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Does the numerical reference citation vis-à-vis the author date system do a disservice to readers and authors?

Dr. John Warren Reynolds

Oligochaetology Laboratory, 9-1250 Weber Street East, Kitchener, ON Canada N2A 4E1, and Research Associate, New Brunswick Museum, Saint John, NB Canada E2K 1E5

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***Corresponding author:** Dr. John Warren Reynolds

Oligochaetology Laboratory, 9-1250 Weber Street East, Kitchener, ON Canada N2A 4E1, and Research Associate, New Brunswick Museum, Saint John, NB Canada E2K 1E5

Abstract

This paper discusses several author-number styles: American Medical Association (AMA), Institute of Electrical and Electronics Engineers (IEEE), Nature, American Chemical Society (ACS) and Modern Language Association (MLA) and the author-date style American Psychological Association (APA). The discussion includes their beginning and brief history plus their key features. The author states his case for preferring the APA and how the author-number styles may eradicate the contributions of some coauthors. The author advocates for the author-date style of referencing.

Keywords: Writing styles, AMA, IEEE, Nature, ACS, MLA, APA

Introduction

When I began publishing scientific papers over 57 years ago, the author-date system was the normal form of citation in biological science journals I used in my research. The following is a sample of the many papers available to me at that time, *e.g.*, Bouché (1972), Brinkhurst (1978), Černosvitov (1942), Cognetti (1905), Gates (1942), Graff (1967), Jamieson (1971), Michaelsen (1910), Omodeo (1952), Pop (1949), Rosa (1983), and Zicsi (1970).

The numerical citation styles have been around for more than a century (Bentley *et al.*, 1929; Cronin, 1984). In this style,

references are numbered and the number appears in the text, with the reference section listed alphabetically or in sequence as they appear in the text. "They exasperate scholars and researchers. They irritate some readers. And they aggravate many editors." (Long, 2019). It is my hope that advocating for the author-date style may cause some journal to consider changing their style Manual. The cost would necessitate a change in the *Instructions to Authors* and/or a change in the Constitution or By-laws of the society governing the journal. What are these different styles?

Background

The formalization of one of the most influential numerical systems, the Vancouver style or sometimes called the author-number system, began in 1978. The International Committee of Medical Journal Editors (ICMJE) met in Vancouver, Canada, and established the Uniform Requirements for Manuscripts Submitted to Biomedical Journals. Since that time, several other systems have evolved. It should be pointed out that the choice of citation style is the prerogative of the editorial board or the society sponsoring the publication. Although not always specifically stated, it is my opinion the numerical systems are used to save space, *e.g.*, shorten the article length.

In the mid 1900s the alternate author-number systems started to appear in scientific journals particularly in the physical and medical sciences. An example, *in text*: Haas [2] or Haas², and *in References*: 2. Haas J.M. The effect of pregnancy on the midsystolic click and murmur of the prolapsing posterior [sic] leaflet of the mitral valve. *Am. Heart J.* 1976; 92(3): 407–408. Since then, numerical citation styles like AMA, IEEE, Nature, and ACS have become standard in medicine, engineering, and the natural sciences. These styles are supposedly favoured for their clarity and efficiency, especially in heavily referenced academic writing.

AMA Style is a citation and formatting system developed by the American Medical Association in 1883, primarily used in medical and scientific writing. It's widely adopted by journals, researchers, and students in the health sciences, including medicine, nursing, pharmacy, and public health. For those preparing a manuscript for the health science the AMA Style is the go to format.

The key features in the 11th edition of AMA Style are:

1. Numerical citations where the sources are cited using superscript numbers in the order they appear in the text, *e.g.*, organisms are parthenogenetic¹.
2. In the Reference or Literature Cited section of the paper, the entries are numbered in the order they appear in the text, and not alphabetically.
3. The author names use initials without punctuation, *e.g.*, Reynolds JW.
4. The journal titles are abbreviated following the National Library of Medicine list, *e.g.*, JAMA Intern Med.
5. There are no bold or italic fonts in the citations even when genus and species names appear.
6. There is minimal punctuation.
7. The emphasis is on clarity and brevity.
8. Consistency across disciplines: Used in medicine, nursing, pharmacy, and public health.

Example Citation

In-text:

The earliest records of earthworm's use in medicine can be found in old Chinese volumes which may be difficult for most westerners to decipher.¹

Reference list:

¹Reynolds JW, Reynolds WM. Earthworms (Annelida: Oligochaeta) as Medicine: A Meta-analysis. *PriMera Scientific Surgical Research and Practice* 2025a;5(4):5–9.

Current journals using this style (This and similar lists are only examples): American Journal of Nursing, Drug Design, Development and Therapy, Journal of Pharmaceutical Analysis, Journal of the American Medical Association, New England Journal of Medicine,

American Psychological Association

IEEE Style is a citation and formatting system developed by the Institute of Electrical and Electronics Engineers (IEEE). It grew in prominence in the years 1960-1970 and is widely used in technical fields like engineering, computer science, and information technology, especially for conference papers, journal articles, and academic writing.

The key features of IEEE Style are:

1. The sources cited use [bracketed numbers] in the order they appear in the text.
2. In the References there is a streamlined formatting with no italics or bold fonts.
3. The author's name appears with initials first, followed by last/family name, *e.g.*, J.W. Reynolds.
4. The journal names and book titles CAPITALIZED, but not italicized.
5. The emphasis is on clarity and efficiency, making it ideal for documents with many references and technical details.

Example Citation

In-text: The proper fixation and preservation of specimens for identification, shipping, and storage has long been a problem. [6]

Reference list: [6] J.W. Reynolds, 2022. The Earthworms (Lumbricidae, Mega- scolecidae and Sparganophilidae) in Canada. Ottawa: Canada Food Inspection Agency,

Current journals using this style: IEEE Transactions on Automation Science and Engineering, IEEE Internet of Things Journal, IEEE Journal on Emerging and Selected Topics in Circuits and Systems, IEEE Sensors Journal, IEEE Transactions on Robotics.

Nature Style is the citation and formatting system used by the journal *Nature* and first published in 1869, although not widely recognized and adopted until the 20th century. It's designed for clarity, brevity, and consistency in high-impact research publications across disciplines like biology, physics, chemistry, and environmental science. It's similar to other numerical styles like Vancouver or AMA, but tailored for the scientific community.

Common Use Cases: Submissions to *Nature* and its affiliated journals, high-level scientific research papers and grant proposals and academic presentations in the sciences.

The key features of Nature Style are:

1. The references cited use superscript numbers in the order they appear in the text, *e.g.*, as demonstrated previously¹.
2. In the References, there is a streamlined formatting with no italics or bold fonts.
3. The author's name appears with initials first followed by last/family name, *e.g.*, J.W. Reynolds.
4. The journal titles are abbreviated following standard scientific conventions.

5. This style emphasizes precision and readability, making it ideal for dense, data-rich writing.

Example Citation

In-text: This method was first introduced in 1995¹ (or 1995^[1]).

Reference list: ¹Reynolds JW. Ecosystem structure and its components. *In:* Khan, M.N. (ed.). Compl. Theme Pap. Environ. Stud. Dhaka: Bangladesh Tech. Ed. Bd., pp. 1–20 (1995).

Current journals using this style: Bone Research, Cell Death & Differentiation, Nature, Nature Medicine, Nature Climate Change, Scientific Reports.

ACS Style is the citation and formatting system developed by the American Chemical Society, primarily used in chemistry and related scientific disciplines. It was first used in 1997 with a second edition of the guide line in 2006, and finally transitioning to online formatting in 2020. It's designed to ensure clarity, precision, and consistency in chemical research writing, whether for journal articles, lab reports, theses, or conference papers. This style is detailed and rigorous, reflecting the precision required in chemical research.

Key Features of ACS Style are:

1. There is citation flexibility depending on the journal or instructor's preference:
 - i. Superscript numbers: *e.g.*, The reaction was first observed¹.
 - ii. Parenthetical numbers: *e.g.*, The reaction was first observed (1).
 - iii. Author–date format: *e.g.*, The reaction was first observed (Smith, 2020).
2. The reference list is found at the end of the document, either in numerical order or alphabetically (depending on citation format).
3. The author's name appears with initials first followed by last/family name, *e.g.*, J.W. Reynolds.
4. The journal titles are abbreviated according to the Chemical Abstracts Service Source Index (CASSI; <https://cassi.cas.org>).

Example Citation

In-text: This method was first introduced in 1995. (1).

Reference list: (1) J.W. Reynolds, S. Huq, A. Rahman. (eds.). Environmental education in Bangladesh at the tertiary level; Bangladesh Centre for Advanced Studies: Dhaka, 1995.

Current journals using this style: Chemical Reviews, Environmental Science & Technology, Inorganic Chemistry, Macromolecules, Organic Letters.

MLA Style is a formatting and citation system developed by the Modern Language Association, primarily used in the humanities, especially in fields such as literature, philosophy, history, and the arts. It was first used in 1951 with the MLA Style Sheet to address inconsistencies in academic writing. There have been several revisions in 1970, 1977, 2016 and 2021 (9th ed.). It emphasizes clarity, consistency, and proper attribution of sources in academic writing. MLA Style is all about elegant simplicity, no footnotes for citations, no clutter, just clean attribution. Generally, if you're

writing a paper for an English or history class, MLA is the goto format.

Key Features of MLA Style (9th Edition) are:

1. The references cited in the text use the author's last name and the page number, *e.g.*, (Reynolds, 45).
2. In the References, journal and book titles are italicized, but quotation marks are used for articles, essays and short works.
3. In the References, the author's full names are used, *e.g.*, Reynolds, John Warren
4. The Reference section lists alphabetically all sources with hanging indent.
5. In the text, the first line in a paragraph is indented.

Example Citation

In-text: (Reynolds 70)

Reference list: Reynolds, John Warren. Earthworms (Oligochaeta: Lumbricidae, Megascolecidae and Sparganophilidae) in the Canadian Ecozones. (pp. 23–75) *In:* Earthworms and their Ecological Significance. Adarsh Pal Vig, A. and S. Singh Suthar (eds.) Nova Science Publishers, Inc., 2022.

Current journals using this style: College Composition and Communication, Journal of Modern Literature, Modern Fiction Studies, Publications of the Modern Language Association, Studies in Browning and his Circle.

My personal choice is the APA Style, to the point that I prefer to publish in journals that use this style, or are flexible enough to allow it, even if they normally use a number style. Most of my 570 publications appear in the APA Style. One journal using the author-number system allowed me to use the following, *e.g.*, from Reynolds and Reynolds (2025b) "The method of healing practiced at the White Eagle Lodge comes into this latter category (Hayward, 2016) [7]."

APA Style is a widely used citation and formatting system developed by the American Psychological Association. It was introduced in 1929 at Vancouver, British Columbia with the first set of guidelines. The first full edition came out in 1952 and several editions appeared subsequently with the last in 2019 (9th ed.). It's designed to ensure clarity, consistency, and credibility in scholarly writing, especially in the social sciences like psychology, sociology, education, and communication, but commonly found in the sciences. It is also known as the Vancouver system or the Harvard Referencing system.

Key Features of APA Style are:

1. The references cited use the author-date format, *e.g.*, (Reynolds, 2022).
2. In the Reference section, the entries are alphabetical with full publication details.
3. The second and following authors' names can have their initials either before or following their last/family name (depending on the journal format).
4. Digital object identifiers (DOIs): for electronic sources are used, when available.
5. Publications used clear headings and subheadings, bias-free language which encourages inclusive, respectful terminology.
6. APA Style in its 7th edition, introduced updates like: 1) using "they" as a singular pronoun, 2) simplified citation

formats for websites and online sources, and 3) more flexibility in font choices.

Example Citation

In-text: (Reynolds *et al.*, 1974)

Reference list: Reynolds, J.W., Clebsch, E.E.C. and Reynolds, W.M. (1974). The earthworms of Tennessee (Oligochaeta). I. Lumbricidae. Contr. N. American Earthworms, No. 3, Bull. Tall Timbers Res. Stn., No. 17, viii + 133 pp.

Current journals using this style: Biodiversity Data Journal, Canadian Field-Naturalist, Megadrilologica, ZooKeys, Zootaxa.

Discussion

Since I have already stated that I have a bias regarding choice of format, there are some generalizations that apply to all styles.

There are some journals where country names in a journal citation are abbreviated and others where the name is spelled out in full. The Cochrane Style Manual (Mitchell and Cochrane, 2024) follows the first case while the Canadian Style the latter, *e.g.*, UK and USA in the Cochrane, but United Kingdom and United States of America in the Canadian. The Chicago Manual of Style (2024) and APA Style both generally favour writing country names in full in bibliographies and publication details unless abbreviations are part of official names (*e.g.*, "U.S. Department of State"). The ACS Style (via CASSI) in chemistry-related citations, country names are often included in publisher locations and should be written in full (*e.g.*, "Springer: New York, NY, USA"). The Canadian Style (Canada.ca) also for formal citations in Canadian government documents, country names are written in full, especially in award citations and official records, *e.g.*, "Brigadier General Scott Johnson, MSC, of the United States of America". In recent years, many publications have opted for complete journal names rather than standard abbreviations, *e.g.*, Journal of Entomology and Zoology Studies, Megadrilologica, Opuscula Zoologica Budapest, Pedozoologica Hungarica, ZooKeys, and Zootaxa.

The *General Rule of Thumb* is to use full country names in publisher locations, author affiliations, and formal citations unless the style guide allows abbreviations. Avoid outdated or politically sensitive names unless historically accurate for the source, *e.g.*, Burma now Myanmar Czechoslovakia now Czechia or Swaziland now Eswatini.

Much of my background in the techniques and concepts of scientific writing comes from Prof. R.E. Blackwelder and Dr. G.E. Gates which I incorporated in the two books I wrote on the subject (Reynolds, 1979 and 1993). One of these concepts I don't see often enough to help readers, in very large papers and/or books is to use the page number after the year, *e.g.* Reynolds, 2022, p. 133, or Reynolds, 2022: 133. Failing to do this places a large burden on a reader to locate the source of your citation in a document of more than 100 pages. This is simple to do and a courtesy to those who are interested in your publication.

My greatest issue in current publications is the use of *et al.* (*et alii* for masculine author names, *et aliae* for feminine author names, or *et alia* for neuter, meaning "and others"). In the text, when there are three or more authors, you would use Reynolds *et al.* for Reynolds, Clebsch and Reynolds, BUT in the reference section all names would be displayed. Currently, in some journals the author is directed to use only the first three authors when there are more than three using *et al.* for the others, while other journals state only

six authors are named with the others as *et al.* Their reasoning is never stated, but one could assume it is to save space which is frequently the rationale for the number citation systems. Some have stated it places a burden on librarians, bibliographers, and those citing a paper for multiple authors, hence the use of *et al.* (Blackwelder, 1967, p. 311). I can accept the use in the text, but not in the reference section, since by doing so you have effectively reduced the credit and acknowledgments of those contributing authors to zero! I can live with the author-number system if all the authors are credited in the reference section.

My reason for favouring the author-date system, particularly in my areas of study, is that when I see a paper listed as (Smith, 1917) I immediately know the document and can relate it to the current discussion in the paper I am reading. This paper will always be (Smith, 1917), but if the author-number system, or simple number system, is employed whether it be [brackets], (parentheses) or superscript³⁴, this will change with every publication. Therefore, anything other than the author-date system has the potential to erase the contribution to those who have worked hard to contribute to the publication.

The increasing use of AI is still too early to determine what effect this will have on future publications. Currently, AI may be used to write cover letters to the selected journal as well as convert the references into that journal's style. This should not be a substitute for failing to read and follow the *Instructions to Authors* set out by the journal, a major reason for manuscript rejection (Dr. F.W. Kutz, *in litt.*, 19 Oct 2025).

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