

Readability metrics in technical communication

Useful or not?

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Who am I?



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- Documentation Specialist at Etteplan
 - Information science and linguistics graduate
 - Technical communication practitioner
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What am I going to talk about?

- What is readability?
 - How can we measure it?
 - Are these methods useful for technical communication?
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Readability

The quality of being easy and enjoyable to read.

(Cambridge Dictionary)

- In the focus of researchers since 1880s.
 - Prof. L.A. Sherman found out that the sentences in written texts were getting shorter (50 words in average in Elizabethan Times, 23 words in late 19th century).
 - In 1921, Harry D. Kitson published *The Mind of the Buyer*, in which he used word syllable counts and sentence length in magazine articles to study readership patterns. Rudolf Flesch would rely on Kitson's work in helping to create the readability formula known as the Flesch Reading Ease Formula.
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Readability metrics

Syllable Counting Formulas

- Flesh Reading Ease Formula
- Flesh-Kincaid Grade Level Formula
- The Gunning Fox Index
- The Fry Readability Graph
- The Raygor Estimate Graph
- The SMOG Index
- The Linsear Write

Word Frequency Formulas

- The Dale-Chall Formula
- Spache Formula
- The Lexile Framework

Syntax-based Formulas

- The Golub Syntactic Density Score
- The Coh-Metric Measurements

Discourse-based Formulas

- ETS TextEvaluator

Flesch Reading Ease

- Developed by Rudolph Flesch, author of *Why Johnny Can't Read* in 1940s. It computes readability based on the average number of syllables per word and the average number of words per sentence.
- The formula:

$$206.835 - 1.015 \left(\frac{\text{total words}}{\text{total sentences}} \right) - 84.6 \left(\frac{\text{total syllables}}{\text{total words}} \right)$$

- The higher the grade, the easier the text is.
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Flesch-Kincaid Grade Level formula

- Developed by the US Navy who worked with the Flesch Reading Ease.
- Presents a score as a U.S. grade level, making it easier to assess the readability level
- The formula:

$$0.39 \left(\frac{\text{total words}}{\text{total sentences}} \right) + 11.8 \left(\frac{\text{total syllables}}{\text{total words}} \right) - 15.59$$

- For example the score 8 means that the text is readable for an 8th grader.
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Gunning Fog Formula

- Developed by Robert Gunning Associates. This was a consultancy set up in 1944. It aimed to help businesses to improve their writing.
- Presents a score as a U.S. grade level, similar to the Flesch-Kincaid Grade Level
- The formula:

$$\text{Grade Level} = 0.4 (\text{ASL} + \text{PHW})$$

where:

ASL = Average Sentence Length (i.e. number of words divided by the number of sentences)

PHW = Percentage of Hard Words

Hard words: those with three or more syllables. Do not include proper nouns, familiar Jargon or compound words. Do not include common suffixes (such as -es, -ed, or -ing) as a syllable.

- The ideal score is between 7 and 8. Every text with a score of 12 and more is considered hard to read (12 = High school senior)
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Linsear Write Formula

- Published by John O'Hayre in his 1966 style manual, *Gobbledygook Has Gotta Go*. It started the Plain language movement.
- Used by the United States Air Force to calculate the readability of their technical manuals

- 1) Find a 100-word sample from your writing.
- 2) Calculate the easy words (defined as two syllables or less).
- 3) Calculate the hard words (defined as three syllables or more).
- 4) Multiply the number of easy words times '1.'
- 5) Multiply the number of hard words times '3.'
- 6) Add the two previous numbers together.
- 7) Divide that total by the number of sentences.
- 8) If your answer is **>20**, **divide by '2,'** and that is your answer.
- 9) If your answer is **<20** or **equal to 20**, **subtract '2,'** and then **divide by '2.'** That is your answer.

- For example the score 8 means that the text is readable for an 8th grader.
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The SMOG Readability formula

- Simple Measure of Gobbledygook created in 1969 by G Harry McLaughlin.
- Estimates the years of education a person needs to understand a piece of writing.

Step 1: Take the entire text to be assessed.

Step 2: Count 10 sentences in a row near the beginning, 10 in the middle, and 10 in the end for a total of 30 sentences.

Step 3: Count every word with three or more syllables in each group of sentences, even if the same word appears more than once.

Step 4: Calculate the square root of the number arrived at in Step 3 and round it off to nearest 10.

Step 4: Add 3 to the figure arrived at in Step 4 to know the SMOG Grade, i.e., the reading grade that a person must have reached if he is to understand fully the text assessed.

SMOG grade = 3 + Square Root of Polysyllable Count

- The higher the score, the more years of education is necessary to understand the text
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The Automated Readability Index

- Developed for military use in 1967.
- It was for real-time monitoring of readability on electric typewriters.
- The formula:

$$4.71 \left(\frac{\text{characters}}{\text{words}} \right) + 0.5 \left(\frac{\text{words}}{\text{sentences}} \right) - 21.43$$

- The higher the score, the more years of education is necessary to understand the text
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The Golub Density Score

- Developed developed by Lester Golub in 1974.
- Syntax-based
- The formula:

1.	Words/T-unit	.95	X	_____	__
2.	Subordinate clauses/T-unit	.90	X	_____	__
3.	Main clause word length (mean)	.20	X	_____	__
4.	Subordinate clause length (mean)	.50	X	_____	__
5.	Number of Modals (will, shall, can, may, must, would...)	.65	X	_____	__
6.	Number of <i>Be</i> and <i>Have</i> forms in the auxiliary	.40	X	_____	__
7.	Number of Prepositional Phrases	.75	X	_____	__
8.	Number of Possessive nouns and pronouns	.70	X	_____	__
9.	Number of Adverbs of Time (when, then, once, while...)	.60	X	_____	__
10.	Number of gerunds, participles, and absolutes Phrases	.85	X	_____	__

SDS	0.5	1.3	2.1	2.9	3.7	4.5	5.3	6.1	6.9	7.7	8.5	9.3	10.1	10.9
Grade	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Text 1

What Is a Fastener?

Let's start by defining what a fastener is. The term fasteners encompasses a fairly broad category of tools, such as screws, nuts and bolts, that share a common purpose: to mechanically hold objects together. Typically, fasteners form a non-permanent joint. In other words, when you use a fastener to connect two components, you can remove it, and the separate pieces should come apart without suffering any damage. The same wouldn't be the case with a welded joint, for instance. The one exception to this rule are rivets, which fall under the category of fasteners, but create permanent joints.

Though most fasteners form a non-permanent joint, this does not mean you only use fasteners when you want to be able to take something apart, and it doesn't mean the joint is weak by any means. Fasteners can reliably hold together objects that can experience a great degree of stress. That means they're a great choice for permanent and non-permanent joints alike, providing versatility for the type of project you want to use them for.

Text 2

What Is a Fastener?

For a start we should define what a fastener is. Fastener is an umbrella term for tools such as screws, nuts and bolts, that have the same purpose: to mechanically keep objects together.

Usually, fasteners form a temporary joint. So, when you use a fastener to connect two elements, you can remove it and the separate elements come apart without any damage. It is not possible with, for example, a welded joint. The one exception to this rule are rivets, which are also a type of fasteners, but create permanent joints.

Most fasteners form a temporary joint, but you do not only use fasteners when you want to be able to take something apart. It also does not mean that the joint is weak. Fasteners can hold together elements that can undergo a great degree of stress. That means they are a good choice for both permanent and temporary joints. Fasteners offer a range of possibilities for the type of project you want to use them for.

Text 1

Flesch Reading Ease score: 62.1 (text scale)
Flesch Reading Ease scored your text: standard / average.

Gunning Fog: 12.9 (text scale)
Gunning Fog scored your text: hard to read.

Flesch-Kincaid Grade Level: 8.6
Grade level: Ninth Grade.

The SMOG Index: 9.4
Grade level: Ninth Grade

Automated Readability Index: 9
Grade level: 13-15 yrs. old (Eighth and Ninth graders)

Linsear Write Formula : 10.7
Grade level: Eleventh Grade.

Text 2

Flesch Reading Ease score: 68.5 (text scale)
Flesch Reading Ease scored your text: standard / average.

Gunning Fog: 12 (text scale)
Gunning Fog scored your text: hard to read.

Flesch-Kincaid Grade Level: 7.2
Grade level: Seventh Grade.

The SMOG Index: 8.8
Grade level: Ninth Grade

Automated Readability Index: 6.4
Grade level: 10-11 yrs. olds (Fifth and Sixth graders)

Linsear Write Formula : 8.3
Grade level: Eighth Grade.

Technical communication as a genre

- The subject matter of technical communication is specialized and difficult.
- Users are motivated to accomplish tasks and solve problems, not simply to acquire information.
- The same information may be consumed by users with a wide variety of unpredictable characteristics and needs.
- Many technical documents are created collaboratively or are assembled from preexisting documents.
- Technical communicators are often not experts in the subjects that they must write about.
- The text's creators and users often do not share the same expertise.
- Technical communication often depends upon complex information technologies for construction and dissemination.
- Much technical communication is high stakes, involving matters of risk or safety.
- Many technical messages have financial, legal, and ethical ramifications.
- Technical communication often occurs in complex organizational or institutional contexts.

Potential problems in the use readability metrics for technical communication

- The potential audience of technical communication is wide and diverse (end-users but also developers, engineers, service personnel)
 - While readability is an important factor for technical communication, it is not the dominant one. Equally important are, for example usability, content structure and organization or visual presentation of the content.
 - The methodology of result assessment while creating some of the formulas was questionable.
 - Writers tend to re-write the content for the sake of getting a better readability score and therefore lose the sense of the original text.
 - When you examine the same text with two different formulas you can get a widely different scores
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Conclusion

- Readability metrics can be a useful aid to identify if a text will be too complex for our target audience. However, the most popular ones only check certain aspects that can be counted, like word length or sentence length.
 - Some indexes are better suited to check certain factors, for example writers who want to check the complexity of vocabulary should rather use the Word Frequency Formulas.
 - **Getting a better score in readability metrics should never be the primary goal of a technical communicator.**
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Golden rules of readability

- Use short, simple, familiar words
 - Avoid jargon
 - Use culture-and-gender-neutral language.
 - Use correct grammar, punctuation, and spelling.
 - Use simple sentences, active voice, and present tense.
 - Begin instructions in the imperative mode by starting sentences with an action verb.
 - Use simple graphic elements such as bulleted lists and numbered steps to make information visually accessible.
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Resources

- <http://readabilityformulas.com/>
 - <http://gunning-fog-index.com>
 - [The Principles of Readability/William H. DuBay](#)
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Questions? ;)



Thank you!

Contact me: kardel.b@gmail.com