty) space	write(out)
had done (previously)	(still) persists
introduced (a new)	mix (together)
often (times)	(end) result

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UNNECESSARY WORDINESS

It has been found that CO2 and H2O formation has been reduced at high temperatures.

Change to:

CO2 and H2O formation is lower at higher temperatures.

Better yet:

Less CO2 and H2O ~~was~~ formed at higher temperature.

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USE OF VAGUE PRONOUNS

Avoid using "this" unqualified.

- Avoid: "We found this to be the most important facet of the ocean's dynamical response."
- Write: "We found this feature of the thermocline to be the most important facet of the ocean's dynamical response."
  - What does "this" refer to? If the reader must guess, then the guess could be wrong.
  - Even when it is "obvious" what "this", "that", "these", or "those" refer to, the author serves the reader well by clearly qualifying.

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USE OF IMPRECISE ADVERBS

Adverb	Imprecise	Clear
extremely	The rate is extremely dependent on operating temperature	The rate depends on temperature
significantly	The rate increases significantly with temperature	The rate doubles for every increase in 10C
very; a lot	Samples were withdrawn from the tube very often	Samples were withdrawn at a frequency of 2/h
approximately	The test lasted approximately between 5s to 30s	The test lasted between 5s and 30s

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USE OF WEAK VERBS

- ***Avoid too many "to be"verbs***

  "is""was""were""has been""have been"
- ***Avoid excess words,*** which slow comprehension of the main point

Not good!	Better!
made arrangements for	arranged
made the decision	decided
made the measurement of	measured
performed the development of	developed
is working as expected	works as expected

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OTHER NOTES ON VERBS…

Use active voice if possible

- The passive voice can be used in the Methods section. Otherwise, the active voice can shorten sentences and make them more dynamic and interesting for the reader.
- Use the active phrase "we found that…" freely, which is a quick signal to the reader that you are describing one of your results. This expression is also more concise than writing in the passive voice, as in, for example, "it has been found that there had been…"

- Ex 1: The feedthrough was composed of a sapphire optical fiber, which was pressed against the pyrotechnic that was used to confine the charge.
- Ex 2: The feedthrough contained a sapphire optical fiber, which pressed against the pyrotechnic that contained the charge.

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AVOID STATEMENTS OF BELIEF

- ***Communication of science is not about conveying belief!!***
- Avoid:
  - "We believe this model result to be true."
- Write:
  - "We show through our analysis that this model result is consistent with the empirical evidence."
- Communication of science is about logically developing lines of evidence that lead one to a hypothesis, theory, or conclusion based on the evidence.

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EXPRESSIONS AND WORDS TO GENERALLY AVOID…

- It is shown that
- It can be noticed that
- It has to be mentioned that
- It should however be noted that
- It is clear that
- Is given by the fact
- As can be seen from the figure
- It takes into account the fact that
- It is identified that
- Tremendous
- Dramatically
- Drastically

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SAY WHAT YOU REALLY MEAN

The following list of phrases and their definitions might help you understand the mysterious language of science and medicine. (IUTAM Understanding and Writing Scientific Research Papers)

What it says	What is means
The results will evaluate…	Results cannot evaluate…
It has long been known . . .	I didn't look up the original reference
A definite trend is evident . . .	These data are not statistically significant, and may be virtually meaningless
Three of the samples were chosen for detailed study .	The other results didn't make any sense
Typical results are shown . ..	This is the prettiest graph/picture, and the only one that makes any sense
In my experience . . .	This happened Once!
In case after case . . .	Twice!
In a series of cases . . .	Three times!
It is generally believed that . . .	A couple of others think so too

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SAY WHAT YOU REALLY MEAN (CONTINUED)

What it says	What is means
Correct within an order of magnitude ..	Wrong
According to statistical analysis . .	Biologically meaningless
A statistically-oriented projection of the significance of these findings . . .	A wild guess
A careful analysis of obtainable data . . .	Three pages of notes were obliterated when I knocked over a glass of beer
It is clear that much additional work will be required before a complete understanding of this phenomenon occurs. . .	I don't understand these results
After additional study by my colleagues . . .	They don't understand it either
It is hoped that this study will stimulate further investigation in this field	I quit

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OTHER KEY POINTS

- Read the document **OUT LOUD** to yourself (seriously, no joke)
- Write a sentence describing the main point of the paragraph next to the paragraph.
  - Can you read through those sentences and get the jist of the whole story?
  - Does each paragraph really say what you think it says? Or what you intend?
  - Is the main point at the top of the paragraph? Or buried where no one can find it…maybe not even you!
- Re-Read the document **OUT LOUD** to yourself (still no joke)
- Use the check list on the next couple of slides. It could be very useful!

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CHECKLIST

- Use this as a checklist when writing/revising.
- Read it through a couple of times ***before*** you really start writing in order to avoid pitfalls in the first place…

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Revision Worksheet

Go through this revision worksheet in order, checking a box only after you have completed that step or verified that you addressed it. The revision/editing process should take longer than the original writing process. By following these revision steps, your paper will be more concise, more precise, and easier to read.

Preparation
- ☐ Print your paper
- ☐ Create an outline from your paper, with a short phrase summarizing each paragraph

Organizational Level
- ☐ The point of your paper is clear from the outline
- ☐ The structure of your argument is clear from the outline
- ☐ Each phrase in the outline follows logically from the one before it
- ☐ Each phrase in the outline is needed for your core argument (no tangents)
- ☐ The paper has no "GoTo" statements (e.g., "discussed below" or "as noted earlier")
- ☐ The opening paragraph grabs the reader's interest and establishes the topic
- ☐ The final paragraph draws a conclusion and places it in a reasonable context

Paragraph Level
- ☐ Each paragraph has only one point
- ☐ Each sentence contributes to the one point of the paragraph
- ☐ Each sentence follows logically from the one before it
- ☐ No sentences are redundant
- ☐ All lists and arguments have a parallel structure

Sentence Level
- ☐ Rewrite passive sentences in active voice
- ☐ Search for sentences with forms of "to be" (e.g., is, are, was, were) and rewrite them with a more powerful verb
- ☐ All lists and arguments within a sentence have a parallel structure
- ☐ No sentences start "X has Y that..." (e.g., Researchers have shown that...)
- ☐ Researcher names are in parenthetical citations and not in the body of the sentence
- ☐ No sentences can be combined or condensed to cut wordiness
- ☐ *Pro Tip*: Make sentences within a paragraph vary in structure and length
- ☐ *Pro Tip*: Show it, don't tell it. Give an example to illustrate your point rather than just stating your point. Show that the result is interesting rather than stating that it is.

Word Level (general)
- ☐ Find and replace all acronyms
- ☐ Verify that any jargon terms are both necessary and defined

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Source: http://www.dansimons.com/resources/writing_tips.html

CHECKLIST (CONTINUED)

- Pick a couple of topics to check for and read ONLY for those things.
- Repeat for more of them.

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Word Level (search and destroy)

- ☐ Search for "which" — either rewrite the sentence or check if "that" is correct
- ☐ Search for "effect" and make sure it is a noun (it almost always should be)
- ☐ Search for "affect" and make sure it's a verb (unless you are writing about emotion)
- ☐ Search for "firstly" and replace with "first" (do the same for "secondly," etc.)
- ☐ Search for other words ending in "ly" (e.g., importantly, hopefully) and make sure you mean "in an X sort of way" (e.g., "importantly" means "in an important sort of way")
- ☐ Search for "less" and replace with "fewer" if you are referring to something countable
- ☐ If you are the sole author, search for "we" and replace with "I"
- ☐ Search for "reaction time" and make sure you don't mean "response time"
- ☐ Search for "random" and make sure you don't mean "arbitrary"
- ☐ Make sure you don't have more than two hands (e.g., on the third hand)

Word Level (principled pet peeves)

- ☐ Search for variants of "usage" and "utilize" and replace them with "use"
- ☐ Search for "since" and make sure you mean "at a later point in time"
- ☐ Search for "while" and make sure you mean "at the same time as"
- ☐ Search for double contrasts (but rather, yet although, etc) and cut one word
- ☐ Search for "this" and make sure it is immediately followed by an antecedent
- ☐ Search for "obtain" and make sure it has a direct object ("obtain results" but not "results obtain")
- ☐ Search for "one" and rewrite the sentence if you are using it to mean "people."
- ☐ Search for "very" and cut it
- ☐ Make sure descriptive adjectives are needed (e.g., eliminate "brilliant" from "brilliant genius")
- ☐ Search for "certain" and "specific" and either make the noun more explicit or rewrite the sentence (e.g., "certain findings" is vague)
- ☐ Search for and cut phrases like "I think," "I feel," and "I believe."
- ☐ Search for "clear" and verify that your claim actually is clear (it probably isn't)
- ☐ Search for "obvious" and verify that your claim is obvious (it probably isn't)
- ☐ Search for "interesting" and make sure your reader would also think it's interesting
- ☐ Search for "human brain" and eliminate "human" if you're not directly contrasting humans with another species
- ☐ Search for "brain" and "mind" and make sure you're taking about the brain or mind and not the whole person (brains and minds don't see or explore)

Final Check

- ☐ grammar check
- ☐ spell check
- ☐ typo check