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ABSTRACT as the Ultimate Display Case of a Biochemistry Article: A Concept Analysis

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Aims: to revisited logical basis and comprehensive suggestions, with examples, for writing the background, methods, results, and conclusions sections of a proper abstract in a biochemistry articles.

Discussion: Common abstract characteristics is short, straightforward and concise standalone writing as summary of a scientific paper, but in the eye of its potential reader, only the provocative tittle and followed by an interesting abstract which arouse their attention and this is the one and only reason for them to continue or discontinue reading the whole scientific articles. For the vast majority of readers, the paper does not exist beyond its abstract. For few in number of dedicated readers who wish to read beyond the abstract, the abstract actually sets as the display case which is actually become the tone for the rest of the paper. So, the main and ultimate duty of the author is to make certain that the abstract section is properly representative of the entire paper, by way of writing it carefully with deep logic and furnish them in the wow effect manner. For this reason, the abstract should have some general qualities with marked differentiating factor, scientifically and marketingly.

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Keywords: Tittle; background; methods; result; conclusion; keywords; potential reader.

1. INTRODUCTION

Biochemistry is the study and investigation of divergent biological processes that are correlated with living organisms. It also explained the molecular basis of biological processes in the path of chemistry (Hussain, et al., 2024). It is the essential basic science that dispenses regulations of biological processes (Konieczny, et al., 2023), mechanisms and functions of crucial life processes and mechanisms (Pierce, 2023), the practical concept and application of life molecules (National Research Council (US) Committee on Research Opportunities in Biology, 1989), and gives the basic understanding of all modern genetic tools and their applications (Abu-Elmagd, et al., 2022) which all can be directed for better understanding and even solution of diseases (Barr, 2018). Biochemistry is a vast growing discipline and consisted of many fields like molecular biology, cell biology, genetics, and biotechnology etc.

Biochemistry has contributed positively to many areas of science, including personalised medicine (Khare & Khare, 2024) and precision medicine (Naithani, et al., 2021), shifting agriculture to become modern and more sustainable (Schmaltz, et al., 2023) environmental improvement, e.g., in the case of combating climate change (Chen, et al., 2023), medical education (Cing, et al., 2022) and biotechnology diversity (Bayer, 2014). Biochemistry research and publication has led to many discoveries and applications, including enormous medical breakthrough (Black, 2020). The huge number of biochemistry articles published varies by source (Wan et al., 2009), including the biochemistry journal, reports of biochemistry and molecular biology, and other biochemistry journals.

The number of biochemistry-related articles published globally increases each year, with many countries contributing to this output. Study conducted by Wang et al 2009 aanlyzed a total of 449,774 Biochemistry and Molecular Biology articles published in the 268 selected journals between 1999 and 2008 revealed the six top-ranking countries – the United States (USA), Japan, Germany, United Kingdom (UK), China and France- contributed to that number (Wan, et al., 2009).

Over 1.5 million scientific articles on biomedicine and life sciences are now published and collected in the PubMed database every year. This vast scale makes it challenging to see how biomedicine evolves in time (González-Márquez, et al., 2024), as part of the fourth step of scientific stage, namely report (Siagian, 2023). Further insights needed to facilitate future literature search to bypass unnecessary tedious and resource-intensive one-by-one bibliography searches by hand (Bramer, et al., 2018). A naive scholar must understand that not all scientific articles are listed in PubMed or in Directory of Open Access Journals nor in conventional biomedical databases (Liljekvist, et al., 2015) for several reasons such as (1) the journal is not indexed in PubMed, (2) the journal is embargoed by PubMed, (3) the PubMed Central (PMC) database only accepts manuscripts from authors who have funding from certain agencies, such as the U.S. National Institutes of Health (NIH) or (4) Some journals that are not legitimate may be indexed in PubMed because these journals may use the identities of reputable researchers. In simple terms, the number of scientific articles published each year is actually greater than what revealed by González-Márquez, et al (González-Márquez, et al., 2024).

Those vast number of published research articles, including biochemistry, means that competition between articles for the attention of readers and reviewers is obviously getting stronger and fiercer every day (Thorngate, et al., 2011). One of the key tools that helps to stand out among many publications is a successful title (Hallock & Bennett, 2020) of a scientific research and then mainly followed by good abstract writing (Harvey, et al., 2019; Sanganyado, 2019).

The aim of this review was to to revisited logical basis and comprehensive suggestions, with examples, for writing the background, methods, results, and conclusions sections of a proper abstract in a biochemistry articles.

2. THE PHYLOSOPHY OF ABSTRACT AND ITS COMMON STRUCTURE AS A DISPLAY OF SCIENTIFIC WRITING

An abstract is specifically written to attract the most possible potential reader's attention, at its maximum (Andrade, 2011). the abstract is actually the sole portion of a scientific article that the vast majority of potential readers see at a glance, or in other word, a scientific article relies mostly on its abstract as its display case. The

philosophy of abstraction in scientific articles is actually a philosophical reflection on the nature of science (de Haro, 2020) which will not recognize a stopping point towards achieving the goal, namely truth. Philosophically, the abstract is a momentarily tiring effort to relate and to summarizes the whole research (if it is an original research articles) or ideas (if it is not an original research articles, e.g., review article) and furthermore facilitate readers to decide if they want to continue reading the full article or stop at that point, give up on the article currently being read and then turn to the next potential articles (Jeyareman, et al., 2023, Ramos & Concepcion, 2020, Subramanyam, 2013).

Visual sorting through abstract reading involves using graphical representations (Jeyareman, et al., 2023), like visual abstracts or diagrams, alongside abstract text to quickly assess and understand the key points of a scientific article (Subramanyam, 2013). This method helps researchers and others make decisions about whether to root around in and got deeper into the full article and hopefully assists in rapidly obtaining the article's main ideas, methods, findings and conclusions. The application of abstract's visual sorting actually redesigning the topography of research dissemination (Ramos & Concepcion, 2020).

An abstract always had a common structure (Harvey, et al., 2019; Sanganyado, 2019; Andrade, 2011). The style and formatting of an abstract is a part of anatomy of scientific writing or perhaps in Biochemistry, can be analogous to the composition of primary (the sequence) (Sanvictores & Farci, 2022), secondary (local arrangement of polypeptide backbone atoms) (Rehman, et al., 2022), tertiary (three-dimensional structure of the entire polypeptide chain) (Rehman et al., 2024) and even quarternary (three-dimensional arrangement of the subunits in a multi-subunit protein) structures in protein formation (Dehner, 2014). A protein's structure determines its function. Just as a protein's structure determines its function, so too does the composition and structure of a good abstract determine its showcase function.

There are three main types of abstracts: informative, critical, and descriptive; each is used under different circumstances to summarise different types of work (Harvey, et al., 2019). Descriptive abstracts provide an overview of the content, along with the main points of underlying problem followed by brief research methods but usually do not include significant findings, conclusions, or recommendations and to some extent often less helpful for determining the relevance of a work (Nagda, 2013). Informative abstracts summarize the key components of the study, including the problem statement, methodology, results, and conclusions, and are most commonly used in research articles because it allows readers to gain a good understanding of the study (Bahadoran, et al., 2020). The last out of those three called, critical abstracts, also known as evaluative abstracts, they are subjective in term of opinion and evaluate the contents of the article or publication and are much longer than descriptive and informative abstracts, usually contain a lot of analysis, such as points about a study's validity or reliability and are often used in social science research (Bahadoran, et al., 2020; Nagda, 2013; Klimova, 2013).

How to write abstract depends on (1) type of article, (2) journal' s instruction for authors, (3) the referencing style, e.g., APA style Abstracts which instruct author to follow the same order as the article: introduction, Method, Results, and Discussion or Conclusion (https://apastyle.apa.org/instructional-aids/reading-abstracts.pdf).

2.1 Type of Article

The type of article can affect the content and structure of an abstract. Abstract for original research article should provide brief but adequate information on the section of purpose, methodology or procedure, results and implications with conclusion of a study (Sanganyado, 2019) which commonly write as introduction, method, result and discussion (IMRAD). An abstract for a review article should summarizes the main points and findings of the article. It should give readers a quick overview of the paper's purpose or aim, discussion, and conclusions (Gülpınar & Güçlü, 2013). But the author of this article believes that a literature review article should not conclude but should simply end with a closing statement because a definitive conclusion or judgment about a particular issue implies that the remark leaves no room for doubt or further discussion, often based on evidence or reasoning that supports a final determination in nowadays of evidence based era (Burns, et al., 2011). On the other hand, closing remarks which ideally exist at the end of every review article showed to the reader that the author describe a statement made at the end of discussion section which acts as a summary or

endmost final thought, wrapping up the main points without necessarily being definitive or judgmental. Furthermore, a literature review as a form of in-depth review of previous publications, which a more or less systematic way of collecting and synthesizing previous research (Snyder, 2019), only brings together these articles in a unique way without changing or adding to or even reducing the truth that is already made available by those previous publications (Chigbu, et al., 2023) which are then processed, combined and arranged so that they have a powerful cumulative effect (Paré & Kitsiou, 2017). Mentioning those previously published articles used as his/her references showed the readers regarding the author's appropriate respect, academic integrity and scholarship (Panjaitan, et al., 2023). An abstract for a case report article typically includes three sections: background, case presentation, and conclusion (Alsaywid & Abdulhaq, 2019). It should highlight the case's importance and any lessons learned which in the end hopefully will facilitate improvement in safety or technique (Nishizawa, et al., 2024; Garg, et al., 2016).

2.2 Journal's Instruction for Authors

Based on the journal's instruction for authors or sometimes called author guidelines, whenever scholar(s) decide to write a scientific article, his/her abstract should be a succinct statement that gives the potential reader context (Nishizawa, et al., 2024). Most journal author guidelines set a maximum of between 250-300 words, including keywords and article classification. Each scientific journal has its own methods and instructions; that is why prospective authors must follow all the details of the instructions or guidelines so that their abstracts are in accordance with the journal. A journal's instructions for authors or author's guidelines may specify the length (in words), content, and format of an abstract. A scholar must always remember that an abstract is a concise summary of his/her research or ideas (in case of review articles) that is carefully tailored according to the instructions of the journal he/she is submitting to. Although not widely seen, there are also journals that are starting to introduce abstracts in graphic form or called as the graphical abstract (Jambor & Bornhäuser, 2024); which should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership (Dallaghan, et al., 2022).

Most journals provide clear instructions to authors on the formatting and contents of different parts of the manuscript. These instructions often include details on what the sections of an abstract should contain. Authors should tailor their abstracts to the specific requirements of the journal to which they plan to submit their manuscript. It could also be an excellent idea to model the abstract of the paper, sentence for sentence, on the abstract of an important paper on a similar subject and with similar methodology, published in the same journal for which the manuscript is slated.

2.3 Referencing Style

Depending on the way in which they record sources, scholarly reference styles can be divided into three main categories: documentary notes styles, parenthetical (or author-date) styles, and numbered styles. In documentary note styles (documentary-note citation systems), references are given in footnotesor endnotes. The notes are indicated by digits, which then recur with the full reference at the bottom of the page (footnote) or after the text (endnote). The digit, in superscript, is usually placed after the full stop ending the sentence to which the reference belongs. Oxford, Chicago, and MHRA are documentary note reference styles. In parenthetical, or author-date styles, in-text references are given within parentheses before the full stop of the sentence containing the reference. American Psychological Association or APA, Harvard, and Modern Language Association or MLA are parenthetical reference styles. In numbered styles, sources are referred to with Arabic numbers within square brackets or in superscript, and the references are listed in a numbered reference list after the text. References are numbered in the order in which they first appear in the text. Vancouver and Institute of Electrical and Electronics Engineers or IEEE are numbered styles.

APA style has specific abstract writing instructions (American Psychological Association, 2020). In their 7th Edition Abstract and Keywords Guide (https://apastyle.apa.org/instructional-aids/abstract-keywords-guide.pdf), APA specifically mention about what to do while writing abstract in two sub section namely abstract content and abstract format. The abstract needs to provide a brief but comprehensive summary of the contents of your paper. It provides an overview of the paper and helps readers decide whether to read the full text. Limit the length of abstract to 250 words, because that is the common lenght in typical

academic journals, however, some instructors or journals have different abstract length and formatting requirements.

3. NON TECHNICAL ASPECT COMMONLY FOUND IN ABSTRACT WRITING INSTRUCTION

Due to lack of training in scientific writing and sometimes unethical practices, abstracts are often poorly written, lack critical information, and sometimes contain spin (Sanganyado, 2019). Non technical aspect commonly found in abstract writing can be found scattered in the journal's instruction for authors or authors guidelines, which will be described briefly in the following section.

Complete. The completeness of an abstract means that it should having all the necessary or appropriate parts. An abstract is a self contained summarization, usually in one paragraph of 300 words or less, which must contain the major aspects of the entire paper in a prescribed sequence. It goes without saying that whatever is present in the abstract must also be present in the text. Likewise, whatever errors should not be made in the text should not appear in the abstract (eg, mistaking association for causality) (Andrade, 2011).

Concise. The conciseness of an abstract means that it gives a lot of information clearly but only in a few words (Tullu, 2019); brief but comprehensive and more straight to the point. It should not contain excess unnecessary information. A concise abstract will surely be help the readers to (1) quickly understand the significance of the research, (2) save time by getting the main points quickly and last but not least (3) attract the reader's attention and encourage them to read the full work.

Clear. The clear abstract means the abstract is easy to perceive, understand, or interpret. An abstract should be clear so that readers can quickly understand the main points of a paper and decide if they want to read the full article (Tsou & Treadwell, 2016). A clear abstract can also help improve search engine rankings and increase the likelihood that readers will find the paper or called visibility aspect (Pottier, et al., 2024).

Cohesive. The cohesiveness of an abstract means that all section is actually united and working together in line. Cohesion is the grammatical and lexical linking that holds a text together. It's related to the broader concept of coherence. An abstract should be cohesive to help readers understand how the sentences relate to one another and to the overall meaning of the document (Jiang & Hyland, 2017).

Cohesion helps readers integrate information between sentences. It also helps readers understand the main ideas of the entire writing without having to read the entire length of a scientific article (He, 2023). This cohesiveness of an abstract more or less can be analogized with the composition of protein structure with its famous *adagium*, the correct structure determines the correct function.

Unbiased. Unbiased abstract means the abstract shows no prejudice for or against something. Unbiased abstract must be impartial. As already mentioned, the abstract is the only part of the paper that the vast majority of readers see. Therefore, it is critically important for authors to ensure that their enthusiasm or bias does not deceive the reader; unjustified speculations could be even more harmful. Misleading readers could harm the cause of science and have an adverse impact on patient care or on student understanding, especially on basic science like Biochemistry.

Summarize. An abstract is a summarization of major aspects of the entire paper in a prescribed sequence. It means that an abstract give a brief statement of the main points of something, e.g., research findings or ideas.

The purpose of all these non-technical aspects but commonly expressed in the instructions for authors or author's guidelines when writing an abstract is most importantly to direct potential readers in the context of time, attention and to place the writing in the context of the perspective of the reader's needs.

4. CONCLUSION

Abstract is a truly display case for a scientific article, including articles regarding Biochemistry. For the vast majority of potential readers, a scientific articles, no matter how great the author's claims are about the novelty or greatness of his findings, actually does not exist beyond its abstract. For the referees, and the few readers who wish to read beyond the abstract, the abstract sets the tone for the rest of the paper. It is therefore the duty of the author to ensure that the abstract is properly

representative of the entire paper. For this, the abstract must have some general qualities.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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