Causal Inference – Theory and Applications

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July 16, 2019

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Agenda
July 16, 2019

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

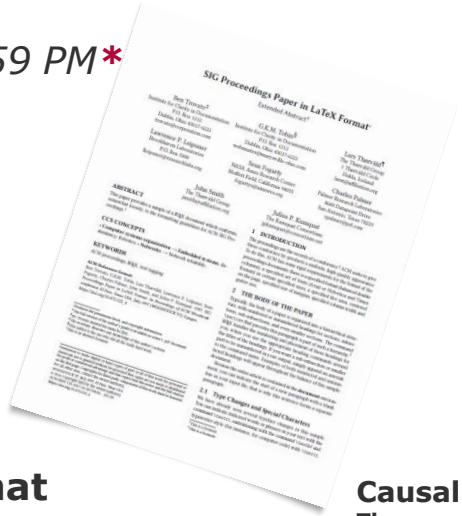
- **Reviewing a Paper – In Short**

Submitting Process

Submitting Process
Overview

Timeline

- **Submission of Draft for Peer-Review:** *August 02, 11:59 PM**
- **Peer-Review Submission:** *August 16, 11:59 PM**
  - One anonymous review per student
- **Notification:** August 19
- **Final Submission:** *August 30, 11:59 PM**



Format

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

* https://easychair.org/my/conference?conf=ci-taec_2019

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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

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

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!*

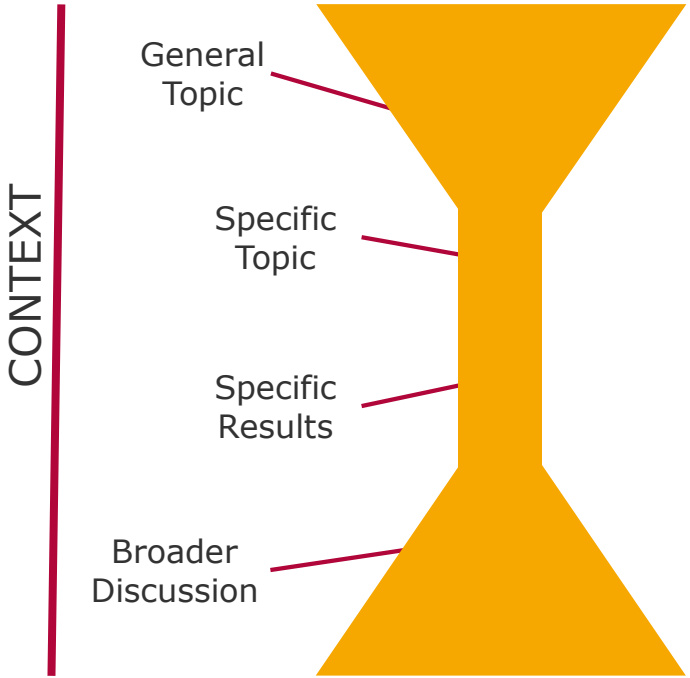
- *Plan your document structure*

  Create an outline, discuss with others

- *Write top-down*

  broad themes/ideas first, then go into detail

2. Paper Sections
Hourglass



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

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

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

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)?

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?

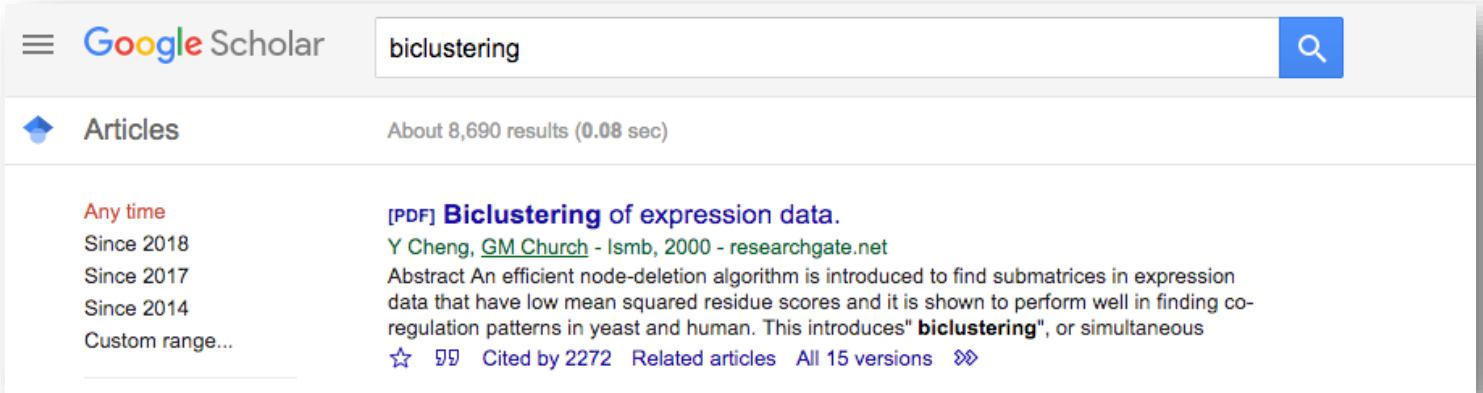
2. Paper Sections
Related Work

- 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

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/



2. Paper Sections
Main Part

- Conceptual part – Particular algorithm
- Implementation part – Architectural aspects of your prototype

Can also go in one chapter

- 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?

Remember your Chemistry protocols at school?

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…")

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

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.

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.

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

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.

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.

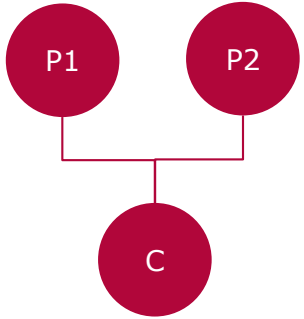
(c) X.

S = { Observation, Study, Expert, Experience, ... }

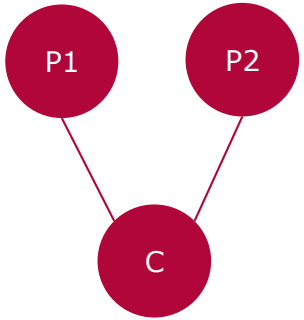
Example 1: Literature shows that ... [3-10]

4. Argumentation Style
Argumentation Structure Types

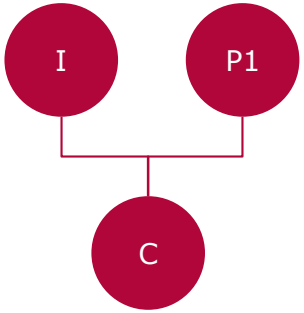
(a) Standard Argument



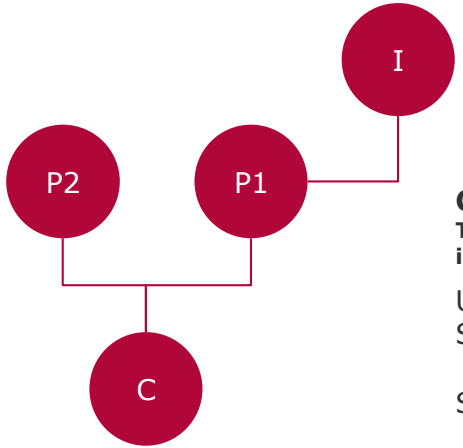
(b) Parallel Argument



(c) Mixed Argument



(d) Nested Argument

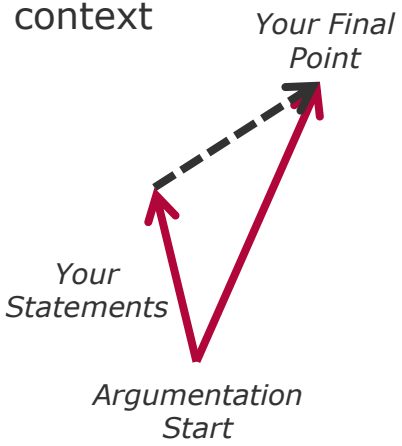


4. Argumentation Style
Recommendations for Written Argumentation

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

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

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

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.

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.

Source:
https://vignette.wikia.nocookie.net/grimmbilder/images/b/be/Rotkaeppchen_Fritz_Baumgarten_02.jpg/revision/latest?cb=20121217072906&path-prefix=de

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.)

5. Accessible Writing Style
Coherent Paragraphs

- Repeat main concept in a number of sentences

Start your sentence with known concepts and end with new insights

(1) Whales feed on plankton.
(2) Plankton is a source of nutrients for whales.

Topic Position

Stress-Position

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*,…

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! ;)

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

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?

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

Reviewing a Paper – In Short
Motivation

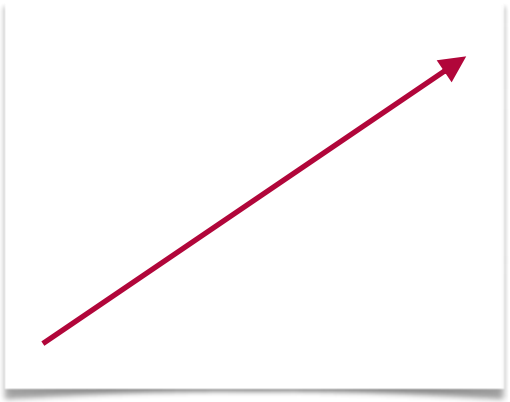
Goals

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

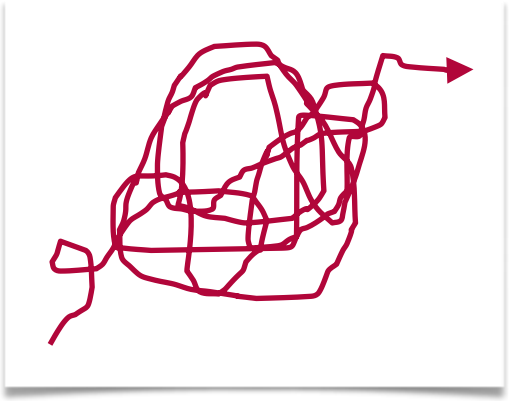
History

- 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

Reviewing a Paper – In Short
The Review System in Brief

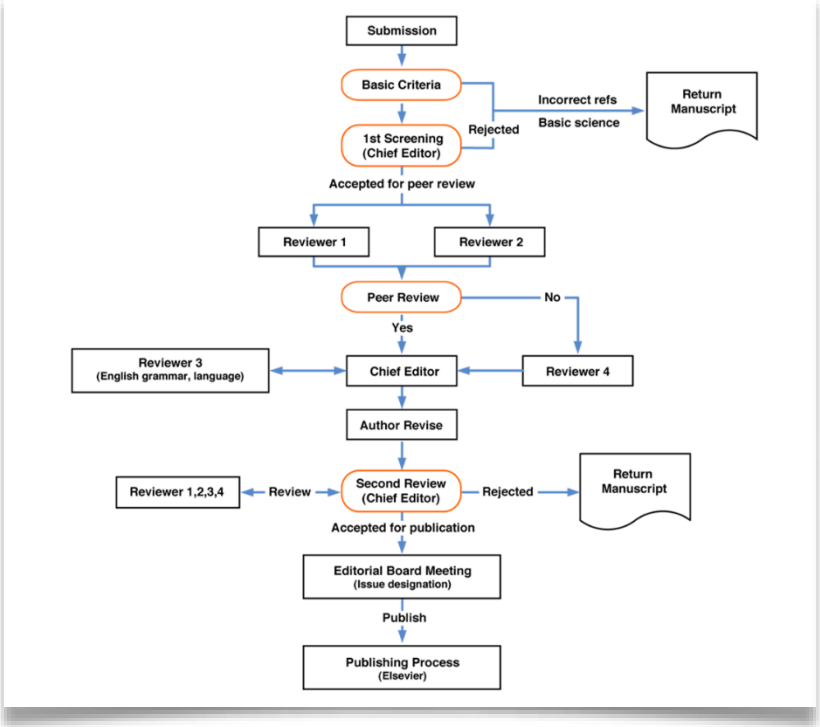


What people think it looks like



What it really looks like

Reviewing a Paper – In Short
The Review Process



Example from www.elsevier.com/reviewers/what-is-peer-review

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?

Reviewing a Paper – In Short
Review for CI-TAEC 2019 (I/IV)

I. OVERVIEW

I. A. Content

1. How do this manuscript advances this field of research and/or contributes something new to the literature.. * Please explain under public comments below.

2. Is the manuscript technically sound?. * Please explain your answer under public comments below.

- 4: No
- 3: Partially
- 2: Appears to be - but didn't check completely
- 1: Yes

Reviewing a Paper – In Short
Review for CI-TAEC 2019 (II/IV)

I. B. Presentation

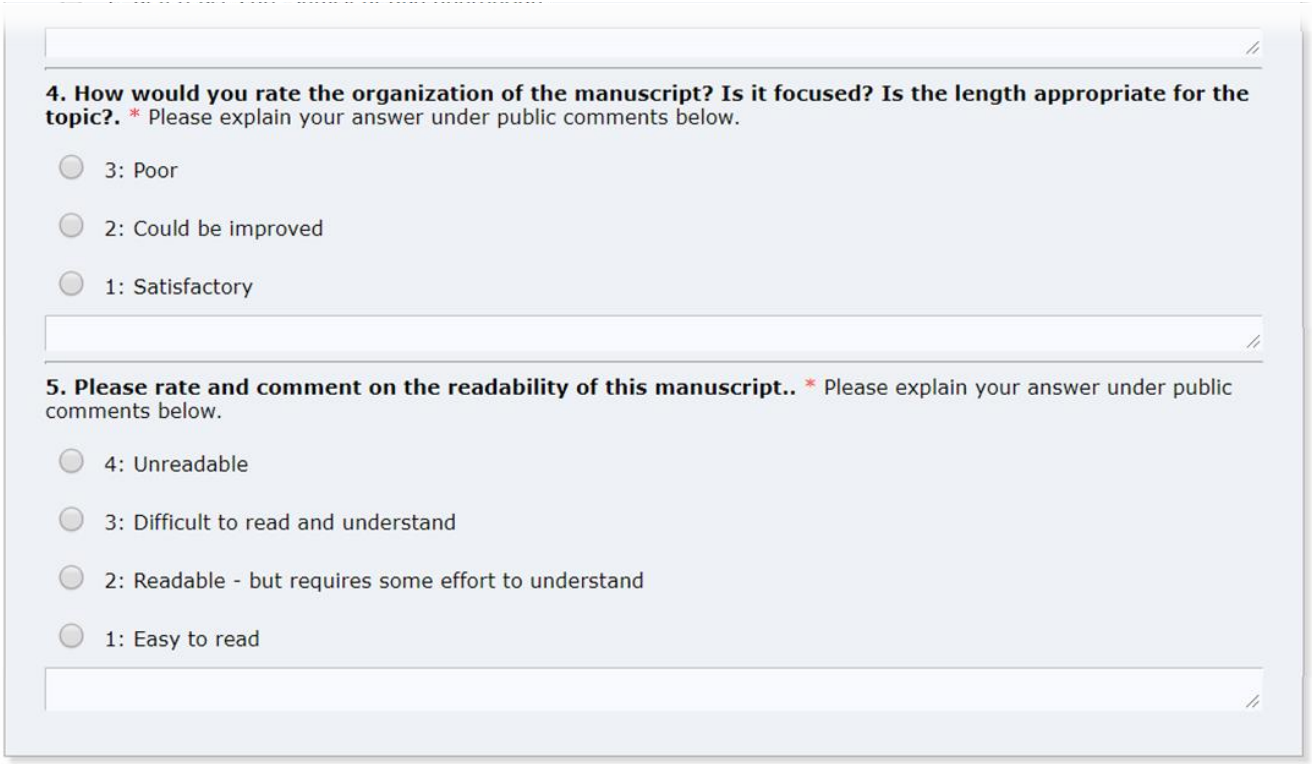
1. Are the title, abstract, and keywords appropriate?. * Please explain under public comments below.

- 2: No
- 1: Yes

2. Does the manuscript contain sufficient and appropriate references?. * Please explain your answer under public comments below.

- 3: Number of references are excessive
- 2: Important references are missing; more references are needed
- 1: References are sufficient and appropriate

Reviewing a Paper – In Short
Review for CI-TAEC 2019 (III/IV)



4. How would you rate the organization of the manuscript? Is it focused? Is the length appropriate for the topic?. * Please explain your answer under public comments below.

- 3: Poor
- 2: Could be improved
- 1: Satisfactory

5. Please rate and comment on the readability of this manuscript.. * Please explain your answer under public comments below.

- 4: Unreadable
- 3: Difficult to read and understand
- 2: Readable - but requires some effort to understand
- 1: Easy to read

Reviewing a Paper – In Short
Review for CI-TAEC 2019 (IV/IV)

II. SUMMARY AND RECOMMENDATION

Overall evaluation. * Please provide a detailed review, including a justification for your scores. Both the score and the review text are required.

- 3: strong accept
- 2: accept
- 1: weak accept
- 0: borderline paper
- -1: weak reject
- -2: reject
- -3: strong reject

Confidential remarks for the program committee. If you wish to add any remarks intended only for PC members please write them below. These remarks will only be seen by the PC members having access to reviews for this submission. They will not be sent to the authors. This field is optional.

Reviewing a Paper – In Short
References and Useful Links

- Spier, R. (2002) *The history of the peer-review process.* TRENDS in Biotechnology
- 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 Hunanity
- Lee et al. (2013). *Bias in peer review.* Journal of the American Society for Information Science and Technology