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REVIEW ARTICLE

The style of scientific communication[☆]

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KEYWORDS

Scientific style;
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Abstract

Context: Writing skills and the importance of drafting quality are often disregarded. Just as there are guidelines on what each part of a scientific article should comprise (introduction, material and methods, results and conclusion), there are 'norms' as to how to draft the article. Novel results can only be appropriately reflected in a formal and structurally correct text.

Objective: To raise awareness on the correct use of language in all professional areas, and to provide some practical recommendations to avoid the most common errors in our environment.

Evidence acquisition: We performed a search of the terms 'scientific style', 'scientific language' and 'how to write an article' in the databases of the search engines Medes, Dialnet and Índice Bibliográfico Español en Ciencias de la Salud (IBECS). We also consulted books on the subject. We then analyzed the characteristics of scientific style and the most common errors observed in scientific texts.

Evidence synthesis: The characteristics of scientific language are: clarity, precision, brevity, conciseness, fluidity and simplicity. Scientific style avoids: long sentences, a lack of connectors, syntax errors, redundancies, barbarisms, foreignisms, false friends, colloquial expressions, cacophonies, slang, too many gerunds, too many abbreviations, too much use of the passive voice and spelling mistakes, etc.

Conclusions: The principal characteristics of scientific style are clarity, precision and brevity. When we write articles, we learn through practice, reading and the help of experienced writers.

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PALABRAS CLAVE

Estilo científico;
Lenguaje científico

El estilo de la comunicación científica

Resumen

Contexto: La destreza para escribir y la importancia de la calidad de la redacción están sujetas a un cierto menosprecio. Igual que hay guías sobre qué debe constar en cada parte del artículo científico (introducción, material y métodos, resultados y conclusión), existen también «normas» sobre cómo redactarlo. Resultados novedosos solo pueden ser reflejados adecuadamente en un texto formal y estructuralmente correcto.

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Objetivo: Despertar la conciencia del buen uso del lenguaje en todos los ámbitos profesionales, así como dar algunas recomendaciones prácticas para evitar los errores más frecuentes en nuestro medio.

Adquisición de evidencia: Se realizó una búsqueda de los términos «estilo científico», «lenguaje científico» y «cómo escribir un artículo» en las bases de datos de los buscadores Medes, Dialnet e Índice Bibliográfico Español en Ciencias de la Salud (IBECS). Se consultaron también libros sobre la temática. Con ello analizamos las características del estilo científico y los errores más comunes que se observan en los textos científicos.

Síntesis de evidencia: Las características del lenguaje científico son: claridad, precisión, brevedad, concisión, fluidez y sencillez. El estilo científico evita, entre otras cosas: frases largas, ausencia de conectores, errores en la sintaxis, la redundancia, barbarismos, extranjerismos, falsos amigos, expresiones coloquiales, cacofonías, jerga, exceso de gerundios, abusar de abreviaturas, usar excesivamente la voz pasiva y errores ortográficos.

Conclusiones: Las características principales del estilo científico son la claridad, precisión y brevedad. A escribir artículos se aprende con la práctica, leyendo y con la ayuda de escritores experimentados.

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Context

The word style comes from the Latin *stylus*, the name given to the punch used by the ancients to write on waxed boards.¹ The scientific style would correspond to the writing style of scientists, in our case, doctors and health professionals. The early texts of the new writer are often characterized by their pomposity, ambiguity, imprecision and lack of clarity. The new writer gives importance to the background (results to be communicated) and forgets about the form (a correct scientific style). However, it should be noted that up to a quarter of the corrections made by reviewers are due to problems of misunderstanding of the text, and that many articles are rejected due to deficiencies in their writing.¹ Each year, at the various urology meetings and congresses, there are many abstracts that have been written without taking into account the scientific style.

Writing skills and the importance of the writing quality are undervalued. In the years of university education, there is little practice in writing skills, since the exams are usually taken with multiple-choice questions. In graduate school, medical histories and reports are written quickly, with abbreviations, anglicisms and jargon that make them unintelligible to anyone outside of medicine. In addition, the world of medicine often reads publications in English, which makes it more difficult to learn how to correctly write medical texts in Spanish.¹

It should be noted that, just as there are guidelines on what should be included in each part of the scientific article (introduction, material and methods, results and conclusion), there are also 'rules' on how to write it. Innovative results can only be adequately reflected in a formal and optimally structured text. Writing a scientific article formally implies dedication, time and effort. It is not an easy task, but with help you will learn it.^{1,2}

Objective

The purpose of this article is to awaken the reader's awareness of the proper use of language in all professional fields, as well as to give some practical recommendations to avoid the most common mistakes in our environment.

Evidence acquisition

A search of the terms 'scientific style', 'scientific language' and 'how to write an article' was carried out in the databases of the browsers Medes, Dialnet and *Índice Bibliográfico Español en Ciencias de la Salud* (IBECS), selecting the articles of greatest interest. Books on the subject were also consulted. With this we analyze the characteristics of the scientific style and its differences with respect to the literary style. We show the most common problems and defects that are observed in scientific texts, to finally give advice to avoid them.

Synthesis of the evidence

Difference between scientific style and literary style

The scientific style avoids ambiguities, turns that give rise to erroneous interpretations and differs clearly from the literary style² (Table 1).

Characteristics of scientific style

As we have observed in Table 1, in order to write a good scientific article, the three fundamental principles of scientific writing must be applied: *clarity*, *precision* and *brevity* of language.¹⁻³

Table 1 Differences between scientific and literary style.

Scientific style	Literary style
It is informative and persuasive	Entertaining and recreational
Rational	Emotional
Objective	Subjective
Impersonal	Personal
Sacrifices originality	Allows for originality
Reports the concrete	Reports the abstract
Presents information	Invents
Free of jargon and pomposity	Uses jargon to create environments
It is transparent, avoids ambiguity	It may obscure the message
Use conventional terms and forms	Prefers the arbitrary
Explains difficult concepts	Leave the explanation in charge of the reader
Follows a preset order	An established order does not have to be followed
Teaches	Delights, pleases the senses

- Clarity: it means that the text can be read and understood quickly. The idea is set out in such a way as to avoid misinterpretations and only to imply what the author means. This is achieved when the language is simple, the sentences are well constructed, and each paragraph develops its theme in a logical and coherent order. It is not convenient to use a cumbersome style, with disordered ideas, with incorrect grammatical constructions. You must use not fancy, but common words.¹⁻⁴
- Accuracy: one is accurate when using direct language, without ambiguous terms or confusing or misleading expressions. It is not possible that there are different interpretations by the reader. Words that communicate exactly what you want to say are used. The reader cannot imagine what the author meant to say.¹⁻⁴
- Brevity: it means communicating information with as few words as possible. Every sentence is full of meaning. Unnecessary text diverts the reader's attention and affects the clarity of the message. In addition, most journals limit the number of words.¹

Other important attributes of the scientific style are: conciseness, fluidity, and simplicity or naturalness.

- Concision: one is concise when one uses only the indispensable and precise words to communicate one's idea. The lack of conciseness is the general defect of those who begin writing. Its antonym would be a pompous, ostentatious, exaggerated style. We must learn to remove the padding, to avoid the superfluous and the verbosity.¹⁻⁴
- Fluency: a fluid style shows no difficulty in reading, the ideas are linked and the line of argument can be followed without problems, it can be read in one go.¹
- Simplicity: simplicity is to avoid the confusing, artificial, complicated and 'baroque' language. The author uses commonly used language, avoiding high-sounding words.^{1,2,5,6}

Example (E.g.) (actual text):

When referring to intra-scrotal neoplasms, we find that there is a group of tumors, which represents a very small number when compared to testicular neoplasms

and which are called paratesticular neoplasms. The incidence corresponds to approximately 2–3%. From the anatomical-clinical point of view, paratesticular neoplasms are grouped into benign and malignant. The former represent 70% and among the malignant ones it should be noted that sarcomas represent more than 90%.

From a clinical-pathological point of view, sarcomas are classified into two groups according to age of presentation and histological type. In this sense, sarcomas developed in children and adolescents (rhabdomyosarcoma) and those that occur in adulthood (liposarcoma, leiomyosarcoma and fibrosarcoma) are distinguished. (129 words)

The text is too long, because the author is not precise and concise. It is also not very fluid and very wordy. It is the typical style of a new writer whose article has not been supervised by someone with experience.

Proposed writing (PROP):

Paratesticular neoplasms account for 2–3% of intra-scrotal tumors. 70% are benign, being sarcomas, 90% of the malignant tumors.

In children and adolescents, the most common histologic type is rhabdomyosarcoma and, in adults, liposarcoma, leiomyosarcoma and fibrosarcoma. (40 words)

E.g (actual text):

LHRH AGONISTS

They are synthetic analogues with a longer average life and about 100 times more potent than the natural decapeptyl. By replacing amino acids in different positions, numerous polypeptides with the same clinical activity have been created. Natural LHRH is released pulsatingly stimulating the release of LH and FSH. The supraphysiological and sustained (non-pulsating) dose of LHRH analogues (LHRHa) causes an inhibition of LH secretion from the second week of treatment, resulting in a decrease of 95% in plasma testosterone. The initial action of the LHRHas, by binding to the LHRH receptors, causes the transitory release of LH and hence testosterone. It begins 2-3 days after the drug is given and lasts for the first week of treatment. This initial increase in testosterone can lead to a clinical worsening of the disease

(flare up). The sustained action of the LHRHa will subsequently induce a desensitization and decrease in the number of LHRH receptors, achieving the desired final therapeutic effect, which is the inhibition of the synthesis of LH and testosterone.

The author writes in a clear, concise, precise, simple and natural way a subject that is not easy to explain.

In the initial stages of writing a scientific paper, the author focuses on the robustness of the results and the contents of the introduction, material and methods, discussion and conclusions. Once the content of the article is established, the author should focus on how to explain it in the best possible way. Improving words, phrases and entire paragraphs if necessary. Good writers go over their work several times and also go over it again after letting it rest for a few days. It is also recommended that another experienced colleague reads the manuscript and gives his or her opinion. A definitive version is never achieved on the first attempt.^{1,2}

Other tips for improving scientific writing

- Arrange your ideas and present them in a logical order. Before writing, you should have a very clear idea of what you want to say.²
 - Write to express and not to impress.²
 - Present or past: use the verb tenses with common sense and coherence. As a general rule, write the sections on material and methods and results in the past, and the introduction, discussion and footnotes in the present. Whenever you cite previously published works you should use the present tense; you are referring to established knowledge. To refer to your current job you must use the past tense. It is assumed that your work will not become established knowledge until it is published. Most of the abstract should be written in the past, as the author is referring to his own current results.^{3,5}
- E.g.: 25% of bladder tumors are infiltrating at the time of diagnosis, in our series they were 28%.
- Use short sentences. Psychology teaches that a sentence composed of 20 words achieves up to 90% of comprehension. As the number of words in the same sentence increases, the reader's comprehension decreases. However, avoid the monotonous succession of short sentences. The combination of phrases of different lengths gives rhythm to the reading of the text.^{1,2,6,7}
 - Bullet points indicate the reader that the reasoning contained in a paragraph has been concluded and that another question is then opened. The paragraphs constitute a complete unit of information. In a paragraph, the reader must know what was communicated without going on to read the following or the previous paragraph: this is called intra coherence. In addition, the paragraph must have inter coherence, that is to say, it must be articulated with the preceding and following paragraphs.^{2,7}
 - Use connectors: expressions that the writer uses to give the reader clues about how the ideas presented in the text are linked. These are: Similarly, on the other hand, for its part, besides, but nevertheless, in any case, now then, although, despite, in spite of, because of this, for this

reason, therefore, because of this, thus, so, hence, consequently, as a consequence, so that, in such a way that, given that, since, because, as, if, in the event that, on the one hand, on the other hand, first, second, firstly, with respect to, in relation to, on the following point, in this section, in summary, to conclude, in short, therefore.⁸

- Pay attention to syntax: a part of grammar that deals with grouping words and forming phrases. When constructing phrases take into account the syntactic arrangement: subject verb and complements.¹⁻⁵

E.g.: Combination chemotherapy drugs used to treat disseminated tumors prohibited by the FDA. It seems that the FDA forbids depending on the tumors.

A large number of publications about the cell wall of staphylococci have been accumulated. Publications crush staphylococci.

- Avoid redundancy: Using unnecessary words to express something that already expresses meaning without them.³

E.g.: The main etiological cause of hematuria. Our personal experience in the treatment of lithiasis. Absolutely positive margins stand out.

PROP: The main cause of hematuria. Our experience in treatment. Positive margins stand out.

- Do not use barbarism: An error that implies the incorrect pronunciation, the misspelling of words or the use of improper words.^{1,2}

E.g.: Using 'pathology' instead of disease, 'routine' instead of habitual, 'manage' instead of treating, 'bacteremia' instead of bacteriemia. 'Control' is one of the most commonly used barbarisms: *analgesia for pain 'control' (relief), they 'control' (stop) the bleeding.*

- Avoid foreign words: voices, phrases or turns of a foreign language. Its use is unacceptable when equivalents can be used in our language. If there is no Spanish equivalent, they should be written in italics or in quotation marks.^{1,2,4,9,10}

E.g.: Test instead of "prueba", feedback for "retroalimentación", second-look for "revisión", "randomizado" for "aleatorizado", shunt for "comunicación" or "circuito", stress instead of "estrés", "reportar" instead of "informar".

- Beware of false friends: terms belonging to different languages of similar morphology to Spanish but with different meanings. Mistakes are made when translating from English.⁴

E.g.: Using "actualmente" instead of "realmente" when translating "actually". "Desorden" instead of "trastorno, dolencia" or "enfermedad" when translating "disorder". Writing "coste-efectividad" instead of "rentabilidad" when translating "cost-effectiveness".

Writing ‘enfermedad severa’ instead of ‘grave’ when translating ‘severe’.

- Do not repeat a word in the same sentence, it creates a poor text. Therefore, we must choose words that avoid repetition. Beware that words that are repeated sometimes bear a hallmark: they are called ‘pet words’. Avoid them.⁴
- Do not use colloquial expressions: there are words or expressions that are not admissible in the usual professional language.²

E.g.: After reviewing the results we saw that there was no placebo effect ‘at all’.

- Avoid jargon: total omission of simple words. Writers who use jargon do not ‘use’, they ‘utilize’. They never do, they ‘carry out’ or ‘elaborate’. They never begin, they ‘initiate’. They never end, they ‘finalize’ (or come to an end). They use ‘hindmost’ for last, ‘initial’ for first, ‘plethora’ for abundance, ‘in this day and age’ for nowadays.⁵
- Avoid cacophony: repeated sounds that mistreat the ears. They are easier to detect by the reader than by the writer. The best way to discover them is to read the text aloud.⁷

E.g.: We should write with only one instruction in mind: precision.

PROP: We should write with only one guideline in mind: precision.

- Try to substitute wild-card words: words that have many uses; they can be either nouns, adjectives or verbs. Nouns: topic, problem, data, information. Adjectives: good, interesting, positive, relevant. Verbs: to do, to be, to have, to say.⁷

E.g.: Based on the ‘data’ (results) of the research
The achieved results were not very ‘positive’ (conclusive)
The first study ‘did not have’ (lacked) any validity

- Avoid excess of gerunds.^{3,4}

E.g.:...recommending a CT scan, showing the diagnosis of pyelonephritis, being this an entity that...

PROP: A CT scan was recommended, which showed a diagnosis of pyelonephritis. It is an entity that....

- It is not convenient to abuse unnecessary prepositions, conjunctions, and adjectives.²
- Do not abuse capital letters. The abuse of capital letters comes from the literal translation of texts, especially from the North American ones. They are used instead of quotation marks or italics to highlight words to which special emphasis is to be given. Nouns such as hepatitis, hematoma, insulin or headache are capitalized.⁴
- Avoid the use of the term ‘and/or’. In most cases, you can choose either ‘and’ or ‘or’. Evidence of the dispensability of the term ‘and/or’ is that no one has felt obliged to use it in spoken language.⁵
- Beware of the numbering of the decades of life: a patient in the sixth decade of life is between 50 and 60 years old, since the first decade goes from 0 to 10 years old. If the

patient is 66 years old we will say that he is in the seventh decade.⁹

- Do not abuse abbreviations: there is a tendency to turn too many terms into abbreviations in order to save space. You should bear in mind that the abuse of acronyms makes it difficult to read the texts, especially if the acronym is not widely used. Abbreviations should not appear in the title, in the abstract or at the beginning of a sentence. The first time the term to be abbreviated appears, it will be written followed by the acronym in parentheses. It is recommended that the term is sufficiently long and is repeated at least three times in the text. Acronyms should be written in capital letters, with no periods or spaces between the letters. They never form the plural by adding an ‘s’ and the Spanish form of the acronym should be written when it exists.³⁻⁵
- Numbers: One-digit numbers are written in letters, unless they are in an enumeration along with larger numbers. It is also preferable to type in the numbers that appear at the beginning of a sentence. In Spanish, the decimals are written with a comma and in English with a dot.³⁻⁵

PROP: Two men and 37 women underwent surgery. Thirty patients (30.7%) met the criteria.

- References to tables and figures: they should appear in sequential and independent orders, with the term ‘figure’ being abbreviated as ‘fig’. It is preferable to use a statement that invites you to refer to the table or figure.³

E.g.: Tumor recurrences appeared in different locations (Table 1). Better than: Table 1 shows the location of tumor recurrences.

- Take punctuation into account. A frequent cause of lack of clarity is incorrect use of punctuation.^{2,3,7,11}

E.g.: The white rabbits that underwent surgery healed and the black ones did not.

The white rabbits, who underwent surgery, healed, and the black ones did not. All the white rabbits were operated and healed.

- Avoid number agreement errors.³

E.g.: A growing number of authors ‘consider’ that...

PROP: A growing number of authors considers...

- Avoid gender agreement errors.³

E.g.: CT showed dilation of the urinary tract.

PROP: CT (computed tomography) showed dilation of the urinary tract.

- Use active rather than passive verb forms. The active voice is usually more precise and less verbose than the passive voice.^{2,3,5}

E.g.: Most of the infections were caused by *Pseudomonas aeruginosa*.

PROP: *Pseudomonas aeruginosa* caused most of the infections.

- Do not abuse the parentheses. Adjust them so that they are not too long.²
- Make sure there are no spelling mistakes. Use the grammar checkers included in the softwares.¹¹
- Have two dictionaries close by, an etymological one (if it is the last edition of the dictionary of the Real Academia Española, better) and another one of synonyms and antonyms.^{1,2}
- Everyone's scientific style can be improved. You learn to write. We recommend that you read regularly articles published in leading journals and, if you are a new writer, consult an experienced mentor or a tutor.

Conclusions

The scientific style is very different from the literary style. For the correct writing of articles, abstracts and other medical texts, the main characteristics of the scientific style should be taken into account: clarity, precision and brevity. Writing articles is learned by practice, by reading and with the help of experienced writers.

Conflict of interest

The authors declare that they have no conflict of interest.

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