

A close-up photograph of a hand in a white shirt cuff and dark suit sleeve striking a matchstick. The match is lit, with a bright yellow flame and wisps of white smoke. To the left of the lit match are seven other unlit matchsticks of the same type, arranged in a slightly curved line on a dark, textured wooden surface. The background is blurred, focusing attention on the hand and the match.

Causal Inference – Theory and Applications

Dr. Matthias Uflacker, Johannes Huegle, Christopher Schmidt

July 10, 2018

Agenda

July 10, 2018

- **Submitting Process**
- **Introduction to Scientific Writing**
 1. Introduction
 2. Paper Sections
 3. Further Recommendations
 4. Argumentation Style
 5. Accessible Writing Style
- **Reviewing a Paper – In Short**

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Submitting Process

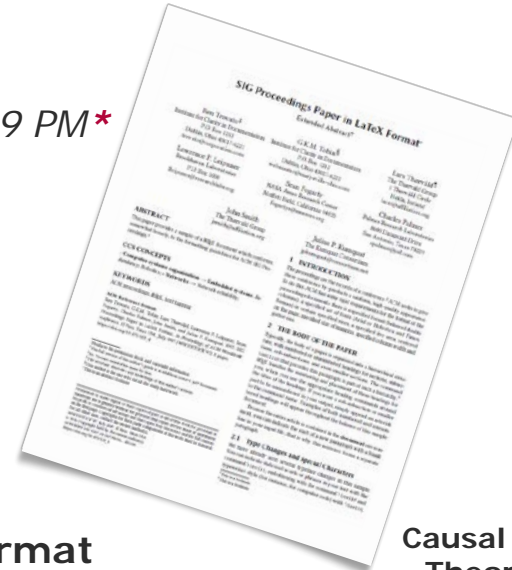
Submitting Process Overview

Timeline

- **Submission of Draft for Peer-Review:** *July 27, 11:59 PM**
- **Peer-Review Submission:** *August 10, 11:59 PM**
 - One anonymous review per student
- **Final Submission:** *August 31, 11:59 PM**

Format

- Formatted using the **ACM SIG Proceedings Paper Format**
 - <https://www.acm.org/publications/authors/submissions>
- Scope of around **six pages**



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* Email to [Johannes Huegle](mailto:Johannes.Huegle)



Introduction to Scientific Writing

1. Introduction

Aims of Research

- Extend knowledge of mankind
 - Identify a *problem* that has not been solved yet
 - Formulate the problem or a question
 - Solve the problem/answer the question
- Have an overview of *existing approaches*, literature, and related issues
- *Organize your arguments* and results to be
 - Short,
 - Profound, and
 - Expressive

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1. Introduction

Types of Scientific Publications

- *Methodical paper*
New algorithms, systems, etc.
- *Review / survey paper*
Status quo / current status of a research area
- *Concepts paper*
New ideas or theories without concrete realization
- *Evaluation paper*
Quantitative comparison of different approaches
- *Technical Report*
Notification of current status of an approach within organization, usually no review

*most typical scientific
publication*

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1. Introduction

Writing Procedure

- Every paper *tells a story – know your story!*
 - *What:* What you want to find, the problem being solved
 - *Why:* Purpose and rationale
 - *How:* Your approach

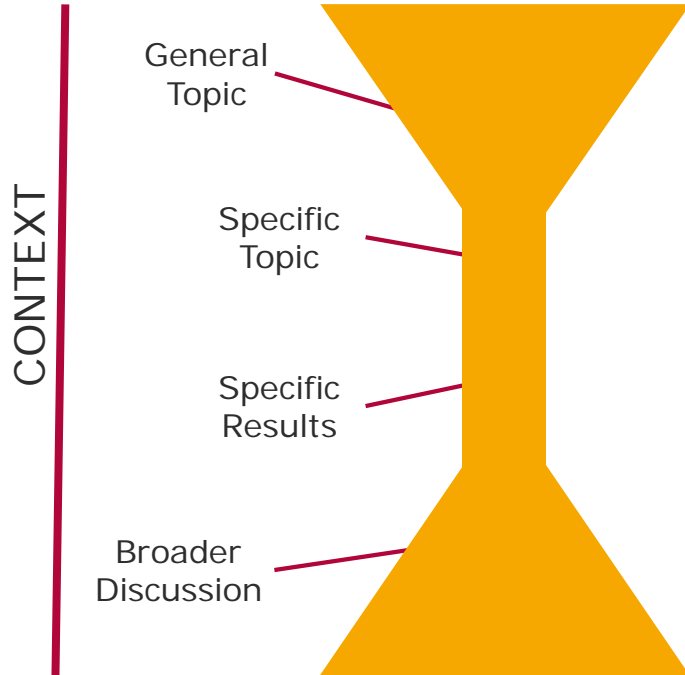
- *Write for the reader, not for yourself!*

- *Plan your document structure*
Create an outline, discuss with others

- *Write top-down*
broad themes/ideas first, then go into detail

2. Paper Sections

Hourglass



- | | |
|----------------|----------------|
| ■ Title | ■ Title |
| ■ Abstract | ■ Abstract |
| ■ Introduction | ■ Introduction |
| ■ (Background) | ■ (Background) |
| ■ Related Work | ■ Main Part |
| ■ Main Part | ■ Related Work |
| ■ Conclusion | ■ Conclusion |
| ■ References | ■ References |

See also: *IMRAD structure*
(<https://en.wikipedia.org/wiki/IMRAD>)

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2. Paper Sections

Abstract



- Usually not more than 140 words
- Reflects the main story of the research paper
- *Calls attention* – make the reader curious about the content!
- Short and concise sentences

- Always follows a *funnel structure*
 - Scope – What is the general context?
 - Problem – What is the specific problem?
 - Significance – Why is it a problem?
 - Solution – How do you solve it?
 - Evaluation – Does your solution fulfill expectations (very short)?



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2. Paper Sections

Introduction



- Structure of abstract also applicable here, but in more detail
- First paragraph important: Reader decides here to continue reading!
- Particular tasks:
 - Introduce the topic and define the terminology
 - Indicate the focus of the paper and research objectives
 - Last paragraph outlines the structure of the paper
- Do not present your results here

What is the problem you specifically consider?

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2. Paper Sections

Related Work



- Purposes:
 - Help understanding the field and the problem
 - Show that you are aware of what is outside and appreciate the work of your colleagues
 - Compare and differentiate your work with the state of the art

- Content:
 - Strategies of the different approaches, strengths/weaknesses
 - How do we address potential shortcomings? (Contribution!)
- Useful instrument: Comparison table with your important criteria

	Approach A	Approach B	Our Approach
Criteria 1	x	x	x
Criteria 2	x	-	x
Criteria 3	x	x	x
Criteria 4	-	-	x

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2. Paper Sections

Hints for Literature Review



- Backward/forward search for publications in online archives
 - IEEE: <http://www.computer.org>
 - ACM: <http://www.acm.org>
 - Google Scholar: <http://scholar.google.com>
 - Microsoft Academic: <https://academic.microsoft.com/>
 - Citeseer: <http://citeseer.ist.psu.edu/>
 - Uni Potsdam Library: <http://info.ub.uni-potsdam.de/>

The screenshot shows the Google Scholar search interface. The search bar contains the term "biclustering" and a search button. Below the search bar, it indicates "Articles" and "About 8,690 results (0.08 sec)". A search result is displayed for a PDF titled "[PDF] Biclustering of expression data." by Y Cheng and GM Church, published in Ismb, 2000. The abstract describes an efficient node-deletion algorithm for finding submatrices in expression data. The result includes a star icon, a link to "Cited by 2272", and links to "Related articles" and "All 15 versions".

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2. Paper Sections

Main Part



- Conceptual part – Particular algorithm
- Implementation part – Architectural aspects of your prototype
- Results – What experiments did we run and what did we observe?
- Evaluation – What are the reasons for our observations?
- Discussion – What do these findings mean for our approach?

Can also go in one chapter

Remember your Chemistry protocols at school?

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2. Paper Sections

Conclusion



- ***NOT a summary:*** Sum up your findings, not what you have done
- Answer research questions/objectives
- State the importance of discovery and future implications
- Strong statements should be made (avoid “it may be concluded...”)

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3. Further Recommendations

Figures

- Good figures can make a paper come alive
- Good figures communicate ideas or patterns in the data much better than big tables of numbers
- Choose reasonable captions
- Be aware of printing resolutions (300 dpi for colors, 600 dpi for b/w)
- Prefer shadings over colors – documents are usually printed in b/w mode

Be aware of color blindness

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3. Further Recommendations

Tables

- Captions should not be too long, but also not *“architecture of ...”*
- Same with figures: Choose reasonable captions
- Explain content in more detail in the text
- If something is not worth explaining it in text → do not put it in the table

3. Further Recommendations

Footnotes

- NOT for parenthetical comments – important things must be in the text
 - Footnotes should be used for things the typical reader can genuinely skip
 - Websites etc. also do not belong into footnotes, list them as reference
- ➔ Footnotes stop readers, so better try to avoid

3. Further Recommendations

Citing

- Direct speech
 - *“With method ... we achieve ...”*
 - *X claims he “... has developed a methodology ...”*

- Indirect speech – rather name system instead of authors
 - *X has developed a method ...*

- Reference is not a subject of sentence – list it at the end of sentence
 - X has developed a method ... [1].

4. Argumentation Style

Proper Argumentation - What is an Argument?

An **argument** is a series of statements in which one or more statements (premises) are intended to support a statement (conclusion).

This is just the standard form! You could also begin with the conclusion

(1) 1st premise

(2) 2nd premise

...

(n) n-th premise

(c) Conclusion

(1) All cats are mammals.

(2) All tigers are cats

(c) Tigers are mammals.

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4. Argumentation Style

Deductive Arguments – Logical Validity

In an argument, the conclusion follows from the premises, if the conclusion has to be true in case the premises are true (were true).

Deductive Argument: An argument is called *valid*, if its conclusion follows *logically* from the premises.

You do not need any background information to check that!

In other words: If the reader agrees on the premises, he **MUST** also agree on the conclusion.

- (1) All cats are mammals.
- (2) Tigers are cats.

- (c) Tigers are mammals.

VS.

- (1) Unicorns like ice cream. ⚡
- (2) I like ice cream.

- (c) I am a unicorn.

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4. Argumentation Style

Deductive Arguments – Soundness

An argument is called *sound*, if

- a) it is valid, and
- b) its premises are true.

(1) All cats are mammals.
(2) Tigers are cats.

(c) Tigers are mammals.

Sound

vs.

(1) Unicorns like ice cream.
(2) I like ice cream.

(c) I am a unicorn.

Logically Invalid

vs.

(1) All dogs are chairs.
(2) Richard is a dog.

(c) Richard is a chair.

False Premise

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4. Argumentation Style

Deductive Arguments – Examples

Always check your deductive arguments for two aspects:

- (1) Does the conclusion follow from the premises? (=LOGIC)
- (2) Are the premises true? (=TRUTH)

Example 1: Paris is the capital of France. That is why Europe should not admit more refugees.

Example 2: All refugees are terrorists, and Europe should not admit terrorists. That is why Europe should not admit more refugees.

Example 3: The NPD is an anti-semitic party. Anti-semitic parties should be banned. Therefore, the NPD should be banned.

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4. Argumentation Style

Inductive Arguments

Inductive Argument: An argument that is intended to be *strong* or *forceful* rather than valid.

The acceptance of this argument depends on the reliability/credibility of the source!

(1) According to source S it is the case that X.

(c) X.

S = {
 Observation
 Study
 Expert
 Experience
 ...
}

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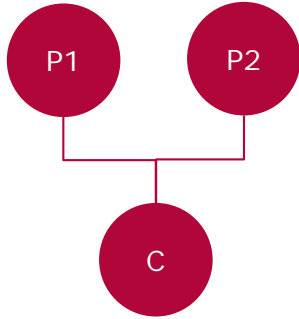
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Example 1: Literature shows that ... [3-10]

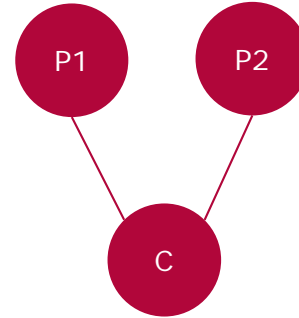
4. Argumentation Style

Argumentation Structure Types

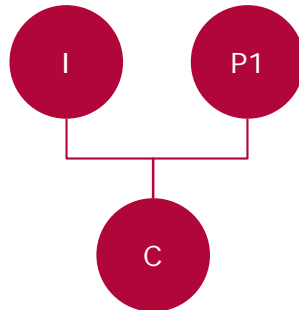
(a) Standard Argument



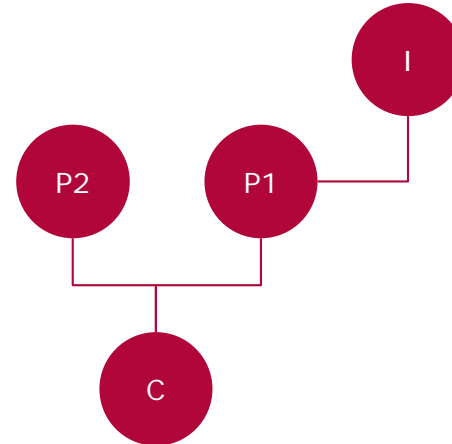
(b) Parallel Argument



(c) Mixed Argument



(d) Nested Argument



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4. Argumentation Style

Recommendations for Written Argumentation

- Make deductive arguments valid
- Do not mix arguments
- State your conclusion explicitly
- Define important concepts
- Do not use synonyms

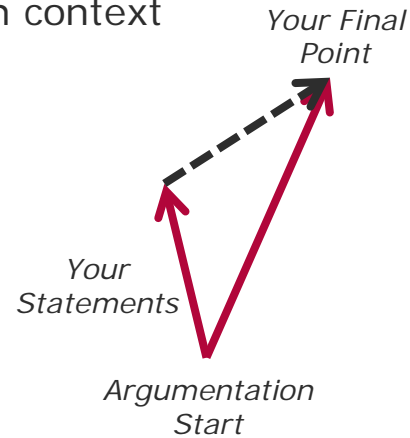
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5. Accessible Writing Style Overview

- Make reading the easiest for the reader
 - Write in an accessible style (no complicated sentence constructs)
 - No one can read your mind – provide enough context



- Reading pages of dense text is **no fun**
 - Make room for white spaces
 - Make content structure visible at first sight
 - Do not overload with 40 graphs – provide the key facts and points

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5. Accessible Writing Style

Main Rules for Accessible Writing

- Use verbs that are concrete
- Have simple things as grammatical subjects in your sentences
- Avoid clutter
- Active = Life, Passive = Death!
- Make your paragraph coherent

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5. Accessible Writing Style

Informative Verbs

- Put activity and information into your verb

The data offer confirmation of the view that substance xy causes the destruction of neurons.

*→ The data **confirm** the view that substance xy **destroys** neurons.*

The obtained trend was positive and significant; depicting that over the years there has been certain increase in the night time surface ozone concentration over the study region.

*→ The obtained trend was positive and significant. It **shows** that over the years the night time surface ozone concentration **increased** over the study region.*

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5. Accessible Writing Style

Little Red Riding Hood Principle



Once upon a time, as a walk in the woods was taking place on the part of Little-red-riding-hood, a jump from behind a tree by the wolf occured, causing a fright reaction.

Long and complicated subjects

Once upon a time, as Little-red-riding-hood was walking in the woods, the wolf jumped out from behind a tree and frightened her.

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5. Accessible Writing Style

Avoid Clutter

- Unnecessary meta-language

~~Another important aspect of the topic of sleep which should definitely be stressed at this point is that~~ sleep deprivation impairs concentration.

→ Sleep deprivation impairs concentration.

- Unnecessary adjectives or adverbs

At the moment, there is a ~~huge~~ gap in the ~~existing~~ literature on autonomous driving regarding the politics ~~and policy dynamics behind~~ autonomous driving.

- Little qualifiers ("kind of", "a bit", "somehow" etc.)

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5. Accessible Writing Style

Coherent Paragraphs

- Repeat main concept in a number of sentences

(1) Whales feed on plankton.

(2) Plankton is a source of nutrients for whales.

↑
Topic
Position

↑
Stress-
Position

Start your sentence with known concepts and end with new insights

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5. Accessible Writing Style

Further Recommendations I/IV

- Keep sentences short and precise (German problem...)
- Use **present** tense – do not switch tenses
- First sentence of a paragraph = lead sentence!
- Do not use abbreviations in headlines
- Avoid (self) assessments - *groundbreaking, good,...*
- Avoid vague statements - *possibly/probably, could/would/should,...*

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5. Accessible Writing Style

Further Recommendations II/IV

- Be aware of the difference between **such as** and **like**
 - *like* applies for closed bodies, i.e. you list all existing examples
 - *such as* applies for open d., i.e. there still exist other examples
- *"Ice cream like vanilla" vs. "Ice cream, such as vanilla"*
- Check **correct reference** of your verbs if you have multiple objects
- *"This results in incomplete patient records which eventually ..."*
- Check your formulations for **correct meaningfulness** and reference
- *"a method called HMW question" vs. "a method called formulation of HMW question"*
- Use **uniform phrasing** in listings
- *"I like eating and to run" vs. "I like eating and running"*

5. Accessible Writing Style

Further Recommendations III/IV

- Do not describe circumstances - *“after eight hours we realized ...”*
- This and that: Avoid references to previous sentences by using them
- That and which: If you can put a comma before it, use which
- Choose the way of your parenthesis according to importance
 - Important: Comma
 - Good to know: Hyphen
 - Actually not important at all: Braces (avoid these! ;)

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5. Accessible Writing Style

Further Recommendations IV/IV

- Absolute statements: Always relate to units
- Consistency throughout the text - spelling, formatting, etc.
- Think about what to highlight: no exclamation marks, use italic
- Do not continuously refer to earlier or later pages
- Add paragraphs between section headline and first subsection

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And Finally...

Before Submitting Any Paper

- Are headlines uniformly formatted, e.g. capitalized?
- Are proper tenses and voices used?
- Are all equations mathematically correct and explained in the text?
- Are all abbreviations explained/introduced?
- Are all figures/tables relevant and of good quality?
- Are all figures, tables, and equations listed and mentioned in the text?
- Are all references relevant, up to date and accessible?
- Are the references structured in a uniform format?

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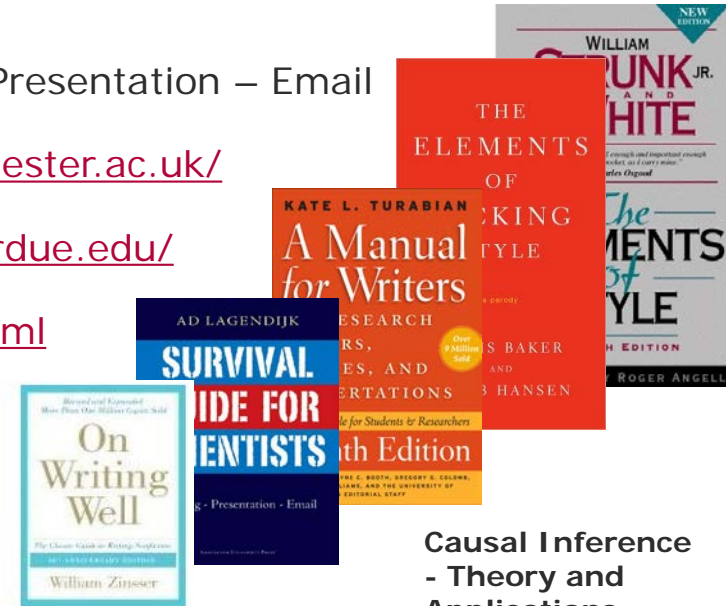
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References

Useful Links and Books

- Ad Lagendijk: Survival Guide for Scientists: Writing - Presentation – Email
- Academic Phrasebank: <http://www.phrasebank.manchester.ac.uk/>
- The Purdue Online Writing Lab - <http://owl.english.purdue.edu/>
- <http://www.cs.columbia.edu/~hgs/etc/writing-style.html>
- <ftp://fast.cs.utah.edu/pub/writing-papers.ps>
- http://www.itc.nl/library/Papers/hengl_rules.pdf
- http://www-net.cs.umass.edu/kurose/talks/top_10_tips_for_writing_a_paper.ppt



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Reviewing a Paper – In Short

The image shows three individuals in a server room setting. A woman on the left, wearing a red shirt, is holding a server hardware component. A man in the center, wearing glasses and a dark shirt, is looking at the component with a smile. A woman on the right, wearing a grey sweater, is holding a laptop. In the background, there are server racks and a poster with technical specifications. The poster includes the word 'Multi', a table with two columns of server configurations, and the heading 'Cloud Computing:'. The table lists 'R3600 2S' and 'R1600 56' configurations with their respective RAM and core counts.

Configuration	RAM	Cores
R3600 2S	1 TB RAM	32 Cores
R1600 56	32 GB RAM	40 Cores

Cloud Computing:
2 Environments
1 TB RAM

Reviewing a Paper – In Short

Motivation

Goals

- Uphold the *quality and validity* of individual articles and the journals that publish them
- Scientific writing is a (never-ending) *learning process*

History

- The introduction of peer reviews set the cornerstone of modern science
- *The Philosophical Transactions of the Royal Society* is thought to be the first journal to formalize the peer review process 300 years ago

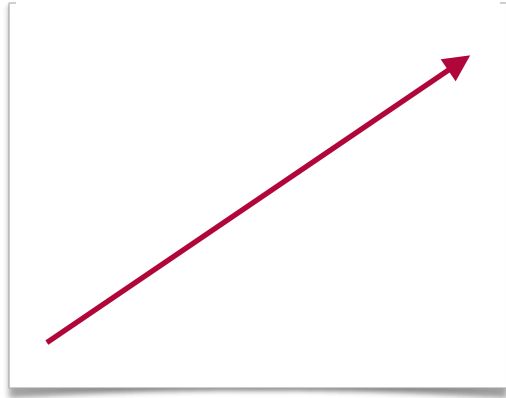
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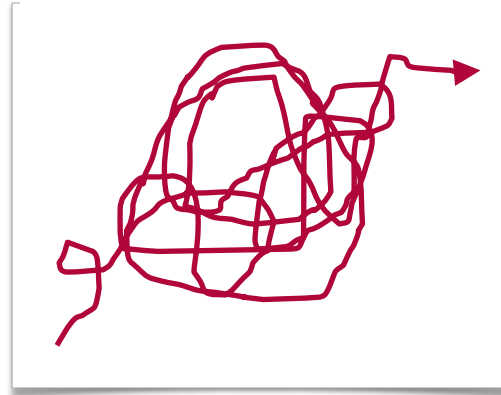
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Reviewing a Paper – In Short

The Review System in Brief



What people think it looks like



What it really looks like

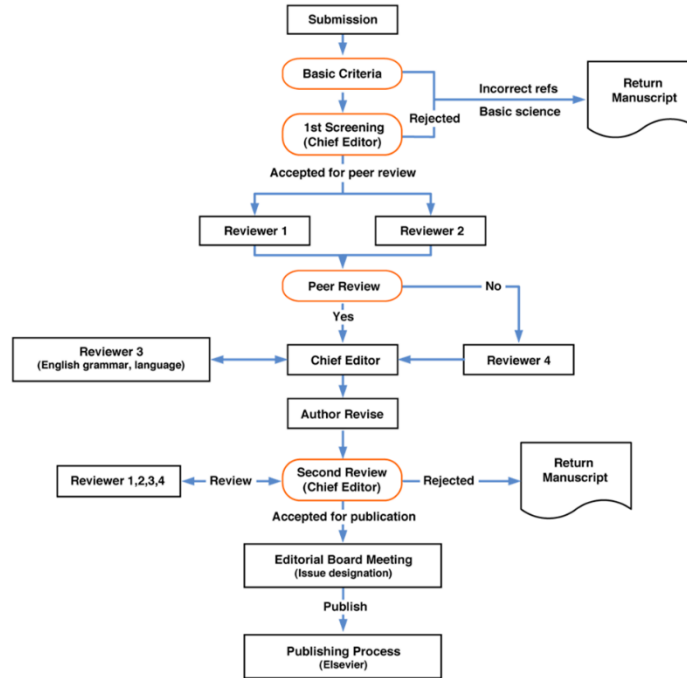
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Reviewing a Paper – In Short

The Review Process



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Reviewing a Paper – In Short

Types of Review

Single blind review

- Reviewers' names and affiliation hidden from the author
- Reviewer anonymity allows for impartial decisions
- Concerned that reviewers in their field could delay publication
- Reviewers may use their anonymity as justification for being unnecessarily critical

Double-blind review

- Both the reviewer and the author are anonymous (most common)
- Author anonymity prevents any reviewer bias
- Articles are considered on the basis of the content of their papers, rather than the reputation of their authors

Open review

- Reviewer and author are known to each other
- Discussions: Less honest or most honest review process?

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Reviewing a Paper – In Short

How to write a Review

- 1. Read the article**
- 2. Write a brief summary of the article and its contribution**
- 3. Write out your major criticisms of the article**
 - Is the article well-organized?
 - Does the article contain all of the components you would expect?
 - Are the sections well-developed?
 - Does the author do a good job of synthesizing the literature?
 - Does the author answer the questions he/she sets out to answer?
 - Is the methodology clearly explained?
 - Does the theory connect to the data?
 - Is the article well-written and easy to understand?
 - Are you convinced by the author's results? Why or why not?
- 4. Write out any minor criticisms of the article**
- 5. Review your review**

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References and Useful Links

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- Mulligan, A. (2005) [*Is peer review in crisis?*](#) Oracle Oncology
- Webster, J., & Watson, R. (2002). [*Analyzing the Past to Prepare for the Future: Writing a Literature Review.*](#) MIS Quarterly
- Smith, A. J. (1990). [*The task of the referee.*](#) IEEE Computer
- Bernstein, D. S., & Arbor, A. [*A Student's Guide to Peer Review.*](#)
- Cawley, V. (2011). [*Is peer review unethical?*](#) International Conference on Social Science and Humanity
- Lee et al. (2013). [*Bias in peer review.*](#) Journal of the American Society for Information Science and Technology

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