

JOURNAL ARTICLE REVIEWS

The goal of the journal article reviews is to help you become familiar with contemporary research issues in musculoskeletal modeling and simulation while simultaneously developing your critical and independent thinking skills. In your academic career, it will be important to develop an effective writing style that allows you to publish your work in peer-reviewed journals. Reviewing papers written by others is good practice for developing your own writing skills.

For each article review, you should seek to summarize succinctly the main points the authors are making and identify the strengths, weaknesses, and future directions of the work. This will be achieved through two avenues:

- 1) A presentation to the class. This may take the form of a PowerPoint presentation, handouts, or any other method you are comfortable with. Limit your presentation to 20 minutes with 8-10 slides. Seek to engage the rest of the class in the discussion by posing questions and/or in-class exercises and by being creative in your mode of delivery (e.g., setup a debate or panel discussion about the article).
- 2) A minimum one page written review handed out to the entire class (double spaced, 12 point Times New Roman). These are to be in your own words, although discussion with your classmates prior to turning in the assignment is encouraged. The written review format should use the following template:

General Comments

Is the article clearly written? Is the study original and an important contribution to the literature? What is your overall impression?

Title and Abstract

Does the title accurately describe the study? Is the abstract informative enough that it can stand alone as an accurate summary of the research? Are the abstract's conclusions supported by the results?

Introduction

What was the author's purpose in writing this article, and do they present a solid rationale for it? What new "twist" were the authors adding to the investigation of this problem? Are the study objectives clearly stated?

Methods

Can you understand what the authors did and would you be able to reproduce their results if you were knowledgeable in that area? Are sufficient details presented? What things did the author do well in the experimental, analytical, or computer simulation methodology? What things could the author have done better? Did the author make any assumptions that were not justified?

Results

Do the authors present and display the data in the clearest way possible? What do you think are the most significant results of this work?

Discussion

Did the authors relate their study to prior work in the literature? Is it clear how this study supports or disagrees with previous studies and why? Did the authors acknowledge the limitations of their study and discuss how these might affect the results and their interpretation? Are the conclusions justified by their data? If you were to continue this work from where the author left off, what would you do next and why?

References

Are the references appropriate for the statements they are meant to support? Are they up-to-date?

JOURNAL ARTICLE BACKGROUND

Overview

Most papers of original research follow a template, usually required by the journals in which they appear. The journal in which the paper appears is important. The first items seen in a paper are the title, the authors, and their affiliations. Many journals require an abstract that summarizes the entire paper. The actual paper begins with an Introduction section, many times labeled as such. Next is the Materials and Methods section, followed by the Results section and the Discussion section. Papers end with Acknowledgements and References in separate sections. We will now discuss each section of the paper and its organization, which should help you in your critical reviews.

Journal

Some journals are perceived to be more desirable in which to be published than others. A measure of this is the impact factor, which is the average number of times a paper in that journal is cited by others. Examples of journals with very large impact factors are *Science*, *Nature*, *Cell*, and *The New England Journal of Medicine*, with impact factors of 40 or more. Important journals in biomechanics (the *Journal of Biomechanical Engineering* and the *Journal of Biomechanics*) typically have impact factors less than two. Some journals in obscure countries have factors many times less than one (*e.g.*, 0.004).

Title

The title should be concise and informative. The title will be the very first item you encounter in a literature search. You will disregard references based on the titles, so you do not want others to disregard your work because of a title. Be suspect of over reaching titles like (the fictitious title) "The effect of exercise on bone adaptation." These papers typically do not cover every aspect of what their titles imply.

Authors

Identifying the authors and their affiliations is important. You will grow to recognize excellent researchers and will find important works that they publish. You will want to know the history of their efforts to help you understand why the current state of the art is what it is. You will want to keep abreast of what other groups are focusing their efforts on to help guide your own work, especially since these groups may have previously solved problems that you now face.

The number and order of authors can be a red herring. Some perceive a long list of authors as a negative ("who did the work?" or "it took you that many people?"). Some groups just include everyone who worked on the project (*e.g.*, 35 authors on a *Science* paper), the thinking being that every cog in the machine is important. Frequently, the first author is the one who conceived of the work and, most likely, wrote most of the paper. The last author in a group is often (but not always) the director of the research group. To address such order issues, the research director is often listed as the corresponding author.

Introduction

This section should begin with a clear statement of the problem addressed in the paper. Key references are cited, how others have tried to solve the problem, and how this paper improves on previous solutions. Background scientific or anatomical information is provided here. Typically, the last sentences describe specifically what was done.

Methods

This section should include descriptions of the experimental set up, mathematical modeling, data acquisition and reduction, and statistical analyses. If these items were previously developed and reported, they should be briefly reiterated with the proper citations given. If a clinical component exists, patient demographics should be reported here, as well as the procedures used. Statements of adhering to the proper institutional review boards (human or animal use) should appear here. Your review of this section should include the main points but not be a blow-by-blow description. No one is expected to be an expert in everything except work intimately related to his own. Some mathematical developments can be quite involved, and given the time, most of us could recreate them. However, your review should not include descriptions of how "equation 27 follows from equation 26."

Results

This section contains a detailed report of the data measured, reduced, and analyzed according to the Materials and Methods section. The authors should only "state the facts," with interpretation of the data delayed until the Discussion. Most readers will scan the abstract and then look through the figures to determine whether the article is worth reading. Therefore, the best authors often start by carefully laying out all the figures to tell the desired story. The text is then written around the figures. Therefore, working hard to develop clear and attractive figures to present the results is a critical part of paper writing.

Discussion

This section contains a more detailed cited history of the problem under study and others' solutions. The current study should be related to existing work, how it differs, how it is the same, and how it is novel. Results should not be repeated except in general terms to support conclusions drawn from these results. Critical assumptions and limitations should be discussed along with their potential impact on the results.

Acknowledgements

This short section contains credit to those deemed not deserving of co-authorship (technicians, machinists, consultants). The applicable funding source should be credited.

References

Each journal has its own format for references. They are usually alphabetized, rather than "chronological" in appearance in paper. When you write a paper, it is usually best to keep citations in the text in terms of the author (or authors if multiply cited) and dates (e.g., Zajac, 1993; Delp and Loan, 2000). You may wonder why important references known to you are not included.