

How to Write a Low-Error Manuscript? Experiences and Recommendations from an Experienced Reviewer

Wie schreibe ich ein fehlerarmes Manuskript?

Erfahrungen und Empfehlungen eines erfahrenen Gutachters

I have been reviewing articles for scientific journals for several years and I keep noticing frequent errors. I wish to use this experience as short tips for authors.

I will examine here only typical publications concerning a study, no surveys, letters to the editor, pro- and contra- series. The following points are important: Motivation, Title, Authors, Summary/Abstract, Key Words, Introduction, Methods, Results, Discussion, Figures, Tables, Language, Various/Formalities and a few summarizing final comments.

Structure of the Work

Motivation

The motivation for writing scientific articles is to promote science and/or make a career for oneself. You have found an interesting topic and researched it. Now, the results are to be made known. What must you pay attention to?

Title

The title should be short and crisp, not contain any fillers like "Influences". Example: "The Oxygen Dissociation Curve of Blood in COVID-19" instead of "Influences of the Oxygen Dissociation Curve of Blood in Patients with COVID-19". A question can rouse interest in controversial themes: „Does Regular Physical Activity reduce Energy Expenditure?“

Authorship

Actually, only authors who were really involved should be named. In 1969, my boss, Prof. Stegemann, gave me the assignment of investigating the unexpected decrease in standard bicarbonate in respiratory acidosis. When, after reviewing the literature and reaching some conclusions, I presented him with a theoretical explanation, he was enthusiastic and said: "Prove that experimentally, you can publish the results alone". Today, by contrast, there is a regular author inflation, because everyone wants to have a long publication list. Often, the supposed co-authors haven't even read the manuscript – that's the only way to explain the many formal errors and oversight errors. The first (writer) and the last (often the boss) are taken to be the most important.

Summary/Abstract

For the Summary, respectively Abstract, the motto is: What was done, what was found, what was concluded. What was found means: data, not only

significances! The latter can rather be omitted if the meaning of the findings is obvious from the text and the word-count is limited (often to 250).

Key Words

Key Words should be additional terms which are not already in the title! The two together are evaluated for databases.

Introduction

The Introduction should include a definition of the topic, state-of-the-art, open questions which are to be answered in the study.

The current state of research is best determined via Pubmed and Google Scholar, which go back to the 19th Century. Google covers more literature, while PubMed only takes evaluated journals into consideration. Special databases, for example for sports sciences, are also important. Reviews offer a valuable overview of research. Discussions with colleagues and visits to Congresses are also helpful sources.

Methods

The methods depend on the type of article (literature survey, experimental study or theoretical treatise).

Test Persons or Animals

For test persons or animals, information should be given on the number, sex, age, origin, state of health, previous illnesses, performance capacity, training experience, life history, as well as climate, season and altitude. Despite criticism, especially since 2019, "Race" is still frequently cited as a genetic factor – in the past 5 years according to Pubmed nearly 79,000 times, usually with terms like White, Black or Amero-Indian. German authors are understandably relatively reticent in this respect.

The study conditions include time of day when the measurement or sample was taken (circadian changes can be considerable), temperature, interval to food consumption, body position (supine, sitting, standing), activity (resting or working, including before the measurement).

Measuring Methods

Measuring methods must be presented comprehensibly and with sources. Since many are frequently used, the description is often identical. To avoid falling victim to plagiarism seekers, it is advisable to paraphrase the text or set it in quotation marks, if it is taken from an earlier publication.

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Statistics

If one is not a specialist, a statistician should be asked for advice. Incorrect applications are found over and over, for example t-tests instead of variance analyses in multiple comparisons.

Ethics Commission

Authorization is obligatory, except for purely methodical studies without biological participation. A general authorization for certain types of tests can be advantageous. Read the updated Authors Guidelines in the German Journal of Sports Medicine and check whether your study requires an IRB Review or a PROSPERO-Registration.

Errors

Errors occur from incorrect application of a measuring method, from inconstant study conditions, during the evaluation of the studies (transcription errors), from math errors, from excluding unwelcome measured values, by chance (i.e. with no recognizable cause).

Examples of Serious, Clearly Avoidable Errors

Methodical

The sodium concentration in human erythrocytes is purportedly 45 instead of correctly <10 mmol/l, since the authors did not correct for “trapped plasma” between the centrifuged erythrocytes (4). Its concentration is about 140 mmol/l.

Evaluation or Transcription Errors

The maximal heart rate of running mice was purportedly less than 160/min (6)! In fact, it is above 700/min (8)!

Extreme Values

These are preferentially considered measurement errors and omitted, but they could indicate unexpected properties!

Example: In mucoviscidosis, we found a right shift of the oxygen binding curve due to an elevated 2,3-Bisphosphoglycerate concentration (2,3-BPG), which was additionally detrimental to the O₂-uptake in the damaged lung (2). But one patient surprisingly showed a left shift due to reduced 2,3-BPGs. This was similar to the adaptation to Hypoxia+Hypercapnia in moles. The measured value was evidence of an advantageous mutation!

I described other errors found in scientific articles several years ago (1).

Results

Important for the Results is a systematic and complete description either in the text, in tables or in figures. The text should in any case cite the most important results. Check also whether the unit names are correct.

Discussion

The Discussion begins with the most important conclusions without repeating a detailed description of the results. Then comes a comparison with the literature, importance of the topic, open questions, summarizing assessment. All authors must contribute to this.

Figures

In Figures, the causing quantity belongs on the x-axis, the resultant quantity on the y-axis. Abbreviations must be defined in the legend, since figures are to be understood independent

of the text. Don't include too much in one figure; that makes it easier for the reader.

Tables

Tables should also be independent of the text, so abbreviations used must also be defined. Literature sources should be given in detail (not only the numbers in the reference list). Check also whether the values of two quantities fit, if the second was calculated from the first. I have found calculation errors here. Large tables are hard to take in, it is better to split them.

Language and Writing

For English texts, it is advantageous if a native speaker or someone who spent a longer period in an English-speaking area is the author or reads the article through. In my experience, criticism often comes from non-native speakers, probably because they do not know all variations in the world language which make several formulations possible.

Abbreviations

Lots of unusual abbreviations make it difficult to read quickly. Even the familiar ones should be explained, they may be forgotten in 10 years.

Frequent Language Errors

Quantity or parameter? Parameters influence the quantity, e. g. the temperature (parameter) influences the energy consumption (quantity). Norm or Normal value? Norms are used in the industry, the norm value is a prescribed value! In biology, normal values are examined.

Various, Formalities

Measured Quantities

The correct way of writing is important! The use of imprecise nomenclature like VO₂ instead of $\dot{V}O_2$ (l min⁻¹) is interpreted by reviewers as lack of knowledge or laziness.

Reference List

Alphabetical makes more sense than the sequence of quotations. Easiest to read are authors names in the text and an alphabetical reference list. Unfortunately, the rules are not uniform.

Disappointing Research Results

These are also important! However, results which do not support a widespread opinion are sometimes rejected by reviewers/editors.

Submission

The article is ready? Don't in any case submit it immediately! Put it aside for 4 weeks. When you read it again, you will be surprised: you find hidden errors, unclear formulations, missing words everywhere. Check, too, whether there are new relevant publications, correct the text – then submit it.

Journal Selection

Start with the best-known that fits thematically and qualitatively. If the article is rejected, an objection is worthwhile, if the criticism is unjustified – not all reviewers are experts or objective. Sometimes the objection leads to an examination, or another reviewer is consulted. If not, revise the article according to the criticism and submit it to another journal.

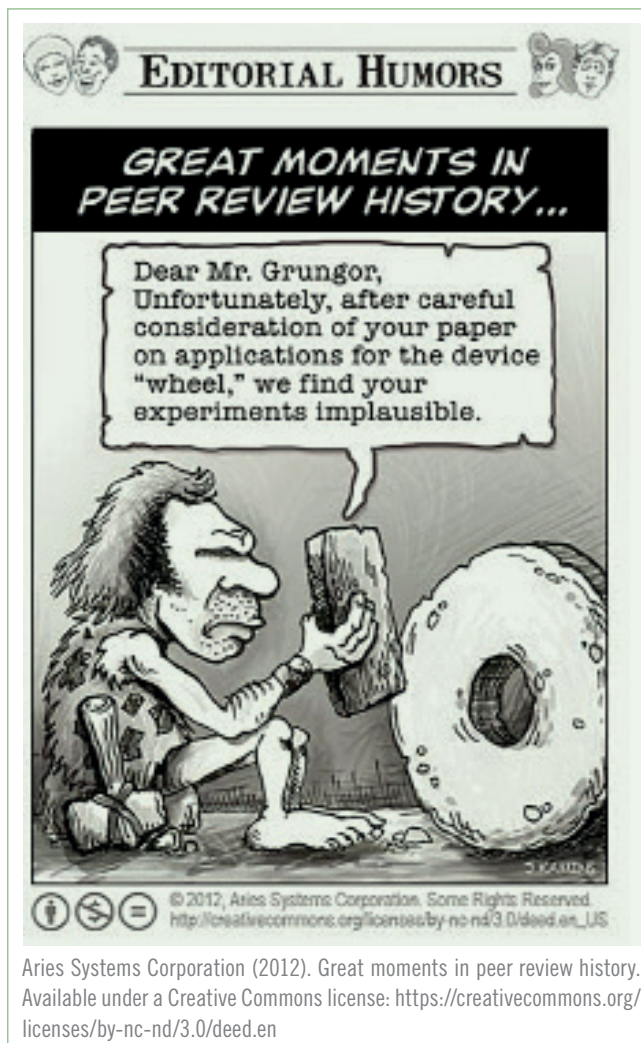
Conclusion

Don't give up too soon, if an article that you wrote with a lot of effort is rejected more than twice. Look at the article a year later – new knowledge often comes with less emotional involvement and current literature. Parts of the text can possibly be used in other articles. Throwing the article out for good should only happen when you and knowledgeable colleagues are convinced that it can't be saved. One thing remains for sure: you learned something from the experience! And remember: even the invention of the wheel was never published!

Unfortunately, nonsense is published again and again. For example, Robergs et al. (5) claimed that when lactate forms in the muscle, no hydrogen ions and thus no lactic acid are formed. That is actually true for the immediate reaction. H^+ is only released after ATP-consumption and then the acid is present (3)! It is also amazing that Stewart's ideas about the acid-base status (9) found such acceptance; they are based on concepts (chloride ions as acids) which, to my knowledge, have been abandoned by chemists for a long time. I am more convinced by the concepts of the Copenhagen School of Astrup and Siggaard-Andersen (7), which use the pH, PCO_2 and standard bicarbonate and base excess in the extracellular space, and these have also become established in clinical practice.

Outlook

In order to increase the quality and the international standard of our journal, we are currently planning an Online-Course with the Title "How to Write a Scientific Article", which is oriented to the requirements of PubMed. The course will be offered as Webinar on our homepage and give authors practice-relevant tips on writing high-value scientific articles, since some dynamics are always involved in this process. By exchanging ideas and experiences, we want to create an inspiring learning environment which will further promote the writing of scientific articles. ■



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