

How to write a paper

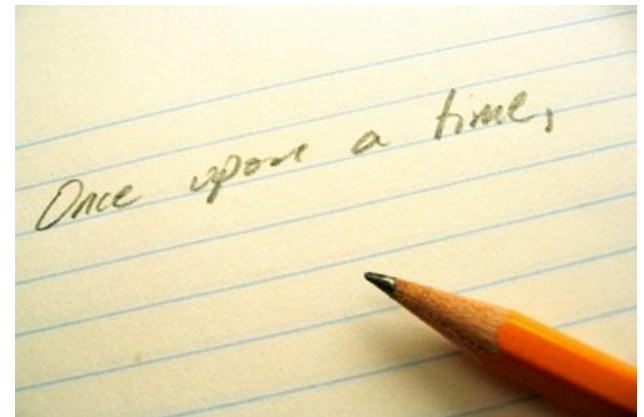
Giorgio MATTEI

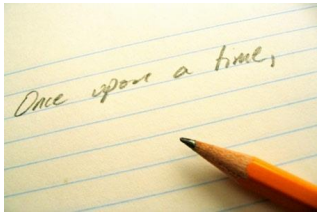
Contacts:

giorgio.mattei@centropiaggio.unipi.it

Course: Fenomeni di trasporto biologico

Date: 04 Oct 2016

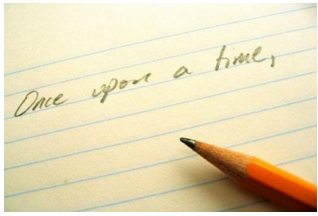




Why a scientific format?

- It is a means of **efficiently communicating scientific findings** to the **broad community of scientists** in a **uniform manner**
- This format **allows the paper to be read at several different levels**
 - For example, **many people skim Titles** to find out what information is available on a **specific subject**
 - Others may read only titles and **Abstracts**
 - Those wanting **to go deeper** may look at the **Tables** and **Figures** in the **Results**, and so on.

“Take home” message: the scientific format helps to insure that at whatever level people read your paper (beyond title skimming) they will likely get the key results and conclusions



The Sections of a Paper

- Most **journal-style scientific papers** are **subdivided into sections** which usually appear in the following prescribed order:

Experimental process	Section of Paper
What did I do in a nutshell?	Abstract
What is the problem?	Introduction
How did I solve the problem?	Materials and Methods
What did I find out?	Results
What does it mean?	Discussion
Who helped me out?	Acknowledgments (optional)
Whose work did I refer to?	Literature Cited
Extra Information	Appendices (optional)



Title, Authors' Names and Institutional Affiliations

- The **title is not a section**, but it is **necessary and important**
- The title **should be short and unambiguous**, yet be an **adequate description of the work**
- A general rule-of-thumb is that the title **should contain the key words describing the work** presented, since it becomes the **basis for most on-line computer searches**: **if your title is insufficient, few people will find or read your paper!**

Journal of Biomechanics 47 (2014) 2641–2646

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Viscoelastic characterisation of pig liver in unconfined compression

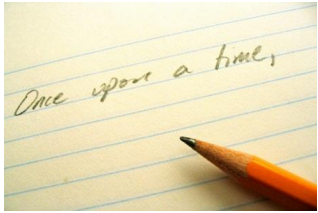
G. Mattei^{a,b,*}, A. Tirella^{a,c}, G. Gallone^{a,b}, A. Ahluwalia^{a,c}



^a Research Centre "E. Piaggio", University of Pisa, Largo Lucio Lazzarino 1, 56122 Pisa, Italy

^b Department of Civil and Industrial Engineering, University of Pisa, Largo Lucio Lazzarino 1, 56122 Pisa, Italy

^c Institute of Clinical Physiology, National Research Council, Via Moruzzi 1, 56124 Pisa, Italy



Title: an example

- Consider a paper reporting on an experiment involving **dosing mice** with the **sex hormone estrogen** and **watching for a certain kind of courtship behavior**

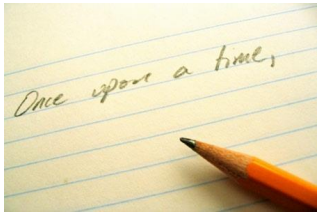
Mouse Behavior

Poor title: it is **very general**, and could be referring to any of a number of mouse behaviors

The Effects of Estrogen on the Nose-Twitch Courtship Behavior in Mice

Better, but improvable: the key words identify a specific behavior, a modifying agent and the experimental organism. **If possible**, give the **key result** of the study **in the title**.

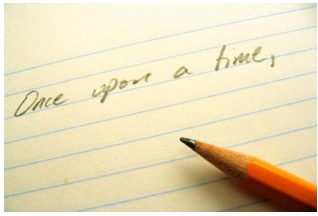
Estrogen Stimulates Intensity of Nose-Twitch Courtship Behavior in Mice



Abstract

Function: summarize, usually in one paragraph, the major aspects of the entire paper in the following prescribed sequence:

- the **question(s) investigated** or purpose (from **Introduction**)
 - ✓ state the purpose very clearly in the first or second sentence
- the **experimental design** and **methods** used (from **Methods**)
 - ✓ clearly express the basic design of the study
 - ✓ name or briefly describe the basic methodology used without going into excessive detail-be sure to indicate the key techniques used
- the **major findings** including key **quantitative results/trends** (from **Results**)
 - ✓ report those results which answer the questions you were asking
 - ✓ identify trends, relative change or differences, etc.
- a brief summary of your **interpretations** and **conclusions** (from **Discussion**)
 - ✓ clearly state the implications of the answers your results gave you



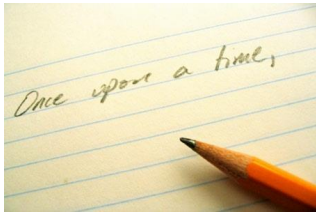
Abstract

- **Typical length:** 200-300 words maximum
- The **Abstract** helps readers to **decide whether** they want to read the rest of the paper, or it may be the only part they can obtain via **electronic literature searches** or in published abstracts.
- Therefore, enough **key information** (e.g., summary results, observations, trends, etc.) **must be included to make the Abstract useful** to someone who may to **reference your work**.

How do I know when my Abstract contain enough information?



Imagine to be a researcher doing a study similar to the one you are reporting. If your **Abstract is the only part** of the paper **you could access, would you be happy** with the **information presented** there?



Abstract

Style: The Abstract is **only text**. Use the **active voice** when possible and **concise-but-complete sentences**, and **get to the point quickly**

- The Abstract **SHOULD NOT** contain: lengthy background information, references to other literature, elliptical (i.e. ending with ...) or incomplete sentences, abbreviations or terms that may be confusing to readers, any sort of illustration, figure, or table, or references to them.

Strategy: Although it is the first section of your paper, the **Abstract must be written last** since it will **summarize the paper**

Check your work: Once you have the completed abstract, check to make sure that the **information in the abstract completely agrees with what is written in the paper and actually appears in its body**

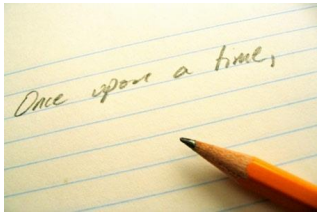


Introduction

Functions:

- **Establish the context of the work being reported** by **discussing the relevant primary research literature** (with **citations**) and **summarizing the current understanding** of the problem investigated
- State the **purpose of the work** in the form of hypothesis(es), question(s), or problem(s) investigated
- Briefly **explain** your **rationale** and **approach** and, whenever possible, the **possible outcomes** your study can reveal.

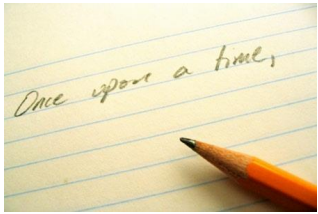
The Introduction must answer the questions: *What was I studying? Why was it an important question? What did we know about it before I did this study? How will this study advance our knowledge?*



Introduction

Structure: can be thought as an **inverted triangle** - the broadest part at the **top reports the most general information** then **focus down to the specific problem you studied**. Organize the information to present the more general aspects of the topic early in the Introduction, then narrow toward the more specific topical information that provides context, finally arriving at your statement of purpose and rationale.

- **Begin by clearly identifying the subject area of interest**
- **Establish the context by providing a brief and balanced review of the pertinent published literature** that is available on the subject
- **Clearly state the purpose and/or hypothesis** that you investigated
- **Provide a clear statement of the rationale** for your approach to the problem studied



Introduction

- **What literature should you look for in your review of what we know about the problem?**
 - ✓ Focus your efforts on the **primary research journals**, i.e. the journals that publish original research articles
 - ✓ **Do not cite general background references** (encyclopedias, textbooks, lab manuals, style manuals, etc.) because **they contain information** that is **considered fundamental** or "**common**" knowledge within the discipline
 - ✓ **Review articles are particularly useful** because they **summarize all the research done on a narrow subject area over a brief period of time** ranging from a year to a few years in most cases



Literature research

PubMed, Web of Science, or Google Scholar?

- **Major differences you must know**

1. **PubMed and Web of Science are human-curated databases. Google Scholar is not.** This is the key to most of the differences you will find in your search results.
2. **Web of Science and Google Scholar track citations, but PubMed does not.**
3. **Google Scholar searches full text of articles but PubMed and Web of Science search only the citation, abstract, and tagging information.**

Source: <http://libguides.lib.msu.edu/pubmedvsgoogle scholar>



Pubmed

<http://www.ncbi.nlm.nih.gov/pubmed>

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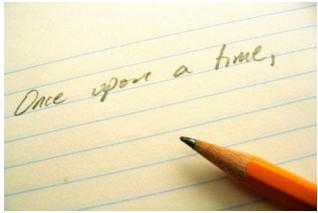
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Google Scholar

<http://scholar.google.it/>

Web Immagini Altro...

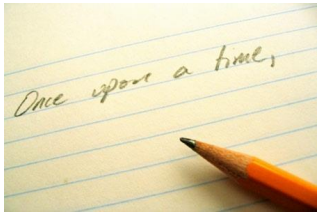
Accedi

 La mia biblioteca  Le mie citazioni  Avvisi  Metriche  Impostazioni



Cerca nel Web Pagine in Italiano

Sali sulle spalle dei giganti

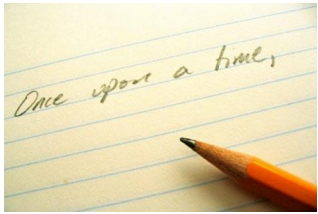


Materials and Methods

Function: to explain how the study was carried out by clearly describing

- **Sample origin** (synthetic, plant, animal, human, ...) and **preparation** (e.g. pre-treatments, handling and care)
- **Experimental or sampling design**, i.e. how the study was structured in terms of controls, treatments, measured variables, number of collected samples, replicates, ...
- **Experimental procedures:** provide **sufficient details** (e.g. masses, volumes, concentrations, source (vendor) and catalog number of reagents used) in order **to allow other scientists to repeat your work and verify your findings**
- **Data analysis:** qualitative analyses and/or statistical procedures used to determine significance, data transformations, significance level (e.g. 0.05), statistical tests and software used, data presentation (e.g. mean \pm std. dev.)

Organize this section so your reader will understand the **logical flow** of the experiment(s); **subheadings** work well for this purpose.



Results

Function: to objectively present your key results without interpretation, in an orderly and logical sequence using both text and illustrative materials (Tables and Figures)

- The body of this section is a text-based presentation of the key findings which includes references to each of the Tables and Figures shown
- The text should guide the reader through your results in a logical order and stress the key findings needed to support the hypotheses and/or answer the questions investigated (stated in the Introduction)
- Important negative results should be reported too
- A major function of the text is to provide clarifying information and not to repeat results shown in Tables or Figures
- Summaries of the statistical analyses may appear either in the text (usually in brackets) or in the relevant Tables or Figures (in the legend or as footnotes to the Table or Figure)



Discussion

Function: to interpret your results in light of what was already known about the subject of investigation and explain our new understanding of the problem after taking your results into account

- The **Discussion will always connect to the Introduction** by way of the question(s) or hypotheses you posed and the literature you cited, **but it does not simply repeat or rearrange the latter**
- It **tells how your study has moved us forward** from the place you left the reader at **the end of the Introduction**



Discussion

Fundamental questions to answer:

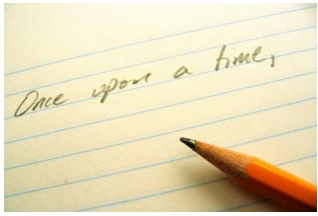
- Do your **results provide answers to your testable hypotheses**? If so, **how do you interpret your findings**?
- Do your **findings agree with** what **others** have shown? If not, do they suggest an alternative explanation or perhaps a unforeseen design flaw in your experiment or theirs?
- Given your conclusions, **what is our new understanding of the problem you investigated** and outlined in the Introduction?
- If warranted, **what would be the next step in your study**, e.g., what experiments would you do next?



Discussion

Approach:

- Organize the Discussion to **address each of the experiments or studies for which you presented results**
- **Discuss results** in the **same sequence** as presented **in the Results**, providing **your interpretation** of what they mean in the larger context of the problem
- **Do not repeat results**, but use **"bridge sentences"**
- You **must relate your work to** the findings of **other studies**, including previous studies you may have done and those of other investigators, **to support your interpretations**
- Be sure to **state the conclusions** that can be **drawn from your results**
- You may **briefly mention eventual future studies** you would do **to clarify your working hypotheses**
- **Do not introduce new results in the Discussion**



Acknowledgements

Function: to **acknowledge people who have helped you** in thinking up, designing, or carrying out the work and/or who **have supplied materials**

- Authors always acknowledge any **sources of funding** that supported the research.
- Acknowledgments are always **brief and never flowery**
- Place the **Acknowledgments** between the Discussion and the Literature Cited.



Thanks!



Literature Cited

Function: to list the references cited in the manuscript text

- **Format the references list** according to the **style of the Journal** to which you would submit your paper (see Author Guidelines)
- **Reference management software** (e.g. Mendeley, EndNote, Zotero) **dramatically help you in handling and formatting references**

EndNote
...Bibliographies Made Easy™



zotero



Reference management

Mendeley desktop: a free citation manager

The screenshot shows the Mendeley Desktop application window. The main area displays a list of references under the heading "Amine quantification in gel". The selected reference is "Colorimetric determination of amino acids using genipin from Gardenia jasminoides" by Lee, Sang-Won; Lim, Jong-... The right-hand pane shows the details for this article, including the title, authors, journal, year, volume, issue, and pages. The abstract and author keywords are also visible.

★	●	📄	Authors	Title	Year	Published In	Added
☆	●	📄	Bang, Tami; Ford, Millicent; ...	A Quantitative Study of Poly-L-Lysine Poly (ethylene glycol) Hydrogels Quantification of Amines			15/06/12
☆	●	📄	Gebeyehu, Setegn	Physiological response to drought stress of common bean (Phaseolus vulgaris L.) genotypes differing in drought resist...	2006		15/12/13
☆	●	📄	Lee, Sang-Won; Lim, Jong-...	Colorimetric determination of amino acids using genipin from Gardenia jasminoides	2003	Analytica Chimica Acta	15/10/12
☆	●	📄	Leslie-Barbick, Julia E; Moo...	Covalently-immobilized vascular endothelial growth factor promotes endothelial cell tubulogenesis in poly(ethylene gly...	2009	Journal of biomaterials scien...	15/06/12
☆	●	📄	Lévesque, Stéphane G; Sho...	Synthesis of cell-adhesive dextran hydrogels and macroporous scaffolds.	2006	Biomaterials	15/06/12
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☆	●	📄	Lutolf, M P; Lauer-Fields, J ...	Synthetic matrix metalloproteinase-sensitive hydrogels for the conduction of tissue regeneration: engineering cell-inv...	2003	Proceedings of the National Academ...	15/10/12
☆	●	📄	McCaldin, D. J.	The Chemistry of Ninhydrin.	1960	Chemical Reviews	15/12/13
☆	●	📄	Yeo, Giselle C; Baldock, Clai...	Tropoelastin bridge region positions the cell-interactive C terminus and contributes to elastic fiber assembly.	2012	Proceedings of the National Academ...	05/12/12
☆	●	📄	Yeo, Giselle C; Baldock, Clai...	Tropoelastin bridge region positions the cell-interactive C terminus and contributes to elastic fiber assembly.	2012	Proceedings of the National Academ...	05/12/12

Details | Notes | Contents | Enrichments

Type: Journal Article

Colorimetric determination of amino acids using genipin from Gardenia jasminoides

Authors: S. Lee, J. Lim, S. Bhoo et al.

View research catalog entry for this paper

Journal: *Analytica Chimica Acta*

Year: 2003

Volume: 480

Issue: 2

Pages: 267-274

Abstract:

Tags:

Author Keywords:

amino acids; genipin; geniposide; molar absorptivity; ninhydrin; uv-vis spectrophotometry

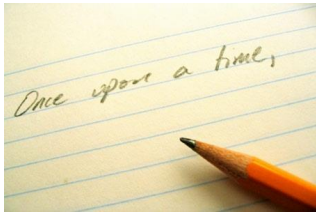
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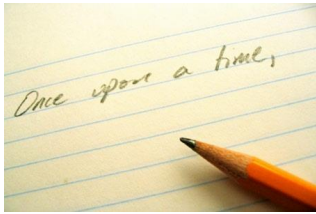
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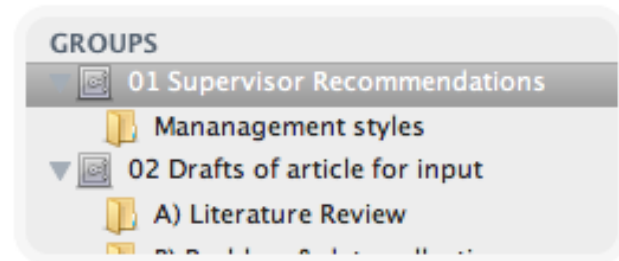




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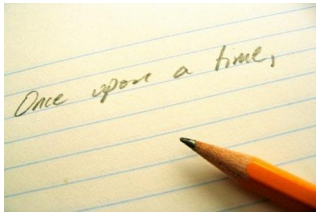
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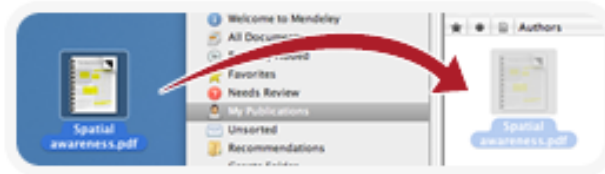
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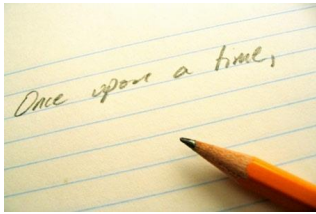
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Reference manager

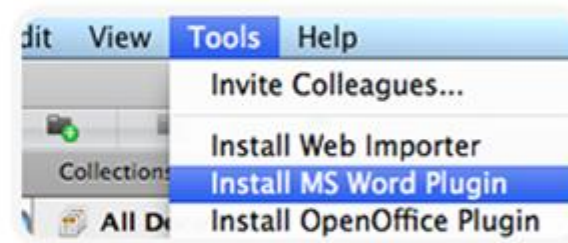
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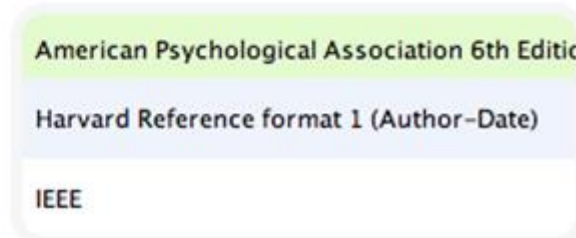
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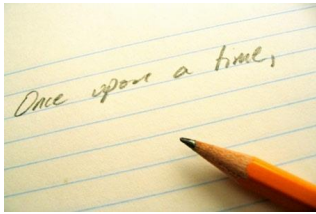


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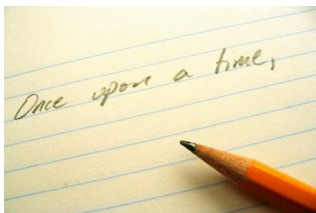
- [1] W. W. Lee, L. T. Nguyen, applicability to chip scale
- [2] S.-W. R. Lee and X. Zhan

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Appendices

Function: to provide information that are **non-essential to understanding the paper**, but may further clarify a point without burdening the body of the presentation

- An **appendix** is an **optional part** of the paper
- Each Appendix should be **identified separately** (e.g. by a Roman numeral in sequence) and should **contain different material**
 - Examples are: raw data, extra figures, explanation of formulas or other mathematical procedures for data analysis, specialized computer programs for a particular procedure, full generic names of chemicals or compounds that you have referred to in somewhat abbreviated fashion or by some common name in the text of your paper, diagrams of specialized apparatus

NOTE: **Figures and Tables** in Appendices are **numbered in a separate sequence** from those found in the body of the paper. If **multiple appendices** are used, the Table and Figure **numbering must indicate the appendix ID as well** (e.g. Figure A1 for the first figure of Appendix A)



Contacts

Giorgio MATTEI

Multi-Dimensional *in vitro* Models group (Prof. Arti AHLUWALIA)

c/o Centro di Ricerca “E. Piaggio” – 3° piano Polo A, Scuola di Ingegneria

<http://www.centropiaggio.unipi.it/research/vitro-models-cell-imaging.html>

Tel: +39 050 2217050

Email: giorgio.mattei@centropiaggio.unipi.it

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