Winners of the **Geoff Hall Scholarship** Essay Competition

Dear all,

The Geoff Hall Scholarships (GHSs) are given in honour of a former President of EMWA. Geoff was a very special person, an extremely valued member of EMWA, and a very good friend to many EMWA members. He firmly believed that the future of EMWA lies in our new and potential members, and so it's a very fitting legacy that we have the Scholarship Awards in his memory. The scholarships are awarded annually on the basis of an essay competition, and the title of this year's essay was "Can scientific documents be easy to read?". The committee has the ability to award up to two scholarships each year. This year those scholarships were awarded to Louisa Ludwig-Begall and Florencia Garro.

Louisa Ludwig-Begall holds a PhD in Veterinary Sciences from the University of Liège, Belgium. To pursue her passion for crafting clear and compelling research stories, she joined Evidera as a publications writer in October 2023. Her first EMWA conference was the 2023 Spring Conference in Prague, and since then she has joined the Sustainability SIG.

FOR CORRESPONDENCE

Lisa Chamberlain James
Lisa@trilogywriting.com

Florencia Garro is a biomedical engineer focused on non-invasive brain-computer interfaces. She recently earned a PhD in Bioengineering from the Italian Institute of Technology, where she currently works on neuromechanical biomarkers for neurorehabilitation. Previously, she worked for 5 years as an R&D engineer in implantable medical device development, as well as a freelance technical consultant. One of her passions lies in blending engineering and design with compelling storytelling and science communication. She is also a committed advocate for accessible science. She loves teaching, mentoring, and fostering open discussions. When not immersed in brain pursuits, she can usually be found running outdoors, immersed in indie rock beats, or lost in the world of Borges' stories.

Louisa's and Florencia's winning essays are presented below, and we wish them the very best at the start of their very promising medical writing careers. For those of you inspired to pick up your laptop, next year's essay title is "What value does medical writing bring to the study team?". (Next year's deadline for essays is September 30, 2024.)

I hope to read your essays soon, and stay safe all, until we see each other at the next EMWA conference. Bestest,

Lisa

Can scientific documents be easy to read?

Louisa Ludwig-Begall
Evidera-PPD, a Thermo Fisher Company
Eynatten, Belgium
louisa.ludwig-begall@evidera.com

doi: 10.56012/bjdd2631

Introduction

"There are thousands to tell you it cannot be done,
There are thousands to prophesy failure,
There are thousands to point out to you one by one,
The dangers that wait to assail you."

– Edgar Albert Guest[1]

An unfortunate (and unfortunately common) misconception is that scientific documents are perforce as dull as ditchwater and similarly impenetrable.

Scientific documents often report on dauntingly specialised topics, but these are not dull – they are scintillating science, transformative technology, and multifaceted, life-changing medicine! Such information should not be hard to access.[2] I posit that scientific documents not only *can* be easy to read but *must* be.

There are documents out there with muddied waters: wordy wells from which wisdom is but laboriously drawn and stilted streams that must be painstakingly panned in search of knowledge. There are, however, also crystal-clear scientific documents to delight wearied readers.

It comes down to this: scientific documents can be easy to read if a few simple rules are followed.

Rules for readability

Easy-peasy?

Easy may mean many things to many people. Equally, the term "scientific document" covers a multitude of scripts; a list of different document types transcends the bounds of this piece (for further details on medical document types please refer to EMWA's excellent *Career Guide for New Medical Writers*).[3]

Many people and many documents must be carefully paired. To do so, the writer must be fully aware of the audience's subject-specific literacy. For example, a research paper detailing the

intricacies of molecular norovirus evolution is probably easily understood by subject matter experts (molecular virologists), somewhat less by biomedical undergrads, and not at all by friends and family of the author(s) (I write from bitter experience).

An easy-to-read scientific document is tailor-made for its readership and avoids talking down to readers. A maxim to keep in mind here is Albert Einstein's "Everything should be made as simple as possible, but not simpler."[4]

Straightforward storytelling

Easy-to-read scientific documents stick to straightforward structures (think Introduction, Methods, Results, and Discussion for publications) and a clearly defined story. There are neither twists nor turns and certainly no red herrings hidden in murky depths.

A well-crafted document communicates its core message clearly and coherently at the outset. A highly effective and accessible way of presenting this message is to formulate it as a problem statement outlining the issue, its importance, and what the document does to address it; all subsequent sections of the text then bridge back to the problem statement.[5,6]

The German figure of speech *ein roter Faden* likens a common theme running through something to a red thread. The term is thought to have originated with Johann Wolfgang von Goethe who described how ropes used by the British Navy were twined in such a way that a red thread ran through all of them, rendering even the smallest piece of rope instantly recognisable as property of the British Crown.[7]

A problem statement twined through a scientific document like a red thread ties its different sections together. The core message resonates repeatedly with the reader and is thus more easily understood.

Sounding smart

An episode of the TV series *Friends* hilariously illustrates the dangers of overcomplicating things by trying to sound too smart. "They are humid, prepossessing *Homo Sapiens* with full-sized aortic pumps", writes character Joey of his friends Monica and Chandler. These two, however, are bewildered. The use of a thesaurus *on every word* of "They're warm, nice people with big hearts", has robbed the sentence of all meaning.

The case for using plain English is clear.[8,9] To paraphrase (in somewhat of a comedown from the illustrious Einstein or Goethe) the fictional but wise Winnie-the-Pooh: "It is more fun to talk with someone who doesn't use long, difficult words but rather short, easy words like, 'What about lunch?'"[10] It is also more fun and easier to read a scientific document following this dictum.

Simple simile

Metaphors, analogies, and similes can facilitate comprehension of complex subjects by providing familiar points of reference to readers. They have a long tradition in medical writing in particular[11] and can evoke graphic images with ease (think "strawberry tongue", "nutmeg liver", or "cauliflower ear"). Judiciously used (just don't go bananas!), such aids can enhance both the relatability and readability of scientific documents.

Short and sweet

Wordiness can pollute otherwise clear manuscripts;[12] long, meandering sentences can lose their befuddled (and often fuming) readers along the way. To all those verbose lovers of length: take the time to pick out pollutants and end those endless sentences! The brief is to be brief.

Easy on the eyes

Readability depends on more than pure content. While this may sometimes be outside an author's purview and reach into the realms of typesetting and design, the "look" of a scientific document can be immensely important to its comprehension.

Visually easy-to-access scientific documents are well-structured (using descriptive headings and distinct paragraphs) and make use of white space to offset large amounts of text. They are written in readable (in the most literal sense of the word!) fonts, text sizes, and colours (blue on green should never be seen!)[13] and respect their readership's visual acuity. Wherever visual impairment may make a text *physically* difficult to read, modifiable electronic copies allowing text-to-speech conversion by screen readers are a great option.[14] Comprehension of texts can be further enhanced by visual supports (e.g., graphical abstracts and illustrations, callout boxes, and colour coding). A text that is "easy on the eyes" enhances the flow and readability of the content.

Conclusion

Scientific articles that are easy to read and do not ask their readers to dredge the ditch for information are not impossible to craft. They can be (made to be) easy to read. To all those setting themselves this challenge:

"Just start in to sing as you tackle the thing
That "cannot be done," and you'll do it."[1]

Disclaimers

The opinions expressed in this essay are the author's own and not necessarily shared by her employer.

Disclosures and conflicts of interest

The author declares no conflicts of interest.

References

1. Guest EA. It couldn't be done. Poetry Foundation. 1919 [cited 2023 July 20]. Available from: https://www.poetryfoundation.org/poems/44314/it-couldnt-be-done.
2. Bindé J, Sampson F, Demarais L, et al. Towards knowledge societies. UNESCO world report. United Nations educational, scientific and cultural organization; 2005 [cited 2023 July 17]. Available from: https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf
3. Singh N, Chang C, Chachati V, et al. Career guide for new medical writers. 2023 [cited 2023 July 17]. Available from: https://www.emwa.org/media/4816/emwa-writing-guide-2023-high-res.pdf
4. Calaprice A. The ultimate quotable Einstein. 4th ed. New Jersey: Princeton University Press; 2011. 475 p.
5. Hurley M. What's your problem? A practical approach to scientific document design. Med Writ. 2012;21(3):201–4.
6. Leventhal P. Manuscript writing – Using problem statements to organise and write a manuscript on original research. Med Writ. 2018;27(3):72.
7. von Goethe JW. Die Wahlverwandtschaften. 1st part, 2nd chapter. public dom. 2000 [cited 2023 July 17]. Available from: https://www.gutenberg.org/ebooks/2403
8. Reeves A. Time to make it shorter: plain English in our context. Med Writ. 2015;24(1):4–8.
9. Gilliver S. Plain language and readability. Med Writ. 2015;24(1):1–2. doi:10.1179/ 2047480614Z.000000000258.
10. Milne AA. The complete tales of Winnie-the-Pooh. 70th anniv. ed. New York: Dutton; 1999, p. 222
11. Bjork RE. When we dead awaken: reviving metaphor in medical writing. J Adv Compos. 1983;4:139–46.
12. Every B. Writing economically in medicine and science: tips for tackling wordiness. Med Writ. 2017;26(1):17–20.
13. Cutts M. Making leaflets clearer for patients. Med Writ. 2015;24(1):14–9. doi:10.1179/2047480614Z.000000000271
14. Clinical Trials Expert Group. Good lay summary practice. EudraLex. 2021; 10:1–85.

Can scientific documents be easy to read?

Florencia Garro
Neural Engineer and Postdoc Researcher
Genova, Italy
fgarro.bollo@gmail.com

doi: 10.56012/ucbw8051

Reading a scientific document can feel like a treasure hunt: Precious knowledge is hidden within the article, waiting to be unraveled. However, its map (the text itself) may sometimes be quite confusing. Our brain won't invest excessive effort in deciphering it, at least not without some nudging. Even though it enjoys a good challenge, it is an efficient energy-saving machine.

Let us first agree with our brains that reading is no simple feat. It is a relatively recent skill, so much so that it lacks a dedicated brain region, and evolution built it upon areas for visual processing.[1] Yes, our visual system has been literally recycled for reading.

It takes us years of practice to automatise the decoding of written material – although you might have forgotten those challenging childhood days. Still, one out of five adults in Europe has poor literacy, meaning that they struggle with basic text comprehension.[2]

Unfortunately, these numbers get worse for scientific manuscripts, the pinnacle of complex written information. Given that they are crucial for condensing and sharing our knowledge, shouldn't they be easy to read?

Mind my read-ability

Researchers have – obviously – come up with a term for how easy content is to read: readability. In a nutshell, high readability means that a text is clear, concise, and easy to understand, whereas low readability indicates the opposite.

Quantifying and researching this property, much as reading itself, can be challenging. While there are more than 200 traditional formulas, none of them is specifically designed for scientific documents.[3] Most commonly used metrics (like the Flesch Reading-Ease score) are primarily based on simple features like sentence and word length,[4] not even considering linguistic factors such as semantic relevance or text coherence.[5]

Besides, they do not account for the neurocognitive aspects of reading – our brains are still out of the loop.

The perks of readability

Easy-to-read scientific articles tend to have a higher success rate, and, surprisingly, a higher chance of going viral.[6] Yet readability goes beyond improving citation rates. It is a key weapon against two major enemies of science: misinformation and reproducibility issues.

The first comes in many flavours, particularly when laypeople turn to secondary sources because the original is too difficult to comprehend, potentially resulting in distortions or sensationalism. Most of us can relate to this to some degree.

But wait, how is readability related to the infamous reproducibility crisis?

Overall scientific literature is becoming more complex over time;[7] if researchers struggle to understand a paper, it might hinder its reproducibility. This concern is not exclusive to humans: in programming-related areas,[8] computers need machine-readable content to ensure replicable results.

Clear documents are deeply intertwined with the integrity and utility of research. Plus, they are good for our brains: they require minimal cognitive effort to be decoded.

Turning science into brain maps

Most writing guidelines oversimplify how the brain reads, focusing mostly on grammar, even though linguistic complexity alone has a minor effect on scientific impact.[9]

So, can scientific documents be more brain-friendly? They can if we turn them into brain maps.

While reading, our visual system connects the shape of letters with speech sounds.[1] However, it is significantly more efficient at building spatial blueprints – it is its primary job. We can exploit this feature by incorporating descriptive diagrams. They shouldn't be limited to the results section alone! The more we use to support an idea, the easier it becomes to grasp.

Visuals are a powerful tool, especially when combined with text anchors: phrases, headlines, and symbols that act as reference points, creating a layout to spatially organise the flow of information. Yet, with great power comes great responsibility. For instance, it's easy to misuse color scales, leading to misinterpretation.[10] The solution is to always use reliable scientific colour maps, such as those created by the researcher and designer Fabio Crameri.[11]

Moreover, we can leverage another type of brain map, one we have employed since long before the invention of writing: stories. They glue every piece of information together, forming schemes that make it easier to recall and pass down. Today, we call this "Storytelling", the art of communicating events or ideas through engaging narratives.

Storytelling is great for readability because it harnesses the brain's natural affinity for stories. Just as we can effortlessly remember the particulars of a seven-book series such as Harry Potter, storytelling can convey complex data in a memorable manner. By converting scientific articles into compelling narratives, we transform the scientific journey into an enjoyable experience.

Readability awareness

A short note on the multilingual brain: While science is predominantly written in English, this is not the first language of many authors and readers. This is highly relevant because our brains are unconsciously drawn by the beauty of our native languages to express ideas, which sometimes results in content that is complicated to read.

For instance, as a non-native English speaker, I often find myself crafting catchy sentences, only to realise that they fall flat or sound awkward – even if they are grammatically correct.

On the other hand, we should bear in mind that slang or "excessively English" nuances can be difficult to grasp. For example, phrasal verbs might be harder to understand because their concept (changing a verb's meaning by adding a particle) is not conceivable in many languages. In this case, we can enhance the text flow by simply using whole verbs when possible.

This "readability awareness" bridges language barriers, encouraging more accessible and inclusive manuscripts.

A journey for the reader's mind

In a world where knowledge is our ultimate treasure, we cannot afford unreadable maps.

Scientific documents can be easy to read if they speak plainly and effectively, acknowledging the diverse linguistic backgrounds of the audience. Let's move beyond grammar and readability formulas: by integrating graphic techniques and storytelling into our skill set, we can help readers navigate toward a better understanding.

It's all about drawing the right map in our readers' minds.

References

1. Dehaene S. Reading in the brain: The new science of how we read. Penguin, 2010.
2. PIAAC – Programme for International Assessment of Adult Competencies. Technical Report of the Survey of Adult Skills. 3rd Ed. 2019. Available from: https://www.oecd.org/skills/piaac/publications/PIAAC_Technical_Report_2019.pdf
3. Vergoulis T, Kanellos I, Tzerefos A, et al. A study on the readability of scientific publications. In: Digital Libraries for Open Knowledge, A. Doucet, A. Isaac, K. Golub, T. Aalberg, and A. Jatowt, eds., in Lecture Notes in Computer Science. Cham: Springer International Publishing, 2019, pp. 136–144. doi:10.1007/978-3-030-30760-8_12.
4. Benjamin RG.Reconstructing readability: recent developments and recommendations in the analysis of text difficulty. Educ Psychol Rev. 2012;24(1):63–88. doi:10.1007 /s10648-011-9181-8
5. Scott A, Skalicky CK, Dasculu M. Moving beyond classic readability formulas: new methods and new models. Journal of Research and Reading. 2019;42(3–4):541–61. doi:10.1111/1467-9817.12283
6. Guerini M, Pepe A, Lepri B. Do linguistic style and readability of scientific abstracts affect their virality? Proc Int AAAI Conf Web Soc Media. 2012;6(1):475–8. doi:10.1609/icwsm. v6i1.14305
7. Plavén-Sigray P, Matheson GJ, Schiffler BC, et al. The readability of scientific texts is decreasing over time. eLife. 2017;6:e27725. doi:10.7554/eLife.27725
8. Akella AP, Koop D, Alhoori H. Laying foundations to quantify the "Effort of Reproducibility". ar Xiv, Aug, 2023. [cited 2023 Sep 21]. Available from: http://arxiv.org/abs/2308.12580
9. Lu C, Bu Y, Dong X, et al. Analyzing linguistic complexity and scientific impact. J Informetrics. 2019:13(3):817. doi:10.1016/j.joi.2019.07.004
10. Crameri F, Shephard GE, Heron PJ. The misuse of colour in science communication. Nat Commun. 2020; 11(1):5444. doi:10.1016/j.joi.2019.07.004.
11. Crameri F. Scientific colour maps. Zenodo; 2023. doi:10.5281/zenodo.1243862