

## Why scientific writers should study writing scientifically: the value of research into written communication

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In the November 2016 EASE Newsletter, Julian Venables proposed “Five golden rules for writing a good scientific paper.”<sup>1</sup> Rule #5 is “Be clear – sentences should be less than 25 words long.” He continues: “The 20 + 10 rule says that for each 10 words above 20 a sentence becomes twice as hard to read. So for a 70 word sentence, which is not uncommon for francophone scientists, there is an ‘excess of 50 words’ ie 5 extra 10s, or a  $2 \times 2 \times 2 \times 2 =$  a 32-fold increase in difficulty!” [Spelling and punctuation are as published.]

Unfortunately, Rule #5 won’t necessarily improve writing.<sup>2-6</sup> It’s actually a myth, and one that harms us professionally when we perpetuate it.<sup>7</sup> I don’t mean to be critical of Dr Venables. Most of my fellow medical writers and clients who are nonnative English speakers are also unaware of the research base and advanced skills that are a part of our profession. I learned them in the 1970s, when I was trained to be a technical writer *by* technical writers. My sense is that people entering the profession of medical writing in mid career do not get the same orientation or training. This lack of awareness is curious, if not disturbing, for another reason however. If physicians study medicine, psychologists study psychology, and historians study history, why don’t writers study writing?

### Why the rule won’t necessarily improve writing

The Rule is puzzling. What does it mean if a text is “twice as hard to read?” What is a “32-fold increase in difficulty?” I suspect that “reading difficulty” is the concept of “reading grade level,” which is the outcome of some readability formulas. The usual understanding of reading grade level is that a text written at, say, an 8th-grade level can be understood by a reader with at least an 8th-grade education. Not so. It means that half the 8th graders tested for their comprehension of a standardised text can answer correctly half of the questions about it.<sup>8</sup> So, if we test 10 adolescents and only 5 answer 5 of 10 questions correctly—the circumstance that defines reading grade level—the “comprehension success rate” is only 25%. In fact, readability formulas have long been discredited as a way to guide revision or to evaluate writing.<sup>2,9-12</sup> Consider the fact that a text and the same text written backwards, making it meaningless, have the same reading grade level.

Back to Rule #5. Shortening sentences, by itself, does not necessarily improve comprehension,<sup>4,5</sup> and may even reduce it.<sup>6</sup> Complexity, not length, is what reduces comprehension, and longer sentences have more opportunities to be complex.<sup>13</sup> Sentence length is a factor in many readability formulas, however, which penalise longer sentences as surrogates for increased complexity. The advice to use shorter sentences is not necessarily bad, it’s just simplistic; based on correlation, not causation; and not supported by the research.

### Why the rule harms scientific writers

Conventional notions of writing are founded on what we learned in college composition classes and practiced in writing term papers in college; that is, on “writer-based texts,” written for an audience of one, who knows more about the topic than we do, and who has no need for the information we have presented.<sup>14</sup> In contrast, scientific writing is functional, “reader-centered” writing, in which we write for a few to a few thousand readers, who know less about the topic than we do, and who need to use the information we provide.<sup>7</sup> Good scientific writing is determined by how well readers understand, remember, recall, and use a text, not by sentence length.<sup>8</sup>

Many people—the public, employers, clients, and even some scientific writers—believe that doing well in academic writing courses and having a knowledge of science qualify someone to be a scientific writer; that a flare for writing is what differentiates scientific writers from other professionals. This belief is so widely and deeply held that many otherwise educated and intelligent professionals in other disciplines have studied various applications of scientific writing without knowing the methods, measures, endpoints, and results of studies in written communication conducted by specialists in that field.

A telling, if unfortunate, example of this mistaken belief is the article titled “Readability assessment of psychiatry journals.”<sup>15</sup> In this article, five authors assessed the “readability” of 500 articles from psychiatric journals, without understanding that the limitations of readability formulas made their efforts meaningless. Although in medicine most “readability” research has been done on patient education materials (PubMed alone lists about 100 articles on this topic), other authors have studied the “readability” of scientific articles and other documents prepared for professionals.<sup>16-24</sup> The article cited above is just the most illustrative of these wasted efforts.

Despite the reality that “there is clearly a difference between competent writing and sophisticated writing,”<sup>25</sup> the conventional wisdom about writing doesn’t recognise this difference. It doesn’t recognise that scientific writing differs fundamentally from literary or creative writing and from journalism or popular writing.<sup>7,26-28</sup> Becoming an expert scientific writer requires more and different training than that provided in college,<sup>7,29-33</sup> as well as a different orientation to writing.<sup>7,14</sup> It requires mastering different skills<sup>7</sup>; learning the characteristics of different audiences, different document types, and different media<sup>7</sup>; and knowing what the research says about written communication.<sup>8,10</sup>

As scientific writers, every time we cite a Rule #5 (there are several such “rules”), we reinforce the mistaken and dangerous notion that scientific writing is merely writing about science; that it is a subset of conventional writing. Among 800 high-ranking medical researchers, 65% believed they could write better than professional medical communicators.<sup>34</sup> If

employers and clients assume that they know pretty much what we know about writing,<sup>35,36</sup> our perceived value may be more related to *what others don't want to do* than to *what we can do that they cannot*. This perception undervalues the profession, if it acknowledges the need for the profession at all. We need to distance ourselves from conventional notions of writing by developing superior knowledge and skills because changing the way people think about scientific writing is essential not only to defining our profession but to *having* one.

Copies of articles published in the *AMWA Journal* are available from the author on request.

## References

- 1 Venables J. Five golden rules for writing a good scientific paper. <https://www.linkedin.com/pulse/five-golden-rules-writing-good-scientific-paper-julian-venables>. Accessed 1 November, 2016.
- 2 Redish J, Selzer, J. The place of readability formulas in technical communication. *Tech Com*. 1985;4:46-52.
- 3 Redish J. Readability formulas have even more limitations than Klare discusses. *ACM J Comp Document* 2000;24(3):132-7.
- 4 Duffy TM, Kabance P. Testing a readable writing approach to text revision. *Journal of Educational Psychology* 1982;74:733-48.
- 5 Schlesinger IM. Sentence Structure and the Reading Process. The Hague: Mouton, 1968
- 6 Pearson PD. The effects of grammatical complexity on children's comprehension, recall, and conception of certain semantic relations. *Reading Res Quart*. 1974;10:155-92.
- 7 Lang T. Medical writing up close and professional: establishing our identity. *AMWA J*. 2015;30(1):10-7.
- 8 Felker D, ed. Document Design: A Review of the Relevant Research. Washington, D.C., American Institutes for Research, Document Design Center, 1980.
- 9 Bruce BC, Rubin AD, Starr KS. Why readability formulas fail. *IEEE Trans Prof Comm*. 1981;PC-24:50-52. Available at <https://www.ideals.illinois.edu/bitstream/handle/2142/15490/why-rf-fail.html?sequence=3>. Accessed 1 November, 2016.
- 10 Charrow PR, Charrow VR. Making legal language understandable: a psycholinguistic study of jury instructions. *Columbia Law Rev*. 1979;79:1306-733.
- 11 Connaster BR. Last rites for readability formulas in technical communication. *J Tech Writing Comm* 1999;29(3):271-87.
- 12 Davison A, Kantor R, Hannah J, Hermon G, Lutz R, Salzillo R. Limitations of readability formulas in guiding adaptations of texts. *Tech. Rep. No. 162*. Urbana: University of Illinois Center for the Study of Reading, March 1980. (ERIC Document Reproduction Service No. ED 184 090)
- 13 Rohrman N. The role of syntactic structure in the recall of English nominalizations. *J Verbal Learning Verbal Behav*. 1968;7, 904-12.
- 14 Britton WE. The trouble with technical writing is freshman English. *J Tech Writ Com*. 1974;4(2):127-31.
- 15 Barbic SP, Roberts K, Durisko Z, Lee C, Yachouh R, Gurriel J, et al. Readability assessment of psychiatry journals. *Euro Sci Editing*. February 2015; 41(1):3-9.
- 16 Wu DT, Hanauer DA, Mei Q, Clark PM, An LC, Proulx J, et al. Assessing the readability of ClinicalTrials.gov. *J Am Med Inform Assoc*. 2016 Mar;23(2):269-75. doi: 10.1093/jamia/ocv062. Epub 2015 Aug 11.
- 17 Wu DT, Hanauer DA, Mei Q, Clark PM, An LC, Lei J, et al. Applying multiple methods to assess the readability of a large corpus of medical documents. *Stud Health Technol Inform*. 2013;192:647-51.
- 18 Hayden JD. Readability in the British Journal of Surgery. *Brit J Surg*. 2008;95:119-24.
- 19 Hall JC. The readability of original articles in surgical journals. *ANZ J Surg*. 2006 Jan-Feb;76(1-2):68-70.
- 20 Heneghan MJB. Scientific articles have hardly changed in 50 years: Plain English and minimal Latin may explain readability of 1950s paper. *BMJ* 2004; 329. Letter. doi: <http://dx.doi.org/10.1136/bmj.329.7461.352> (Published 05 August 2004)
- 21 Hochhauser M. Readability of British and American medical prose. Why are unreadable articles still being written? *BMJ*. 2003 Mar 29;326(7391):711.
- 22 Cardinal BJ. Readability analysis of health, physical education, recreation and dance journal articles. *Percept Mot Skills*. 1995 Feb;80(1):255-8.
- 23 Roberts JC1, Fletcher RH, Fletcher SW. Effects of peer review and editing on the readability of articles published in *Annals of Internal Medicine*. *JAMA*. 1994 Jul 13;272(2):119-21.
- 24 Hurst K, Thompson D. A software package to determine the readability of nursing articles. *Nurs Stand*. 1992 Feb 5-11;6(20):43.
- 25 Thompson T, Gallagher A. When a college professor and a high school teacher read the same papers. In: Sullivan P, Timberg H, Sheridan B, eds. What is "College-Level Writing"? Volume 2: Assignments, Readings, and Student Writing Samples. National Council of Teachers of English, 2010. [https://secure.ncte.org/library/NCTEFiles/Resources/Books/Sample/56766Intro\\_Chap01\\_x.pdf](https://secure.ncte.org/library/NCTEFiles/Resources/Books/Sample/56766Intro_Chap01_x.pdf). Accessed 1 November, 2016.
- 26 Institute of Scientific and Technical Communicators. Thinking of career in technical communication? <http://www.istc.org.uk/wp-content/uploads/2011/08/CareersLeaflet-v1-1.pdf>. Accessed 1 November, 2016.
- 27 Difference between technical writing and literary writing. <http://www.differencebetween.com/difference-between-technical-writing-and-vs-literary-writing/#ixzz2M5jN0Fdx>. Accessed 1 November, 2016.
- 28 Technical and literary writing: what's the difference? <http://rodrigo75.wordpress.com/2011/01/18/technical-and-literary-writing-whats-the-difference/>. Accessed 1 November, 2016.
- 29 Meltzer D. Writing assignments across the curriculum: a national study of college writing. *College Comp Communication*. 2009;61(2):W240-61.
- 30 Zorn J. English compositionism as fraud and failure. *Acad Questions*. 2013;26(3). doi 10.1007/s12129-013-9368-1. <https://www.deepdyve.com/lp/springer-journals/english-compositionism-as-fraud-and-failure-7o57HUJfSE>. Accessed 1 November, 2016.
- 31 Carter M, Miller CR, Penrose AM. Effective composition instruction: what does the research show? Center for Communication in Science, Technology, and Management. North Carolina State University, April, 1998. [http://writing.uncc.edu/sites/writing.uncc.edu/files/media/docs/Effective\\_Writing\\_Instruction\\_What\\_Research\\_Shows.pdf](http://writing.uncc.edu/sites/writing.uncc.edu/files/media/docs/Effective_Writing_Instruction_What_Research_Shows.pdf). Accessed 1 November, 2016.
- 32 Casner-Lotto J, Barrington L. Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21<sup>st</sup> century U.S. Workforce. The Conference Board, Inc., the Partnership for 21st Century Skills, Corporate Voices for Working Families, and the Society for Human Resource Management, 2006.
- 33 Elsberg M. Why trying to learn clear writing in college is like trying to learn sobriety in a bar. <http://www.forbes.com/sites/michaellesberg/2011/07/31/why-trying-to-learn-clear-writing-in-college-is-like-trying-to-learn-sobriety-in-a-bar/>. Accessed 1 November, 2016.
- 34 Hamilton C. Don't get spooked! How to collaborate with a professional medical communicator (and avoid ghostwriting). *Arch Immunol Ther Exp*. 2010;58:255-261. doi 10.1007/s00005-010-0080-3
- 35 Lang T. Letter to the editor. Response to the article titled "Use of the passive voice in medical journal articles." *AMWA J*. 2011;26(1):46.
- 36 Lang T. Letter to the Editor. Response to "Readability and text cohesion of online colorectal cancer and screening information." *AMWA J*. 2014;29:48.