Writing in Biology: The Use of Language, Style, and Reference

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In the field of biology, communication is imperative to the success of an individual and to the discipline as a whole. Randy Moore’s “Writing as a Tool for Learning Biology” opens by noting that effective writing was ranked the second most important quality in prospective biotechnology companies, only trailing slightly behind relevant work experience.[[1]](#footnote-1) Moore also addresses that writing is important in any profession in order to be successful, especially in the sciences. [[2]](#footnote-2) Having proper writing skills is one of the most useful and marketable traits a biology student can develop.

The language, structure, and reference of biological writing are three main characteristics that students should aim to master. Language is the way something is communicated by words through syntax, punctuation, point of view and other mechanical components. Structure is the organization or layout of the paper and is dictated by the reference style of the paper. Reference controls what sources you use and how you use them. Reference style and structure are closely linked, especially in biological writing. Because of writing’s crucial role in the professional world, it is necessary to develop a strong foundation of biological writing in college, which is why it is important to understand the language, structure, and reference of writing in the discipline of biology.

Language

The use of language in biology is arguably its most powerful characteristic. The way information is presented can have considerable consequences. Christoph Kueffer and Brendon Larson’s "Responsible Use of Language in Scientific Writing and Science Communication" states that reliable scientific evidence is necessary for appropriate decision making, and neglecting or misinterpreting scientific information can prejudice decision making. [[3]](#footnote-3) In an increasingly secular world, scientific data plays a tremendous role in our society’s policies and progress, with makes responsible language even more crucial. Writing responsibly in biology can be achieved by using proper scientific language. Scientific language does not just mean the use of a specialized vocabularies and complex theories. According to Kueffer and Larson, scientific writing involves communicating in factually correct, neutral, socially acceptable, and transparent language. [[4]](#footnote-4) Writing should not be offensive or prejudice towards a group and cannot be influenced by a motive. Unlike other disciplines, like the social sciences, language must be completely objective, with no persuasion coming from anywhere other than factual evidence.

Being responsible communicators is not always an easy task, and many scientists unintentionally fault their audience through the use of metaphors. Kueffer and Larson note that scientists often attempt to relate complex scientific phenomena to the public through metaphors.[[5]](#footnote-5) Through metaphors, the audience can better understand the information being presented to them. However, Kueffer and Larson warn that metaphors are often misleading: “[They] encourage the interpretation of a partial view as the whole truth.”[[6]](#footnote-6) Too often, scientists resort to the use of overly simplistic or inadequate metaphors in order to make their information more accessible to their audience, but this can lead to ineffectual communication. One of the greatest language difficulties scientists face is communicating in a way that can be widely understood without misrepresenting the data.

Biological writing must also be responsible in its attitude. Many of the reports and research papers we read today are swamped in negativity. Kueffer and Larson note that scientists often resort to fear-based language even though evidence shows that type of language is counterproductive.[[7]](#footnote-7) The goal of scientific writing, especially in genres meant for the public, should be to encourage change or progress, not to scare the audience with a negative attitude. If our experts’ attitudes seem panicked or discouraged, the audience will also embody these feelings. Kueffer and Larson discuss climate change as a topic often presented negatively and contribute this attitude to the lack of action to make an environmental change: “To change environmental attitudes, a focus on solutions and cultural values – as opposed to danger and loss – is often more effective.”[[8]](#footnote-8) If scientists adjust their language to present more positive outlooks, communication with their audience will be more effective and likely to provoke a greater response. Students must understand their responsibility to report information accurately and with an appropriate attitude in order to reliably contribute to the scientific community.

# The style of language in biological should also be concise not grandiose; the point of writing is to be understood, not to showcase one’s vocabulary. In Amin Bredan’s “Inheritance of Poor Writing Habits,” he notes that scientists have large vocabularies necessary to their profession, but reports that generations of readers of scientific literature have struggled to understand the pompous, exaggerated language often used by scientist.[[9]](#footnote-9) Scientists have to utilize their expansive vocabulary in order to share information with their colleagues and audience, but they must do so in a way that is conservative and appropriate in order to be accessible to as many people as possible, not just to those in their specialty. The language of biological writing is characterized by responsible use of word choice and metaphors, positive attitudes, and humble yet appropriate language.

Structure

The structure of biological writing goes beyond its varying genres. In his work "Academic Writing," Ben Rafoth compares academic writing to that of a newspaper: “… it tends to be relatively formal, uses lots of proper names, is arranged in paragraphs and headings, and is embedded in complex sentences.”[[10]](#footnote-10) Both scientific writing and newspapers use a structure conducive to sharing information and establish their credibility through sophisticated, but understandable language and referencing. Referencing in newspapers usually involves primary accounts of an event whereas scientific writing involves referencing previous work by other scientists. This is important because referencing is a necessary component of scientific replication. Replication in science means to take the ideas and work of someone else and refine or build upon them in order to advance knowledge of scientific phenomena.

This idea of scientific replication has a huge influence on the structure of biological writing. When scientists report information, they structure their papers in a manner that contains all the information necessary for another scientist to replicate their work. Typically, IMRAD structures, or variations of it, are used to report new results from scientific experimentation because it contains a section that corresponds to each part of the scientific method. The scientific method is a format for creating and conducting experiments and contains an observation, hypothesis, procedure, results, and analysis section. Similarly, an IMRAD paper contains these sections so that all the information of an experiment can be explained within in research or a proposal. Replication is imperative to the field of biology, as it is the primary way that knowledge in the field is authenticated and advanced. By having a consistent structure across the biological discipline, scientists can read each other’s work more efficiently and effectively because the information is presented in a uniform and organized manner.

Although biological writing can take on many forms, its structure remains fairly uniform across each genre. Jared Colton and Thilina Surasinghe’s work, "Using Collaboration Between English and Biology to Teach Scientific Writing and Communication," identifies some of the most common genres of biological writing as IMRAD papers for peer-reviewed journals, research papers, proposals, articles, journal reviews, syntheses, opinion papers, and commentaries on previous work.[[11]](#footnote-11) Despite a broad array of genres within biology, the structural differences are minimal. The end goal of scientific writing is to communicate information and make a claim based on evidence. As demonstrated by Alexander Peden and James Ironside’s “Molecular Pathology in Neurodegenerative Diseases,” a scientific paper will outline the data of an experiment and then the scientist will argue the implications or the applications of the research’s results.[[12]](#footnote-12) Keeping in mind the aforementioned importance of responsible and scientific language, a scientist’s writing must take on the structure of an argument in order to persuade the validity of their work. Moore argues that “truth in science is the product of argument and persuasion, which, in turn, are created with language.”[[13]](#footnote-13) Without threatening the integrity of their work through irresponsible language, scientists must take on an argumentative structure in their papers in order to convince their audience to take action, perform further research, fund their research, etcetera.

Reference

Reference in biology is extremely important. Progress in this field must be made by building off other’s work, not taking credit for it. It is critical for scientists to avoid plagiarism, both for the validity of their work and for their own credibility. Colton and Surasinghe’s work with college biology students “emphasized the need to avoid plagiarism and maintain the academic integrity standards of [their] institution.”[[14]](#footnote-14) Proper reference in scientific writing is not only necessary for giving credit to original sources, but also so that proper replication of experiments and research can take place.

Writing in biology follows the American Psychological Association (APA) format. In Andrea Lunsford’s *The Everyday Writer,* she notes that different disciplines prefer different documentation styles based on what information is valued the most.[[15]](#footnote-15) Citations in APA emphasize the date of publication more than other popular reference styles such as MLA and Chicago. Lunsford describes that in scientific research, the timeliness of publication is crucial and thus appears directly following the author’s name. [[16]](#footnote-16) APA uses two styles of citation: in-text citations that occur in the body of the paper and full citations that are listed on the “Reference” page after the paper’s conclusion. In-cite citations give credit to an idea’s original source in the body of the paper and point the reader to the full citation, where more information about a source can be obtained. It is important to determine what type of source is being referenced, because

different sources call for slight variations in citations. Nonetheless, all types of sources will be cited in a way that is consistent with APA’s emphasis on the author and publication date.

Biological papers written in APA also following formatting guidelines. APA papers contain certain standards for a title page, abstract, margins and spacing, headers, page numbers, and visual elements. APA is typical of manuscripts written for publication in academic journals, such as those like Peden and Ironside’s publication; however, most formal writing in biology also follows this basic APA format, with a few discrepancies in certain genres.[[17]](#footnote-17) In most cases, APA is the preferred and most widely accepted form in which papers are referenced and structured.

Discussion

Now that the language, structure, and reference of biological writing have been defined, it is important to discuss why they are important. Aforementioned, students need to understand these elements of biological writing before beginning their careers because writing is an essential element of biological occupations. Writing is especially important in biology since communication is vital to advancing knowledge in this field through the process of replication. In order to be successful contributors to the field of biology, students must be able to achieve proper language, structure, and reference in their writing.

College curriculums should be structured to give students more opportunities to develop writing skills in accordance with proper language, structure, and reference. Implementing interdisciplinary biological English classes that incorporate necessary literary development, while also maintaining a focus on biological concept, such as the course described in Colton and Surasinghe’s research, is a promising step towards enhancing writing in biology.[[18]](#footnote-18) Students with an understanding of proper biological writing will be better prepared for future education or careers and will likely be more successful biologist compared to their peers with less developed writing skills. Therefore, institutions that wish to give their biology students a competitive edge should put a larger focus on writing development, with a particular focus on language, structure, and reference in biological writing.

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1. Randy Moore, "Writing as a Tool for Learning Biology." *Bioscience* 44, no. 9 (1994): 613. [↑](#footnote-ref-1)
2. Ibid, 616 [↑](#footnote-ref-2)
3. Christoph Kueffer and Brendon Larson, "Responsible Use of Language in Scientific Writing and Science Communication." *BioScience* 64, no. 8 (2014): 719. [↑](#footnote-ref-3)
4. Ibid, 722 [↑](#footnote-ref-4)
5. Ibid, 720 [↑](#footnote-ref-5)
6. Ibid, 720 [↑](#footnote-ref-6)
7. Ibid, 721 [↑](#footnote-ref-7)
8. Ibid, 721 [↑](#footnote-ref-8)
9. Amin Bredan, "Inheritance of Poor Writing Habits. to Improve Scientific Writing.” *EMBO Reports* 14, no. 7 (07, 2013): 593. [↑](#footnote-ref-9)
10. Ben Rafoth, "Academic Writing." In *Multilingual Writers and Writing Centers*. (Boulder, Colorado: University Press of Colorado, 2015), 75.

    [↑](#footnote-ref-10)
11. Jared Sterling Colton & Thilina Dilan Surasinghe. "Using Collaboration Between English and Biology to Teach Scientific Writing and Communication." *Journal of College Science Teaching* 44, no. 2 (2014): 35-36. [↑](#footnote-ref-11)
12. Alexander Peden & James Ironside’s “Molecular Pathology in Neurodegenerative Diseases,” *Current Drug Targets* 13, no. 12 (11, 2012): 1548-1559. [↑](#footnote-ref-12)
13. Randy Moore, "Writing as a Tool for Learning Biology." 613 [↑](#footnote-ref-13)
14. Jared Sterling Colton & Thilina Dilan Surasinghe. "Using Collaboration Between English and Biology to Teach Scientific Writing and Communication." 38. [↑](#footnote-ref-14)
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16. Ibid [↑](#footnote-ref-16)
17. Alexander Peden and James Ironside’s “Molecular Pathology in Neurodegenerative Diseases.” 1548-1559. [↑](#footnote-ref-17)
18. Jared Sterling Colton & Thilina Dilan Surasinghe. "Using Collaboration Between English and Biology to Teach Scientific Writing and Communication." 31-39. [↑](#footnote-ref-18)