

# What is a scientific article?

## IMRaD and JARS: Components and meaning

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# Credits

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# Abstract and keywords

- Abstract
  - Components and meaning of IMRaD and JARS (APA Style). This presentation examines the structure and elements of IMRaD as well as those of the Journal Article Reporting Standards (JARS). The aim is to help young researchers, especially pre-doctoral researchers, to prepare better manuscripts for academic journals.
- Keywords
  - IMRaD, JARS, APA Style, academic articles, academic journals

# What is IMRaD?

- The main recommended structure of an academic paper is IMRaD:
  - Introduction
  - **M**ethods
  - **R**esults **a**nd **D**iscussion
- Provides the structure that editors and reviewers expect to find when they receive a manuscript.
- Reasons:
  - It forces to make explicit the critical components that affirm (or deny) the validity of an investigation.
  - Meaning: it makes the manuscript vulnerable to reviews.
  - Key idea: if a manuscript does not offer evaluation points (vulnerabilities), instead of being automatically accepted, it Will be rejected without even an evaluation.

# What is a scientific article?

- A scientific article is the **report** of a research
- Corollary: best way to write an article is... not writing an article (at least, not directly).

# What is a research?

- Research is a systematic, traceable, transparent and replicable procedure carried out to answer research questions or to verify a hypothesis.

# But, what makes the difference?

- The differential element of a research is:
  - The existence of a systematic **data collection** process
  - Followed by systematic **data analysis** process
- Without the data collection, there is no real research. There may be a study, but there is no research. We could speak of an essay or work of thought, but not research.
- Without data collection, research is incomplete.
- In every case, processes must be systematic, traceable, transparent and replicable.

# 6 must-have of all research:

1. A significative object of study and well-identified objectives
2. A set of research questions or hypotheses (or both)
3. A method suitable to the characteristics of points 1 and 2
4. A systematic data collection guided by point 3
5. Properly presented, analysed and synthesized results
6. A meaningful discussion to highlight the significance of the results



# What IMRaD does NOT imply

- IMR&D **does not** imply:
  - Numerical data: because data or information can be textual or iconic or of any other nature
  - Quantitative methods: because they can be qualitative methods
  - Experimental designs: because they can consist of surveys, or interviews, or documentary analysis, or case studies, or content analysis, etc.
  - Field work: because it can be documentary analysis, or content analysis, or any other of the indicated analysis techniques.

Key idea: the IMRaD model does not exclude any area of either the Arts & Humanities or the Social Sciences.

# Expanded IMRaD or actual structure of an article

- Title
- Summary
- Introduction
- Theoretical framework | State of the question
- **M**ethods | Materials and methods
- **R**esults
- **D**iscussion
- Conclusions
- References

# APA Journal Article Reporting Standards (JARS)

- The **JARS** develop the components of IMR&D and propose a fine-grained structure.
- JARS are part of the APA 7<sup>a</sup> edition
- JARS:
  - Quant: articles that report **quantitative** research
  - Qual: articles for **qualitative** research
  - Mixes: articles reporting research **combining quantitative and qualitative methods**
- There are JARS for **primary** research and for **review work**

# Meaning of JARS

- They are part of the most accepted regulations on academic communication in the world:
- At a disciplinary level: applied by fields of knowledge of all kinds, both experimental and non-experimental, as well as for qualitative or quantitative methods, for primary research or for review works, etc.
- Geographically: it is a standard of acceptance in universities around the world

# JARS application

- Provide guidance for components in all elements of IMRaD
- The guidelines are recommendations, and they are presented in a flexible way who often include a large variety of alternatives.
- The guidelines are for both authors and reviewers.

# BONUS · 1 What does a quality research require?

1. Determine objectives and the object of study
2. Establish appropriate research question(s) or hypotheses
3. Select the suitable methodology that allows to relate the two previous points
4. Obtain and present socially and/or academically significant results

# BONUS 2 · Stages of the research

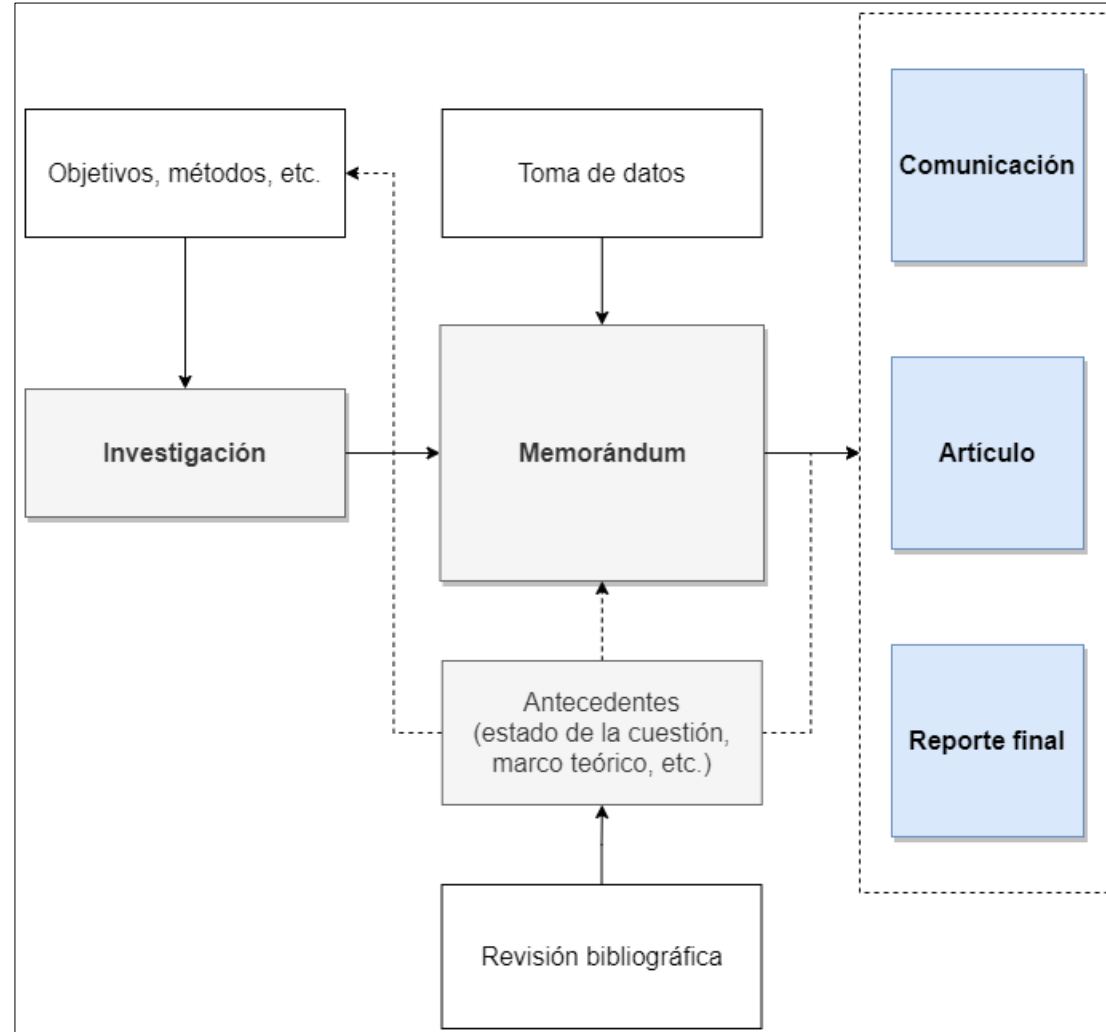
- **Design:** conception of the main research parameters expressed in an initial report (objectives, object of study, research questions, methodology)
- **Planification:** development of the analysis protocol (method + procedures) and the components and stages of the work plan, expressed in the form of SMART objectives (specific, measurable, achievable, relevant, time-bounded)
- **Execution:** application of the work plan, especially the data collection guided by the protocol designed in the previous stages and eventually refined by trial and error in its execution
- **Documentation:** generation of the complete research memorandum with the results and their interpretation
- FROM THIS POINT> We can now proceed to report the investigation

# BONUS 3 · The investigation memorandum as prior stage to the report

- The memorandum is a document or a group of documents where the following items are recorded throughout the project:
  - Main parameters of the research
  - Analysis protocols: methods + procedures
  - Completed results
  - Different form of synthesis of the results
- It may imply (eventually)....
  - State of the art, especially if a review (traditional or systematic) was carried out
  - Materials or ideas for discussion
  - Elements or points for conclusions
  - Executive Summary
  - Bibliography
- So, the memorandum (document, or group of documents) is the basis for subsequent reports:
  - Communications
  - Articles
  - Book chapters, etc.



# BONUS 4 · Synthesis of the idea



## BONUS 5 · Components of an investigation for a thesis with the capacity to generate reports (example)

- **Literature review** (traditional or systematic) > provides the theoretical framework and helps to identify the object of study and focus the objectives
- **Case study** (or comparative analysis) > provides meaningful primary research and original results
- **Semi-structured interviews** > adds triangulation components to the investigation and makes better results
- Summary: from the literature reviews (systematic or traditional) there are many other variations: heuristic analysis, qualitative analysis, quantitative analysis, content analysis, etc., which allow the development for a thesis research.

# References (IMRaD)

- **Codina, L.** (2021) ¿Qué es un artículo científico? Modelo IMRyD: estructura, componentes y significado. Abril 2021. Acceso: <https://www.lluiscodina.com/modelo-imryd/>
- **Sollaci, L. B., & Pereira, M. G.** (2004). «The introduction, methods, results, and discussion (IMRAD) structure: a fifty-year survey». *Journal of the Medical Library Association : JMLA*, 92(3), 364–367.  
Acces: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC442179/>
- **Wu, Jianguo.** (2011). «Improving the writing of research papers: IMRAD and beyond». *Landscape Ecology* 26, 1345–1349 (2011). <https://doi.org/10.1007/s10980-011-9674-3>

# References (academic journals)

- **Abadal, Ernest** (ed.) (2017). Revistas científicas: situación actual y retos de futuro. Barcelona: Edicions de la Universitat de Barcelona. (978-84-9168-8 | 978-84-9168-038-3).
- **Anderson, Rick** (2018). Scholarly Communication. What everyone needs to know. New York: Oxford Univ. Press.
- **Baiget, Tomàs** (2020). Manual SCImago de revistas científicas. Creación, gestión y publicación. EPI, 2020 (<http://profesionaldelainformacion.com/manual-revistas.html>)
- **Cantu-Ortiz, Francisco J.** (Ed.) (2018). Research Analytics: Boosting University Productivity and Competitiveness through Scientometrics. New York: Auerbach Publications, 2018.
- **Hames, Irene** (2007). Peer Review and Manuscript Management in Scientific Journals: Guidelines for Good Practice. London: Blackwell.
- **Nicholas, D., Watkinson, A., Volentine, R., Allard, S., Levine, K., Tenopir, C., & Herman, E.** (2014). "Trust and Authority in Scholarly Communications in the Light of the Digital Transition: setting the scene for a major study". Learned Publishing, 27, 121–134. doi:10.1087/20140206
- **Vesnic-Alujevic, L.** (2014). "Peer review and scientific publishing in times of web 2.0. Publishing" Research Quarterly. doi:10.1007/s12109-014-9345-8.

# Useful links · 1

- APA
  - <https://apastyle.apa.org/>
- Elsevier
  - <https://researcheracademy.elsevier.com/interactive-course/display/825/393>
  - <https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously>
  - <http://media.journals.elsevier.com/content/files/26275-11195249.pdf>
  - <https://www.elsevier.com/journals/structures/2352-0124/guide-for-authors>
  - <https://www.elsevier.com/connect/writing-a-science-paper-some-dos-and-donts>

# Useful links · 2

- Springer
  - <https://www.springer.com/gp/authors-editors/authorandreviewertutorials/writing-a-journal-manuscript/author-academy/10534936>
  - <https://www.springer.com/gp/authors-editors/journal-author/overview-of-imrad-structure/1408>
- Emerald
  - <https://www.emeraldgrouppublishing.com/services/authors/author-how-guides/structure-your-journal-submission>
  - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC442179/>
- Enago Academy
  - [How to Write a Research Paper – A to Z of Academic Writing](#)

# Related links on the author's site

- [IMRaD](#)
- [JARS](#)
- [Posts about academic communication](#) (articles, academic Works, TFM, thesis, etc.)