

Academic Compliance and Textual Organization: The Role of Titles and Subheadings in Scientific Articles in IMRAD Format

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Abstract:

This contribution explores the impact of titles and the number of subheadings on the structure of scientific articles written in the IMRAD format. Through a quantitative and comparative analysis of various articles published on the ASJP platform, the research highlights the importance of the number of subheadings in scientific articles as a key indicator of their adherence to the model in question, thereby contributing to their effectiveness and compliance with scientific publication standards.

Keywords: Scientific paper; subheadings; Imrad; structure; Titles

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1. INTRODUCTION

In the context of academia and scientific research, adherence to standards constitutes an essential foundation of intellectual credibility. These standards ensure uniformity and allow for fair evaluation. By adopting methodological, bibliographic, and structural standards, the author positions their work within a scientific community. This rigor ensures the internal coherence of the work, the clarity of the hypotheses, and the transparency of the methods employed in the research. Which facilitates reproducibility, which is a sine qua non condition for scientific validity. In other words, a well-described protocol can easily be verified and replicated by other researchers.

Adhering to standards also contributes to the visibility of academic work. A scientific article structured according to recognized conventions, such as the IMRaD structure, APA or Chicago citation standards, or typographic styles specific to each field and journal, is more likely to be integrated into the circuits of publication and dissemination of knowledge. Thus gaining readability for evaluators, readers, and search engines. In this sense, academic normativity frames scientific reflection to better showcase it. It is not just a formal matter, but an essential condition that allows for a well-structured reasoning and a progressive argumentation.

From this point of view, writing a scientific article constitutes a complex exercise where methodological rigor and clarity of discourse are paramount. In this context, the structuring of the scientific article plays a crucial role in the successful transmission of knowledge, as it not only allows for the hierarchy of information but also guides the logical progression of the argumentation. Traditionally, great attention is given to the internal logic of the argumentation or the formulation of hypotheses, but it is also crucial to take into account the textual

devices that facilitate the understanding of the discourse. Among these devices, titles and subtitles occupy an essential place.

Although often perceived as mere visual markers, titles and subtitles are powerful rhetorical instruments that, beyond their structural function, contribute to the implementation of the argumentative function of the scientific text. Their impact is not limited to the mere material organization of the discourse. They also play a strategic role in guiding the reading and organizing the sequence of scientific reasoning.

Thus, the use of titles and subtitles in scientific articles raises the question of their contribution to the cognitive clarity and argumentative understanding of the text. According to Marie-Paule Jacques (2014) and Robeyrolle et al. (2009), they are crucial in constructing a fluid and logical argumentation, acting as anchor points throughout the text. By signaling the major articulations of the argument and introducing transitions between the different stages of reasoning, they also facilitate the intelligibility of the discourse (Robeyrolle, J., Jacques, M.P. et Péry-Wideley, 2009).

Indeed, within the framework of scientific writing, which demands great clarity and precision, their role is to guide the reader in interpreting the discourse and to reduce ambiguities. Titles and subtitles, therefore, do not merely delineate spaces for argumentation, but also contribute to highlighting the stakes of scientific reasoning. Their impact is therefore both structural and rhetorical, contributing to enhancing the effectiveness of the discourse. In light of what has just been stated, we pose the following question: How do the titles and the number of subheadings in an Imrad-format scientific article provide an adequate and balanced structure to the content?

This reflection therefore aims to demonstrate that the choice of titles and the number of subheadings, far from being mere formal

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elements, play an essential role in the organization of scientific texts by facilitating the hierarchy of information and ensuring clear compliance with the Imrad model through the readability of the argumentative reasoning. Beyond their structural function, they actively contribute to the clear highlighting of arguments by being neither too restrictive nor too detailed. To address this research question, we formulate a hypothesis that suggests that the titles and the number of subheadings in an IMRaD format scientific article would determine the quality of its structure. In other words, well-chosen and hierarchically organized titles and subtitles (main and secondary) would facilitate understanding for the reader.

We will first present the IMRaD model and its impact on the visibility and quality of scientific writing. Subsequently, we will highlight the importance of linguistic structure in the validity and communication of scientific research, particularly in the field of languages. Then, we will highlight the role of titles and section and subsection headings in constructing arguments and organizing ideas in scientific articles. We will then describe the methodology followed in the collection of the corpus and its analysis. Finally, we will conclude with a presentation of the results and limitations of our research work.

2. The importance of number of titles and subtitles in the Imrad model

2.1.The IMRaD model in scientific writing

Respecting scientific standards in academic work is of crucial importance, both to ensure the rigor of the analysis and to guarantee its reception within the scholarly community. Compliance with academic rules (text structure, citation norms, presentation of sources, methodology) establishes the legitimacy of the discourse and situates the reflection within a recognized scientific tradition. Formal rigor cannot be dissociated from intellectual rigor: it demonstrates the

researcher's ability to organize their ideas, justify their interpretations, and engage in dialogue with the authors, theories, and texts studied.

In literary, didactic, and linguistic studies, where analysis often relies on complex corpora and multiple approaches (stylistic, semiotic, sociolinguistic, comparatists, etc.), clarity of organization is indispensable. A clearly formulated problem statement, an explicit methodological approach, and a coherent critical apparatus not only allow for convincing arguments but also ensure the reproducibility and verifiability of the analysis, even in disciplines where interpretation plays a central role. The precise citation of sources, the use of standardized bibliographic references (such as MLA or Chicago style), and the contextualization of the analyzed works contribute to the credibility of the approach. Moreover, adherence to standards enhances the visibility of the work in academic spaces. A text that meets the editorial expectations of specialized journals or academic institutions will be more easily accepted, read, and cited.

He can thus fully engage in contemporary research dynamics, participate in the circulation of ideas, and enrich scientific debates. In a field where meaning is constructed through interpretation and writing, academic normativity does not limit creativity, but rather delineates its contours to make it a methodologically grounded and communicable production. Therefore, the relevance of a work in literature, didactics, or linguistics also depends on its ability to meet the epistemological requirements of the field: rigorous argumentation, mastery of theoretical tools, and stylistic coherence are all elements that give research its scientific value. In short, adhering to the standards in academic work in the field of languages means asserting a researcher's stance, concerned not only with producing knowledge but also with transmitting it with rigor, clarity, and intellectual ethics.

Numerous academic works have highlighted the importance of the structure of scientific writing in the transmission of knowledge, particularly in the field of languages. Among the authors who have addressed this subject, we can mention K.-L. Turabian (2018), who asserts that a well-conducted research must follow a precise structure,

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with an introduction presenting the problem, a reasoned development, and a conclusion synthesizing the results (Turabian, K.L., 2018). Swales (2012) emphasizes the importance of a logical organization of ideas, often structured according to the Imrad model (introduction, methodology, results, discussion) (Swales, J. M. & Feak, C. B., 2012) (Swales, J.M. & Feak, C.B., 2012). He notes above all that this organization allows for increased readability and easy access to essential information: « *The IMRAD structure ensures clarity by separating background information from methodology, findings, and interpretation.* » (Swales, J.M., 1990, p. 176)

One of this author's major contributions is the CARS model (Create A Research Space), which describes how research article introductions are structured to justify a study. Swales identifies three rhetorical moves: establishing a territory (presenting the field and its importance); establishing a niche (identifying a gap in the existing research); occupying the niche (presenting the study as a response to that gap). The author notes that: « *Writers of research articles use these rhetorical moves to position their work within the ongoing academic conversation.* » (Ibid, p.141).

On their part, Sollaci and Pereira explain that the IMRAD model gradually established itself in the 20th century as a means of making scientific articles clearer and more accessible:

« *The IMRAD format became the standard in scientific writing because it facilitates the communication of research findings and enhances the readability of scientific papers.* » (Sollaci, L.B. et Pereira, 2004)¹

Among the elements contributing to the proper structuring of a scientific article according to the Imrad model, titles and subtitles are fundamentally important.

2.2. The role of titles and subtitles in the linguistic structure of scientific articles

The linguistic structure of a scientific article is not limited to the arrangement of sentences, lexical precision, or paragraph organization. It also extends to the overall textual architecture of the scientific article, particularly embodied by the titles and subtitles of the sections and subsections. These elements are not mere typographical markers, but cognitive and discursive markers that organize information and actively contribute to demonstrating the scientific approach.

It should be noted that subheadings in academic works such as scientific articles, particularly those in IMRaD format, which specialize in languages and literatures, are fundamental both for structuring the discourse and for the readability of the argumentation. They are true textual markers because they allow the content to be organized into coherent units. In this way, they actively contribute to the shaping of knowledge. Whether it is linguistics, didactics, translation studies, or literary criticism, section headings play both a rhetorical and heuristic role. Rhetorical, because they highlight the logical progression of the argument and signal the transitions between the different stages of the analysis (e.g., "Theoretical Framework," "Methodology," "Textual Analysis," "Interpretation of Results," "Didactic Perspectives," etc.). Heuristic, because their elaboration forces the researcher to clarify their thinking, delineate argumentative sequences, and structure a rigorous plan. This role was emphasized by Jean-Michel Adam (1997, 68), who considers textual organization as a key factor of discursive coherence in scientific writing (Adam, J.M., 2008, p. 68).

Subheadings also contribute to the visibility of concepts and theoretical choices. In a linguistics article, for example, subtitles such as "Enunciative Approach to Irony" or "Reported Speech in Narrative Context" do not merely segment the text; they announce the analytical framework, display a scientific orientation, and prepare the reader for a critical reading. In this sense, the subheadings contribute to the disciplinary anchoring of the work. In literature, they help delineate

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the entry into distinct levels of analysis (narrative, symbolic, thematic, stylistic) and clarify the interpretative approach.

Finally, the subheadings meet a pedagogical and communicative requirement: they make the text accessible to a varied readership. In a university context, where works are often evaluated by teachers and consulted by students or researchers, good titles facilitate overall understanding. As Umberto Eco points out in *How to Write a Thesis* (1977), the ability to clearly structure a discourse is not only a formal skill but also an act of respect towards the reader and a proof of intellectual maturity (Eco, U., 2012 (1977)). In the field of languages and literatures, subheadings are much more than typographical markers: they serve as cognitive and methodological tools in the pursuit of scientific rigor.

Titles and subtitles, particularly in articles structured according to the Imrad model, serve a narrative and argumentative function. They signal not only a change of perspective (going from the theoretical framework to experimentation, then analysis), but also delimit the epistemic status of the information: hypothetical in the introduction, procedural in the method, factual in the results, interpretative in the discussion (Day, R.A. & Gastel, B., 2006).

The precise choice of subheadings allows for the refinement of this architecture by creating hierarchical levels of information. A good structuring, supported by explicit subtitles aligned with the objectives of each section, offers the reader a clear map of the reasoning. It thus facilitates navigation through the text and contributes to its scientific readability.

As Booth, Colomb, and Williams (2008) explain, the quality of a research text does not reside solely in its data, but in its ability to effectively guide the reader's intellect toward a justified conclusion. This is the role of subheadings, which do not merely name a part of the text but rather announce the guiding idea of the section and its content, ensure readability, orient interpretation, and reinforce

argumentative coherence. By serving as a logical link to the general thesis, each subheading advances the overall reasoning of the article (Booth, W.C, Colomb, G.G & Williams, J.M., 2008).

In turn, Swales (2004) indicates that subheadings play an essential role in guiding the reader through the different stages of the argumentation. According to him, the rigorous structuring of scientific discourse, particularly through the strategic use of subheadings and transitions, is essential to make reasoning clearer, more logical, and more persuasive, thereby facilitating the understanding and effectiveness of scientific argumentation (Swales, J.M., 2004).

In the same vein, Charteris-Black (2004) explores the use of subheadings in scientific texts, highlighting their fundamental role in the organization and structuring of arguments, while also emphasizing their strategic rhetorical functions. He considers that headings are not mere separation tools but powerful cognitive and discursive devices that guide reading and influence the understanding of main ideas (Charteris-Black, J. , 2004). Depending on the disciplines, their use varies. In the natural and exact sciences, they are primarily functional and descriptive, serving to methodically structure the text and present the stages of research, while in the social and human sciences, they often take on a more analytical and theoretical character, guiding the reader through complex reflections.

According to Gerritsen and Krennmayer (2011), they emphasize that subheadings, while facilitating navigation within a text, play a key role in highlighting important arguments and transitions, making the argumentation more persuasive (Gerritsen, M. & Krennmayer, T., 2011). Gotti (2016) reinforces this idea by showing that the use of subheadings reflects the specific discursive norms of each field and contributes to the hierarchical organization of information to facilitate access to reasoning (Gotti, M., 2016). Similarly, Swales & Feak (2012) emphasize that :

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« Section headings guide the reader's expectations and function as rhetorical signals that structure the text and reflect its logical development ».

Thus, a subheading fully participates in the discursive strategy of persuasion. In addition to having an argumentative and organizational function, subheadings allow the author to name the intellectual movements of the text, as seen in the subheadings "Methodological Limitations," "Comparative Data Analysis," "Contradictory Interpretations," which anticipate the expectations of the scientific readership, facilitate peer evaluation, and enhance the transparency of the analysis (Swales, 1990). They also allow for marking argumentative modulations, such as objections or transitions to new data.

The care taken in naming the sections and subsections thus becomes an indicator of intellectual rigor, while also demonstrating discursive professionalism. In this perspective, the linguistic structure of the text, integrating its phrasal components as well as its macro-textual components, becomes inseparable from the perceived validity of the research.

The linguistic structure of a scientific article cannot be considered without sustained attention to the hierarchy and formulation of titles and subtitles. These play a central role in the scripting of scientific knowledge, explicitly articulating the different stages of scientific reasoning that the researcher demonstrates throughout their writing in order to provide greater readability and transparency to their article. They especially allow him to ensure the effective reception of the research results.

3. Methodological framework

3.1 Corpus analysis

In order to collect our corpus, we first gathered 10 articles published in journals via the ASJP platform, which fall under the field of language sciences. In a second phase, we selected 10 more articles. Five in literature and five in language didactics in order to compare them with five others written in linguistics that we selected from the initial 10 articles. The objective of our research work is to analyze the impact of the titles of the introduction and conclusion as well as those of the different sections on the structure and comprehension of scientific articles.

It should be noted that each of the journals on the ASJP platform, which adopt the IMRaD model structure, imposes a specific template that authors are required to follow. Each article must contain sections represented by titles (02 to 03). These sections may in turn include subsections also represented by subtitles (up to 03 for certain journals). On this subject, Marie-Paule Jacques emphasizes the importance not only of adhering to the content of the scientific article but also to the form of the genre, specifying that:

« Parmi les genres de l'écrit scientifique, l'article de recherche constitue l'une des productions les plus abouties de l'activité scientifique. Destiné à informer la communauté de l'avancée des recherches de ses auteurs, il doit respecter les canons du genre aussi bien en termes de contenu que de mise en forme » (Marie-Paule, Jacques, 2014)

The template of the journal from which we collected our corpus includes a main title, section titles, and subsection titles. This means that in the structure of the article, there is a level 1 title that provides an overall view of the topic addressed, level 2 section titles (main headings) allowing the author to structure the major parts, as well as level 3 subsection titles (subheadings) serving to detail specific points of the scientific article. The analysis of the corpus primarily focuses on a quantitative study of the structure of the articles, examining the

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number and distribution of both main and secondary titles and subtitles. The objective of this analysis is to evaluate the role of the latter in structuring the text from the author's perspective and their impact on comprehension from the reader's perspective. In other words, the role of their balanced distribution in the coherence and scientific credibility of the article.

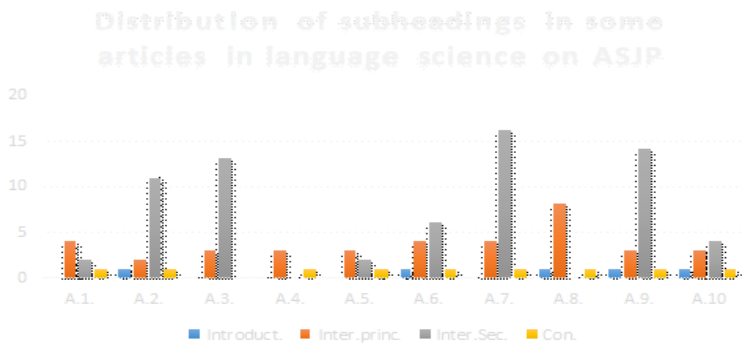
3.2 The quantitative analysis of titles and subtitles of sections in language science articles

The quantitative analysis of articles written in language sciences, which was conducted based on the number of titles in the introductions, conclusions, sections (main headings), and subsections (subheadings), is summarized in the table below:

Table 1: Frequency of titles, main and secondary headings in scientific articles in language sciences

Article	Title of introduction	Main head.	Sec.head.	Title of Conclusion
A.1.	0	4	2	1
A.2.	1	2	11	1
A.3	0	3	13	0
A.4.	0	3	0	1
A.5.	0	3	2	1
A.6.	1	4	6	1
A.7.	0	4	16	1
A.8.	1	8	0	1
A.9.	1	3	14	1
A.10	1	3	4	1

The results of the table are represented by a bar graph, which shows the distribution of the structures of articles in language sciences in terms of titles, main subheadings, and secondary subheadings.



We observe that five (05) out of ten articles have the title "Introduction." The latter facilitates entry into the text and guides the reader by announcing the subject and the objective of the article. Articles without an introduction, such as A.1, A.3, A.4, A.5, A.7, may be less accessible, as the introduction helps to contextualize and problematize the research topic. It is also the place where the author presents the study's interest, formulates their hypothesis, and develops their plan. Its absence thus marks a considerable lack in the clarity of the research.

The majority of the articles have between three and four level 1 headings, except for A.2 which contains two titles and A.8 which has eight. Regarding level 2 headings (subheadings), there is a significant variation. Articles A.4 and A.8 have no subtitles. While others contain several subtitles, such as A.7 with 16 subtitles and A.3 with 13 subtitles. This leads us to deduce that some articles have a more detailed and segmented structure, such as A.7 and A.3, which include numerous subtitles, while others are more concise and less hierarchical.

Other articles include an introduction, several main headings, and secondary headings like A.6., A.9., A.10, which present a balanced structure, potentially having a positive impact on the article's understanding and readability. These articles are easy to skim, well-structured, and allow for smooth reading. As for the main

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subheadings, whose proper distribution improves the organization of the content, an article with too few uses of this type of subheading, such as A.2, risks being dense and difficult to navigate. On the contrary, too many main headings like in the case of A.8 can indicate excessive fragmentation, making the reading more choppy.

Articles with numerous secondary headings such as A.7 and A.3, with 16 and 13 headings respectively, are more detailed because these contribute to the hierarchy and identification of ideas. They help structure the information and facilitate quick reading. However, when their number is too high, it can hinder the flow of the article. Note that articles without secondary headings like A.4 and A.8 are likely to be more difficult to follow, as the information is not clearly segmented. On the other hand, articles with too little structuring, like A.4 and A.8, which lack secondary headings, can be more complex to read. So, they present a potential reading difficulty. Other articles, on the other hand, present a structure with excessive fragmentation, such as A.7 with 16 subheadings. They risk being too fragmented. Finally, the absence of a conclusion, as noted in article A.3, can make the ending more abrupt, forcing the reader to guess where the argumentation ends.

3.3. Comparison of articles from the three specialties: language sciences, literature, and language didactics

The analysis of the number of titles (introduction and conclusion) and subheadings (sections and subsections) in the five articles selected for each specialty, namely language sciences, literature, and language teaching, revealed significant results that appear in the table below:

Table 2: Comparison of the use of subtitles by specialty

Spécialité	Article	Title of Introd.	Main headings	Sec. headings	Title of Conc.
SDL	A.1.	0	5	5	1
	A.2.	0	4	2	1
	A.3	0	3	0	1
	A.4.	0	3	13	0
	A.5.	0	0	0	0
Litt.	A.1	0	4	12	1
	A.2.	0	3	6	1
	A.3.	0	2	7	1
	A.4.	0	3	0	1
	A.5.	0	2	0	1
Did.	A.1.	0	7	13	1
	A.2.	0	4	17	1
	A.3.	0	4	16	1
	A.4.	0	3	8	1
	A.5.	0	0	0	0

Regarding the articles written in Language Sciences, there is a significant variation in the number of subheadings, ranging from 0 to 13 in some cases like A.4. This could indicate that these articles are more detailed or longer, requiring more subdivisions to clarify and structure the ideas. Article A.5, on the other hand, has a particularity: it has neither titles nor subtitles, which could indicate a less structured text or one that is more narrative in nature or less academic, without explicit divisions. For literature articles, they are characterized by a more consistent number of subheadings compared to SDL articles, with an average of about 6 subheadings. Article A.5 (similar to article SDL A.5) has no apparent subdivisions, suggesting a fluid structure and perhaps a more homogeneous or global approach.

The articles in the field of didactics seem to favor a more detailed structure, with a higher number of subheadings. For example, article A.1 includes 13 subheadings, which suggests a very segmented approach to the content to facilitate reading and comprehension. We have notably observed that articles in this specialty also show

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consistency in organization, with a relatively stable number of subheadings, which could indicate a desire to present information in a very readable manner for the reader.

4. Discussion and conclusion

The analysis of articles in language sciences (Table 1) on the ASJP highlights disparities in the application of the Imrad format (introduction, methods, results, discussion), which is an expected standard in scientific publications. Some articles adhere well to this structure, while others exhibit notable gaps in terms of segmentation and organization. Some articles, notably A.6, A.9, and A.10, generally follow the IMRaD structure by presenting a good balance between titles and subtitles. They include an introduction, several main subheadings, and a reasonable number of secondary subheadings, thus facilitating reading and comprehension. Moreover, the presence of the conclusion confirms a coherent and structured organization. The distribution of main headings (between 3 and 4) and subheadings (between 4 and 14) suggests a clear segmentation, adhering to the expected structure of the different sections of a scientific article. These articles are therefore the most compliant with academic standards.

Other articles, such as A.2 and A.5, exhibit imperfect structuring despite incorporating elements of the Imrad format. Although they have an introduction and a conclusion, their segmentation remains unbalanced. For example, A.2 has only two main headings, which may indicate a merging of some essential sections, such as results and discussion. Similarly, A.5 has very few secondary headings (02 headings), which can make the reading denser and limit the clarity of the subsections. Both articles would benefit from a better distribution of titles to improve the distinction between the sections of the Imrad format.

Finally, several articles significantly deviate from the expected structure and present major gaps. Articles A.1, A.3, A.4, A.7, and A.8

present several structuring issues. Some, like A.1, A.3, A.4, A.5, and A.7, do not have an introduction. Which can hinder the identification of the subject and objectives for the reader. Article A.3 is particularly problematic, as it lacks both an introduction and a conclusion, which can seriously compromise readability and adherence to the Imrad format. Other articles, such as A.7 and A.3, display an excessive number of subheadings (16 and 13 respectively), thereby risking excessive fragmentation of the content and harming the fluidity of the reading. Conversely, A.8 presents an atypical structure with a high number of main headings (08 headings) without any use of subheadings, which may indicate a confusing organization of the sections.

In conclusion, the analysis of articles written in language sciences highlights that A.6, A.9, and A.10 are the most compliant with the Imrad format, while A.3, A.4, A.7, and A.8 show significant deficiencies in structuring. Articles A.2 and A.5, on the other hand, fall into an intermediate zone. In order to optimize the structuring of the articles, it is therefore essential to ensure the presence of an introduction and a conclusion, to maintain a balance between main headings and subheadings, and to clearly separate the IMRaD sections for better text clarity.

As for the analysis of Table 2, it allows us to observe several interesting trends regarding the structure of articles in different academic specialties, namely linguistics, literature, and language didactics. In the field of language sciences, the articles seem less structured, or at least, introductory titles and subheadings are not systematically used. This could reflect a more exploratory or theoretical approach in the organization of the text. In literature, articles contain quite a few subheadings, but slightly fewer than in language didactics. This could indicate a more fluid structuring of literary argumentation, with less need for strict subdivisions. Regarding language didactics, there seems to be a strong emphasis on a clear and detailed structure, with articles using a series of subheadings to divide the text into more accessible parts.

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The structuring of the articles in the table shows notable differences between the specialties, likely influencing the clarity, readability, and approach of each field. Articles in language didactics seem to favor a detailed and precise structuring, while articles in language sciences and literature show greater diversity and flexibility in the way the text is organized, with a tendency to subdivide information less.

This analysis has certain limitations that must be taken into account. First of all, the small sample size, namely 20 articles, does not allow for fully generalizing the results. A larger corpus, including publications from various journals and related disciplines, would allow for a better understanding of the general trends in the structuring of scientific articles.

Moreover, this study primarily relies on a quantitative analysis of the main and secondary titles and subtitles. A complementary evaluation, including readability tests or feedback from researchers and students in language sciences, would refine the interpretation of the results and more precisely assess the impact of the structures on comprehension.

Another limitation lies in the absence of an analysis of the content of the titles. Although the number of main and secondary headings was taken into account, their formulation and relevance were not examined. However, a poorly formulated or too vague title can harm the clarity of the text, even if its presence conforms to the structural expectations of the Imrad format.

Finally, this study does not take into account the editorial constraints specific to scientific journals. Some journals impose strict standards regarding structuring, while others allow more freedom to authors. It would be interesting to study to what extent these constraints influence the structuring of articles and whether they contribute to the observed disparities.

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