



LECTURE ON HOW TO (SERIOUSLY) READ A SCIENTIFIC PAPER

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SATURDAY 26 MARCH 2016 TIME 11 AM - 12 PM FCI- BLIND CENTER



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ACKNOWLEDGMENT



The essential mission of SRGE toward the research and education in Egypt is to foster learning and promoting research integrity in the current and next generation of researchers in Egypt. SRGE is rededicating itself to this fundamental purpose.

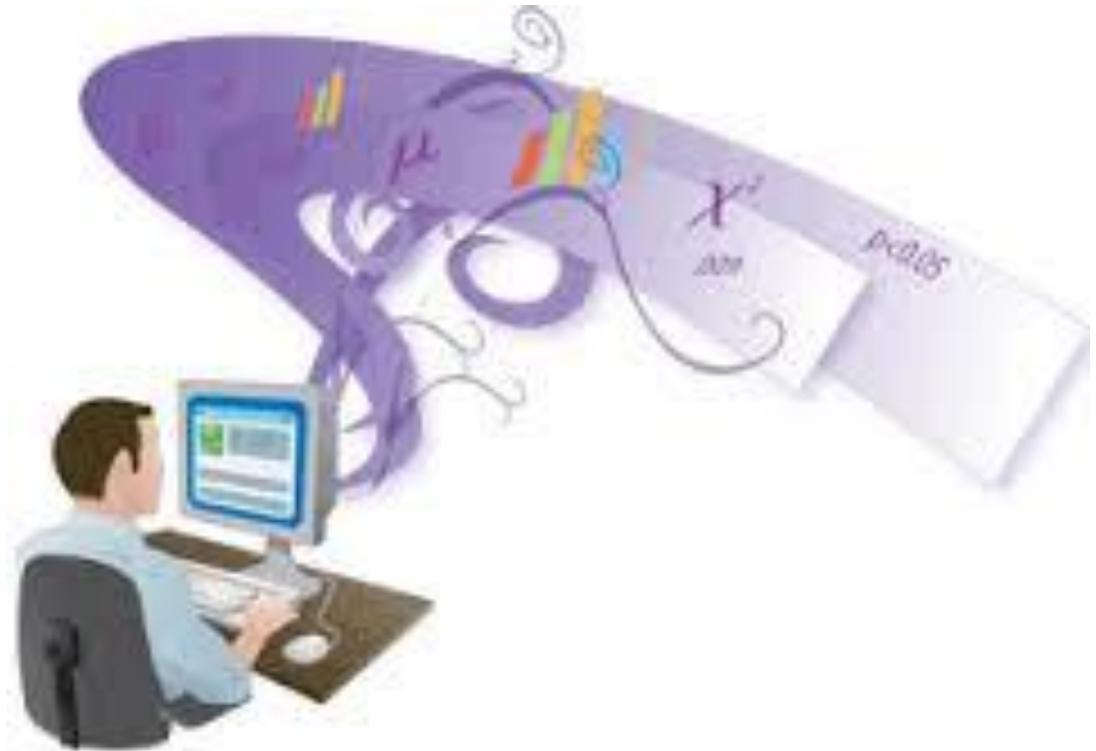
****Slides are adapted from several presentations and books on the internet****

The structure of a scientific paper:

How to write one and how to read one.

Today's agenda:

1. What is a scientific paper?
2. Why read scientific papers?
3. Anatomy of a scientific paper
4. Structure and purpose of each section
what to consider as you read
5. Examine the published papers that students chose. How are they similar and different?
6. How to go about it
7. Links to glossaries of research terminology





WHAT IS A SCIENTIFIC PAPER?

- ***Scientific papers present data and interpretations***
- Scientists report the results of their research by writing and publishing scientific papers, which are written in a very formal style.
- One of the objectives of a scientific paper is to make available the data from a set of studies so that others can learn from them and build on them to address new questions.
- By publishing and sharing data, scientists work together to advance our understanding. Some articles include results from a few targeted studies, and others present large datasets that other scientists can use in new ways to address different questions.



WHY READ SCIENTIFIC PAPERS?

- When studying sciences at university you will be expected to read and critically evaluate scientific papers, including original research and systematic reviews. These papers are usually found in peer reviewed journals, meaning that the papers have been through a peer review process. This involves reviewers, who are expert in the field, critiquing the work and providing feedback to the authors so that any concerns arising can be addressed before the work is accepted for publication.
- It is important to read scientific papers from peer-reviewed journals rather than just text books because of this peer-review process and because scientific journals provide more up to date information on a topic. Additionally, it is the main way scientists communicate their ideas and findings to each other. As you are studying science/ applied science, it is also important to get an understanding of scientific methodologies and reading such research will help you to achieve this. Note. Whilst for the reasons discussed it is important to read scientific papers, to start with it is often helpful to get background knowledge around a topic from textbooks.

A scientific paper is really three (3) separate papers. This fact is critically important when you set out to write a paper, or to read one.

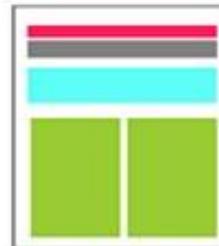
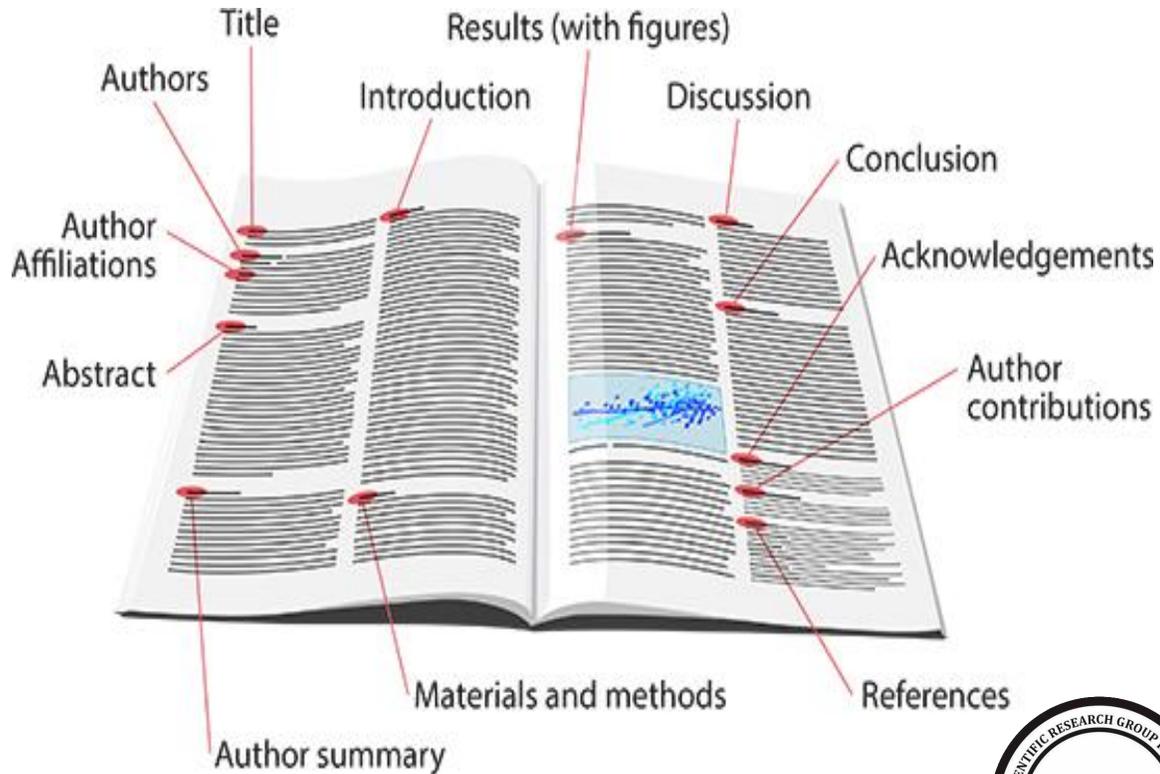
Although, in published form, the title comes first and the abstract second, they are nearly always the last to be written

Title: Fishing for readers

Abstract: The “Reader’s Digest” version

**The body of the paper:
The whole story**

ANATOMY OF A SCIENTIFIC PAPER



TITLE

AUTHOR INFORMATION

ABSTRACT: A summary of the study and findings, written by the author.

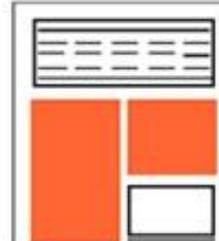
INTRODUCTION: A statement of what is currently known about the study subject that articulates the questions being investigated. It cites other scholarly works, lays the foundations for the study, and sometimes states a hypothesis to be tested.



RESULTS: A description of the research conducted and the results obtained.

Results are presented as tables, large datasets, and figures, which can include graphs, videos, diagrams, and photographs.

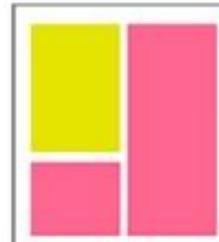
Some papers include additional supporting data as a supplement.



DISCUSSION: An analysis and interpretation of the data presented that integrates the new information with prior findings, states the implications of the work, and sometimes generates new hypotheses to be tested.

METHODS: A description of how the studies were conducted, with sufficient detail so that others can repeat them exactly.

REFERENCES: The list of the articles cited in the paper that provide information on the research topic and the methods used.



THE BODY OF A PAPER IN A TYPICAL JOURNAL



- Introduction
- Materials and Methods (sometimes just “Methods”)
- Results
 - Text
 - Tables
 - Figures
- Discussion
- Acknowledgments
- Literature Cited

A number of journals, including some highly prestigious ones like *Science* and *Nature*, have very different formats, but we'll focus on the standard format used by the vast majority of journals.

Never read a paper from start to finish



Most of us never read a paper from start to finish:

Read the **title** first,
then the **abstract**,
then the **last paragraph of the Introduction**,
then the **first paragraph of the Discussion**,
look at the **figures and tables**.



STRUCTURE AND PURPOSE OF EACH SECTION

WHAT TO CONSIDER AS YOU READ



Section	Purpose	Relevance for critical evaluation
Title	Identifies what the paper is about.	Provides information on the paper's relevance to your purposes. If uncertain, see the abstract.
Authors	Identifies who did the work, their affiliation/s and who the contact is for the work.	Who the individuals are may not be particularly important. Knowing if the paper has been peer-reviewed and if there is any potential conflict of interest with the authors who did the research (for example, sources of funding from those with a vested interest in the results)).
Abstract	Summarises the paper, particularly the key findings and often the methodology.	Allows you to determine relevance and identify key findings. Note: you should read the full paper to critically evaluate the work.
Introduction	Sets the framework for the paper, identifying gaps in previous research, justifies why the current research is important and outlines aims, research questions and / or hypotheses.	Contributes to the credibility of the paper in terms of providing a sound background and justification for the research.
Method/ Design	Outlines the design of the study and method used in the experiment. Usually includes information on the population (subjects/ cohort) studied.	Highly important. You need to critically evaluate the methods to identify if the experiment is well conducted to control for things (biases) that might influence the results of the study that are not the things in the experiment being tested. Well-designed studies that have minimal sources of bias and use tools to measure outcomes that are reliable and valid, allow you to believe the findings are due to the experiment itself, rather than other influences.
Results	Report what the research has found. Results may be quantitative (data expressed numerical) or qualitative (descriptive observations) depending on the study design and type of data collected.	Highly important. Look at the results to determine the answer to the study's research questions (Do the results support or go against the hypothesis? Are the results inconclusive?) The results provide you with the findings of the research rather than the authors' interpretation of these findings.
Discussion	Provides the authors' interpretation of the results in the context of the research question and other research in the field. Relevance of the results suggested in a practical or 'real world' context. Reports on limitations and areas for further research.	Helps you to understand the results and the 'real world' applications of these findings. As you become more experienced and skilled in studying science, ideally, you should try to draw your own conclusions from the data in the results section. As the authors critique their own work here, this can help inform your critical evaluation of the paper.
Conclusion	<u>Often included in the discussion section</u> , but may be separate. Provides a take home message based on the aims and findings.	Ideally, the reader should try to draw their own conclusions from the results section. However, as beginning scientists this section can be very helpful for relevance.
References	Lists other sources cited in the paper (these are mainly cited in the introduction and discussion).	Evaluate to determine if the relevance and currency of the literature. This can also be a helpful source for finding other relevant literature in the area.



HOW TO GO ABOUT IT

Now that you have an understanding of how scientific papers are structured and the content and relevance of each section, the following is to help to identify an approach to reading a scientific paper.

- Screen the title to see if the paper is relevant for your purpose. If uncertain check the abstract for more detail to determine if the paper is relevant.
- Once you have determined the paper is likely to be relevant, read the abstract in detail to get an idea of the key findings and how the research was approached.

Apply your knowledge on the structure and relevance of each section to interpret and evaluate the paper :

- Read through the introduction to get an understanding of what is known in the area and the reason or purpose of the research (or paper). Ask yourself if the purpose is clear and justified from the background information provided in the introduction?
- Read the methods section in detail to understand and critically evaluate the design of the study. Ask yourself: is the study well designed?; have the researchers tried to eliminate things that may influence the results other than the variables of interest (i.e. minimised sources of bias)?; are the results likely to be reliable and can they be reproduced?



HOW TO GO ABOUT IT (CONT.)

Now that you have an understanding of how scientific papers are structured and the content and relevance of each section, the following is to help to identify an approach to reading a scientific paper.

Apply your knowledge on the structure and relevance of each section to interpret and evaluate the paper :

- Read the results section in detail, including the figures and tables, to interpret what the results indicate in terms of answering the research questions/ aims proposed in the introduction. Draw conclusion from these results. (As beginners in studying the sciences, the discussion/ conclusion sections will be helpful to interpret the results of the paper).
- Read the discussion with purpose to get an understanding of the authors' interpretation of their results in the context of other scientific literature. There may also be information about limitations of the researchers' work and directions for further research. A conclusion should be provided in terms of an interpretation of the key findings in the context of the research aims/ question (this may be in a separate section labelled 'conclusion').

LINKS TO GLOSSARIES OF RESEARCH TERMINOLOGY



- When reading scientific papers you will often come across research terminology that you are not familiar with. It is a good idea to look these up so you can understand what you are reading

What to write first?

Although, in published form, the Title comes first and the Abstract second, they are nearly always the last to be written, or at least the last items to be finalized.

The body of the paper is tackled first.

