

Miniproject: Peer Review

BIOENG-451 Course Notes
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1 Peer Review Simulation

In this Miniproject, you will perform a peer review of a research paper, assessing its methodology, claims, and overall scientific validity. Your goal is to provide constructive feedback, simulating the role of a reviewer in the scientific publishing process.

2 Submission Components

Peer Review Report: A 1000-1200 word referee report. The structure is not strictly enforced but roughly we expect:

Initial Summary: (Aprox. 200 words). A brief summary of the paper, including its main claims and an indication of your general impression.

Evaluation and Recommendations: (Aprox. 800 words). Critically assess the methodology, relevance, and whether the authors claims are supported by the data. Offer suggestions for improvement, separated into major and minor comments.

3 Expected Components and Structure of the Peer Review Report

A well-composed peer review report serves as a **dual dialogue**: it communicates with both the editor and the authors. While some portions of the report may clearly target one audience over the other, remember that both parties will read the entire document.

A well-executed referee report **balances critique and guidance**. It is meticulous in its examination of the methodology, claims, and conclusions. The reviewer should identify discrepancies, inconsistencies, or insufficiencies and clearly articulate these in the report. A good report is not just a list of errors but provides **actionable recommendations** for improvement. Lastly, professionalism and respect should underpin all comments made.

Initial Summary: Start by summarising the article to the editor, do not only summarise the key take-home, but also summarise briefly how the claim is achieved and presented in the key narrative. This is also an opportunity to hint at your general impression of the paper by how you phrase your summary. Include the authors' claims and indicate whether you believe these are supported.

Evaluation and Recommendations *Value to the Field:* Comment on the paper's relevance, both intrinsically and in relation to existing literature. Highlight how the work contributes to current understanding and its significance in broader academic discourse. An expert refereeing the work should easily gauge if the work is outstandingly novel or incremental. *Editorial Recommendation:* Offer your opinion on what action the editor should take. Be cautious in this segment; your role

is to assess the adherence to the claim and if they are supportive and advise on the quality of the science and not to make editorial decisions about where the paper should be published. *Points of Criticism and Revision Recommendations* : This is the core of your report. You might want to distinguish between major and minor comments, providing detailed explanations and suggestions for each. Major comments should address fundamental issues that impact the validity of the research, while minor comments can focus on clarity, presentation, or smaller methodological concerns.

4 Revision Recommendations: Elaboration and Examples

The revision recommendations are the essence of your peer review report. This section is generally subdivided into major and minor comments, each serving distinct functions:

Major Comments: These are the critiques that deal with the core aspects of the research. They usually require substantial effort from the authors to address. Major comments may include:

- *Methodological Flaws:* If the methodology is unsound, the results cannot be trusted. Identify and articulate any such flaws.
- *Unsupported Claims:* Point out instances where the authors make claims that are not substantiated by the presented data.
- *Incomplete Analysis:* Indicate if further statistical tests are needed or if additional data should be collected.

For example, a major comment might read: "The authors claim that the drug X reduces tumor size significantly, but the statistical analysis provided does not adjust for multiple comparisons, rendering the conclusion questionable."

Minor Comments: These are smaller issues that do not fundamentally affect the validity of the research but do contribute to its overall quality. Minor comments often relate to:

- *Clarity and Language:* Suggest rephrasing sentences that are difficult to understand.
- *Figure and Table Improvements:* Recommend changes that make graphs or tables more informative and easier to interpret.
- *Reference Updates:* Point out if key literature is missing or if existing citations are outdated.

An example of a minor comment could be: "Figure 3 would benefit from a logarithmic scale to better visualize the smaller values."

5 Structuring the Comments

Typically, each comment should form a concise paragraph rather than a bullet point, providing enough detail for the authors to understand the issue and its solution. Major and minor comments usually appear in separate sections for clarity and ease of reading.

6 Concluding Remarks

While not mandatory, a concluding statement can wrap up the review, summarizing the key points and reiterating the recommended actions for the authors and editor. Since the beginning of the report already contains summaries and recommendations, the conclusion is optional but can add a final touch of coherence.

7 Additional Consideration: Your Role as a Reviewer

It's important to remember that you are not a co-author. While you assess the paper's methodology, claims, and relevance, you should not introduce new claims or hypotheses. The aim is to evaluate the paper's current state and its capacity to support its conclusions, not to redefine its scope or aims. Your role is not to dictate the research direction but to assess the validity and quality of the work presented.

8 Evaluation Criteria

- Clarity and thoroughness in the initial summary.
- Insightfulness in the assessment of the paper's value to the field.
- Appropriateness of the editorial recommendation.
- Comprehensiveness and specificity in the revision recommendations.

9 3-slide Flash presentations on the peer review

It is important to share a bit of what you did. In the final day we will have this opportunity. We will organize 3 slides of presentation per person to share the salient points from your review. The final day you will share, you can organize with the student with the same paper how not to be repetitive and organize your slides. This is graded and counts 20% of the miniproject grade.

9.1 Additional Guidelines

For a clearer understanding of what constitutes a high-quality peer review report, it is recommended to read published referee reports, such as those found in eLife.