Words to Throw Away

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Abstract

English is growing: new words are added rapidly. This makes it increasingly complicated - and thus harder to read - especially for non-native speakers. In particular, in the scientific and technical literature, the proliferation of new words slows down readers and hampers the distribution and use of new ideas, so that all of us, native speakers included, are disadvantaged by unnecessarily complicated papers. This paper focuses on the scientific and technical literature; it lists examples of unnecessary words found in recent papers. In each case, it suggests a simpler alternative, using a word or short phrase, that can be understood more readily by any reader. Some examples of patterns in unnecessary words, i.e. ones that should not be used by a good technical writer, are discussed and some ways to recognize words, e.g. words prefixed (unnecessarily) by "meta" or "hyper," that we do not need in our vocabularies, are discussed. Use of these simpler words particularly benefits non-native speakers, who know the simple words, because they met them in early English classes or introductory science classes. By writing simply, your ideas will be promoted and more widely discussed: your paper will not be the one that your reader puts aside, because he or she does not have time to comprehend the unfamiliar words.

Introduction

The number of words in English continues to increase; there are many ways to count the words "considered to be English" now - you could count

> (a) lemmas or basic root words [1],
>
> (b) derivatives of existing words,
>
> (c) words spelt identically, but with different parts of speech or meanings,
>
> (d) temporary words invented solely for advertising,
>
> (e) words borrowed from foreign languages,
>
> (f) words added to the scientific literature to describe new phenomena or new procedures,
>
> (g) words allowed in word games, e.g. Scrabble [2] etc.

However, whatever counting criterion is used, the language continues to grow. *The Oxford Dictionary* has 273,000 head words; 171,476 of them being in current use, 47,156 being obsolete words and 9,500 derivative words: the second edition fills 22 volumes [3]. In 2021,

Merriam-Webster claimed 490,000 entries, 700,000 definitions and 158,000 etymologies for them [4].

Historically, Shakespeare's vocabulary, considered by many to be one of the largest in English, included ~34000 words [5], but he has been accredited with ~1700 words that first appeared in his work. However, recently, Brysbaert et al. estimated that native speakers know from 27,000 to 52,000 lemmas (average 42,000) by the age of 20 [1], where a lemma was defined as an uninflected or root form of a word. Despite wide variations in these counts, we can assume that an educated reader will need a vocabulary well in excess of 30,000 words to be an efficient reader, i.e. one who is not constantly searching a dictionary–assuming one carries the convenient CD form, since the printed version is too large to carry any longer – or searching the web.

1.1 Literary Use
This work is clearly not directed at those, authors and literary critics, whose task is to enliven our lives with new words and ways to express ourselves verbally or in writing. As children, we learnt from Humpty Dumpty:

> When I use a word", Humpty Dumpty said in rather a scornful tone,
> it means just what I choose it to mean neither more nor less.
>
> ~Lewis Carroll, *Through the Looking Glass*, 1872 [6]

that language could be manipulated to serve a purpose or misused for effect or amusement. Sheridan's Mrs Malaprop is a well-known example of constant word misuse: two examples are

> illiterate him quite from your memory

or

> he is the very pineapple of politeness
>
> ~R.B. Sheridan, *The Rivals*, 1775 [7]

The name of Sheridan's character was derived from a French phrase, "*mal a propos*," which has been used in English to describe a "malaprop," the accidental or intentional misuse of a word, since 1630. This has been the source of many scholarly articles on English and its use, as well as many characters in our literary heritage, starting with Constable Dogberry, in Shakespeare's *Much Ado About Nothing* [8][1]. These, and other literary devices, e.g. metaphors, allusions, etc., are the tools of authors and critics, and our life might be dull without them. We allow them to expand the language freely and observe whether their innovations will take hold or disappear into the dustbins of bad literature.

1.2 Scientific and Technical Use
Here, we will focus on the scientific literature, a fertile area for inventing new terms. In science, engineering and related technical fields, most new ideas are eventually published in English, but many – possibly the majority, if we count the many who would be considered fluent, but who started school in another language – written or read by non-native speakers. If

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[1] Shakespeare's Dogberry preceded Sheridan's Mrs Malaprop, by more than a century, and led to the word "Dogberryism," a synonym for "malaprop," which appears to have replaced it.

you use a new word in your scientific paper, your native speakers, especially those that have some knowledge of either Greek or Latin, from which new words are commonly formed, may be able to infer its meaning sufficiently closely to be able to complete reading your paper, without recourse to a technical dictionary, Wikipedia® or Google®. However, a non-native speaker, even one reasonably fluent in English, will likely be reaching for a dictionary to follow your paper. This will inevitably slow down the promulgation and use of your ideas and is fundamentally contrary to your aims in publishing the paper in the first place[2].

On the other hand, in scientific research, language is a tool for communicating ideas – as widely as possible – so that common protocols are needed to ensure wide propagation. These protocols are the grammar rules and the definitions and use of words. Clearly, good protocols are simple ones, with minimal rules, that need to be learnt to allow efficient, error-free communication with others.

1.3 Verbosity and Plain English

A related issue is verbose writing. It has been strongly criticized in recent years and is likely a consequence of excesses, found in legal or quasi-legal documents issued by many government and commercial organizations, which spawned the UK "Plain English Campaign" [9], the U.S. Plain Writing Act [10], PLAIN Canada [11] and similar organizations in other countries, e.g. DGLS in Germany [12].

This idea is far from new, verbosity has been decried by authors for millennia – see the ancient work of Hesiod (~ 700 B.C.) [13] or Liu Xie (5th century A.D.) [14]. In Shakespeare's plays, we can find several characters who are mocked for verbosity – the tendency to use many more words that are necessary to convey an idea.

> He draweth out the thread of his verbosity finer than the staple of his argument.

~Holofornes in *Love's Labours Lost*, Act 5, Scene I [15]

Roughly translated from Shakespeare's poetry, the speaker, Holofornes, laughs that Don Adriano can turn a simple (staple) statement to a long (drawn out or verbose) one. In possibly his most famous play, *Hamlet*, Shakespeare made the king's advisor, Polonius, into a figure of fun (and the source of a saying that should be remembered by all technical writers):

> Brevity is the soul of wit.

~Polonius in *Hamlet*, Act 2 [15]

Polonius is telling us that, if you want your advice to be followed, you should keep it short. He continues:

> And tediousness the limbs and outward flourishes,
> I will be brief.

telling us directly that listeners tire of verbosity – but fails to follow his own advice.

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[2] We exclude here the, regrettably not trivial, fraction of papers, which are published simply to augment paper counts or impress a naive audience.

Even politicians, usually experts in verbosity, can be found mocking others for their long and complex manner of speaking: one famous English politician, Benjamin Disraeli, mocked his political opponent, William Gladstone, describing him as:

> A sophistical rhetorician, inebriated with the exuberance of his own verbosity, and gifted with an egotistical imagination that who can at all times command an interminable and inconsistent series of arguments to malign an opponent and glorify himself.

~Benjamin Disraeli - mocking William Gladstone [16]

Here, Disraeli also used a word, "inebriated," that has a simpler synonym, "drunk." However, we do not wish to decry this, almost poetic, use, which strongly emphasized Disraeli's point and, incidentally, provided considerable amusement to his listeners, as making his statement memorable. However, as we will argue later, expressions like this have little place in modern day scientific literature.

Thus, although many great writers, from Hesiod [13] to modern days, have promoted the simplicity in writing or expression as a benefit, a scan of the scientific literature suggests that their lessons have been lost! Many modern texts on technical writing repeat the same message, but regrettably it has been substantially ignored, despite being resurrected in government-supported campaigns to promote "plain English" [9] [10] [11][12].

2 Words to Avoid

Many technical writers try to use more complex words than the context requires. A classic example is writing "employ" when "use" would suffice. Sometimes this trend is a result of a common myth, believed by many technical writers:

2.1 Myth One

Editors, reviewers and readers expect complex words; without them, the paper will not appear "scientific."

Technical writers need to constantly remember their readers: one can assume that most of them learnt "use" in the first few English classes, but most will have learnt "employ" much later, if at all.

There are many words that, although commonly used, and, therefore, probably understood by most readers, a better writing style would remember, that the purpose of a technical paper is to share ideas and methods – not to test a reader's grasp of English. Thus, the simplest possible word should be preferred in all cases. Further, myth one is certainly not true: editors and reviewers will not ask a writer to replace a simple word by a more complex one, unless there is a very specific word, with a special and clearly defined meaning, that is commonly used. Editors and reviewers will rarely notice that you wrote "use" instead of "employ": they will continue to read on, because your meaning is clear. General readers will, of course, appreciate the simple word. It will allow them to read faster and finish your paper faster: they will not need to take breaks to consult Google or find a dictionary.

2.2 Colloquial and Slang Expressions

Querying some writers "Why did you add this complex word or expression?" revealed that they wanted (a) "to make a paper seem more formal" (to satisfy myth one) or (b) to avoid slang. Unfortunately, the prevalence of Hollywood movies, as arbiters of good English, makes this problem difficult to resolve and teaching how to avoid it is the subject of further study. Here, we will focus on avoiding unnecessarily complex, invented words to make papers more easily read by all. It should not be confused with a clear requirement that a paper is formally written and avoids slang.

2.3 Non-technical Domains

There is an excellent site which focuses on business English [17]; we quote from the introduction:

> In her weekly *Financial Times* column and her annual Guff/Golden Flannel Awards, Lucy Kellaway has been prosecuting corporate crimes against the English language for two decades.
>
> ~*The Financial Times Ltd*, 2016

It presents a list of words that should be avoided by financial authors, which shows that scientific writers are not the only ones committing the "crimes" that Kellaway describes.

3 Common, but unnecessarily complex words

Some, regrettably commonly used, words have much simpler (and better) synonyms, that should replace them – see Table 1. Although these words are generally readily understood, papers would be improved by using the shorter and simpler (and certainly understood) one. "Employ" or "utilize" is a typical example. Although Wood [18] explains the situation where "utilize" is correctly used, in a scientific paper, one would rarely "use" anything, if it was not useful. Further, "employ" is overused even by native speakers, we could almost remove it from the language - with little loss, if it were not for its very specific use in "employing" staff to do paid work and its derivative, "employee." In this case only, "use" must be avoided, because it has a very poor connotation – implying taking advantage of someone. However, in a scientific paper, "use" will suffice.

Table 1: Words to avoid

Complex word	Simple word	Notes
employed utilized	used	
performed	analysed analyzed	Performed is usually simply not needed, e.g. instead of "performed an analysis," use the verb "analysed" or "analyzed" instead
categorized	divided into x classes grouped assigned to x classes	Several simpler alternatives - most followed by an explicit statement of the number of classes
daunting	difficult	ca. 1300 from old French, danter
ponder	consider	ca. mid-14c from Latin, ponderare, to weigh
discrepancy	difference distinction	ca. mid 15c from "dis-" apart + "crepare" to rattle, crack
alleviate	decrease	ca. early 15c. from Latin ad + levis, light
sophisticated	advanced modern up-to-date	ca. 1400 as "impure"; ca. 1500 with current meaning
unveil	reveal	ca. 1590
drawback	disadvantage limitation	ca. 1720
disparity	difference distinction	ca. 1550
prominence	importance	ca. 1590
subsumed	included in classified	ca. 1530
conjecture	assume	ca. late 14c
acumen	intelligence	ca. 1530, from Latin acumen – a point, sting

Although the words in Table 1 have mostly been in use for centuries and are well understood by native speakers, the lower section of the table was contributed by an author of this paper, an Indonesian teacher of English and PhD candidate, who would certainly qualify as fluent: she found these words in reading for her thesis and did not have them in her vocabulary when she started her study.

While this paper focused on newly invented words, that perhaps should never have been invented, technical writers in the 20th century should also write for their readers and search for words that will convey the intended meaning but also be quickly understood by all readers. Table 1 only represents a sample of words that may slow down non-native speakers, these words have a long history and sometimes have a connotation that does simplify the words needed to convey a writer's intent – see also the final note at the end of this paper. Therefore, they will not disappear quickly, but good writers should be continuously searching for the simplest word that suffices.

Table 2: Words better avoided

Invented word	Syl cnt	Simple English equivalent	Syl cnt	Use	Ref
functionality	5	Functions capability	2 5	ca. 1970	
robustified	5	strengthened	3	2006	[20]
				2018	[21]
"meta-" group					
meta-analysis	5	analyses	4	See notes in Section 4.3.3	
"hyper-" group					
hyper-parameter	6	parameter			
hypertextual	5	with hyperlinks	4		
hypertextuality	7	able to add hyper-links	6		
"-ization" group					
internalization	6	study	2	e.g. knowledge internalization	
		learn	1	learn or study or remember	
valorization	5	give a value to	5	ca. 1906 [4]	
compatibilization	7	make A misclible with B	5		
		thoroughly mix A with B	4		
informatization	5	use of information	6	Apparently coined in China - small spread	
alkalization	6	increase the pH	5	alkalize - common ca. 1800,	
alkalinization	7	increase the pH	5	but dying a deserved death after 1940	
managerialized	7	managed	3	dominated by management theories	
contextualized	6	moved into context		contextual ca. 15 c, "improved" since 1822	
functionalization	6	adding a functional group	7	even in chemical papers plain English works better	
incentivize	4	encourage	3		
"bio-" group					
bioethanol	5	ethanol	3	pointless – most ethanol is from biological sources	
bioethics	4	ethics	2	ethics is always associated with (bio)human behaviour	

Table 2: Words better avoided

Invented word	Syl cnt	Simple English equivalent	Syl cnt	Use	Ref
General group					
complexation	4	form a complex	4		
alcothermal	4	(with) alcohol and heat	5		
incentivize	4	encourage	3		
immunomodulation	7	changing immune response	6		
andropophagic	5	cannibalistic	5	Cannibal coined ca. 1490, by Columbus	
heteonormativity	5	following heterosexual norms	9	1991	
homonormativity	5	**		2003; from heteronormativity	
misinformative	5	misleading	3		
sociomaterial	7	social and material	8	***	[22]
imbrication	4	overlapping layers	6		

* Cannibal is more common in English than "andropophagic" despite being used much earlier by Greeks to refer to the Andropophagi, a race of cannibals.

** This word is derived from two simple, well-understood roots, but its intended meaning is so unclear that it should clearly be avoided.

*** We thank Prof Introna for his title "Sociomaterial Imbrication" [22], guaranteed to challenge any reader, except architects, for whom "imbrication" is a useful technical term for tiling, but should be restricted to architecture journals.

4 Examples of words that we do not need

This section will list some words, found in the literature, that were invented recently, but which have simple alternatives, based on existing, and generally much simpler, English words.

4.1 Functionality

A leading example of a completely useless word is "functionality." Several years ago, it became popular in the computer literature and has subsequently permeated (or corrupted) many other disciplines. It is a classic example of a word that we do not actually need.

Consider its derivation: we took a basic word that we already know – function (verb or noun), derived from a Latin root, *functio* or *fungi* – meaning to perform, we added "-al" to form the adjective, "functional," and then we added "-ity" to turn it back into a noun. To a careful non-English speaking reader who has not met this word in basic English class, has to search the her dictionary to find out exactly what it means. Mostly, it is used as a synonym for "capability," a word which has been used since the 1587 [19], or, worse, as a substitute for "functions," which has been used for a similarly long period.

4.2 Simplicity

Users of the new complex word will often claim that it somehow makes their writing simpler or more precise. Table 2 lists simpler substitutes for many invented and unnecessary words found in the literature; it also counts the syllables in the complex term and the simpler replacement. The syllable count is a rough measure of the difficulty to pronounce a word: shorter words are clearly less challenging for most and particularly for non-native speakers.

4.3 Grand Terms

Many complex words appear to be used simply for effect; their sole purpose is to make the work sound more important or grandiose or follow myth one. Prefixes, such as "meta" or "hyper-" are commonly added without real justification.

4.3.1 Prefix "meta"

Adding "meta-" is a common device, used by those wishing to add importance or novelty to their work. The prefix comes from the Greek meaning "over," "from" or "across" and consistently (following its original meaning) applied to the English words, "metaphor" or "metaphysics" to imply a something transferred from the original, i.e. a model. As an example of the "growth" of a simple word to a more complex one, nowadays, "meta-analysis" has come to mean simply an analysis from multiple sources, i.e. something no different from the original analysis. One example is "This rubric is based on six meta-analyses," [23] where the writer tells us that he simply combined data from other studies in "A meta-analysis statistically combines all the relevant existing studies," i.e. he could have simply written "I combined data from six other studies ...." This use has become so prevalent that lexicographers, who generally record what they observe, without commenting on appropriateness, now record the new and more grandiose meaning. Thus, the original meaning, which should be reserved for methods or models of analysis, is now obscured.

4.3.2 Prefix "hyper"

Addition of "hyper" is another common device for making a term seem more important. The original Greek, ὑπέρ, implies above or extremely and appears logically in "hyperactive" or "hyperspace" (a space with many dimensions). However, as with "meta," is often used to simply make a term seem more important, e.g. in neural nets papers, we find "hyperparameters," used apparently to distinguish parameters which control the net from the others (of which a neural net has many). Since the term "weights" is commonly used for the many adjustable parameters of a net, we could write more simply and clearly, if we just used "weights" for the multiple coefficients of a node and "parameters" for all the rest.

In the "hypertextual" example, we see a word that should be thrown away; it simply refers to documents with hyperlinks, further expanded to "hypertextuality" to confuse and slow down readers, when a simple phrase, e.g. able to add hyperlinks, would suffice and enhance communication.

4.3.3 Suffix "ization"

This is a particularly fertile region for inventors of new words: the basic suffix, "ize" from the Greek "-izein," to make, appears in many common words, e.g. sterllize, theorize and many more, and the "ization" suffix is found in many well-known words, e.g. "fertilize" becomes "fertilization," derived directly from the French since about 1860. However, this was taken to extremes to form "compatibilization" which simply means to make two things "miscible" or able to mix, and thus better replaced by "to make A and B miscible." In this

case, avoiding a seven-syllable tongue-twister will be appreciated by all, particularly an English novice who needs to use it in a conference presentation. However, some of the simple uses, e.g. "sterilization," appear so commonly in existing literature, that even non-native speakers are likely to have seen them, but the addition of new (and unnecessary six or seven syllable) ones should be strongly discouraged.

4.3.4 Prefix "bio"

To garner support from conservationists, many things are now prefixed with "bio" to imply a biological or environmentally friendly source. Among these, we found "bioethanol," which is somewhat pointless, since the most common source of ethanol has been distillation from fermented grain since ancient times. Thus, "normal" ethanol is, almost by default, bioethanol, where the "bio" prefix is invariably redundant. It should only be used when it is necessary to distinguish between natural or biological sources and synthetic or chemical ones.

The general section of Table 2 contains words that do not fall into any obvious category, except perhaps excessive length, making them a pronunciation challenge for all. It includes several whose main purpose appears to be impressing naive readers and, as this paper argues, make a negative contribution to the technical literature.

4.4 Ease of use

Many writers seem to believe that using complex technical terms makes a paper more "efficient" or "concise," but the examples in Table 2 shows that they rarely achieve that aim; the "more efficient" word can often be replaced by existing simpler and shorter words that will improve overall comprehension of a paper, particularly for non-native speakers.

The approximate syllable counts in Tables 2 shows that the new invented word became more difficult to pronounce and reduced comprehension when non-native speakers are presenting work orally.

4.5 Impressing (or confusing) readers

4.5.1 Why are writers attracted to useless words?

Several factors encourage technical writers to use words, from the list set out in Table 2 and, particularly, the later part of Table 2 and all their relatives.

4.5.2 What are editor or reviewer expectations?

This was mentioned as myth one – the belief that, to be accepted, writing must have a formal style. This is routinely, but incorrectly, interpreted as implying a level of complexity or elaboration is required.

4.5.3 What about transcribing?

Whilst most of the previous examples used in this paper are long and unnecessarily complicated words, we have also observed students in our classes often used similarly unusual words, generally in "previous work" sections of papers. Although the words were correct, when challenged to explain them, the students often could not supply an even close approximation to the correct meaning; the students copied phrases containing them from existing papers and, following those examples, assumed, without understanding, that the word was appropriate or correct.

5 Valuable New Terms

Human knowledge continues to expand, so we need new terms that apply to genuinely new phenomena. However, ideally, the new terms should be simple, easy to pronounce and not

simply expansions of existing terms that already cover known phenomena. Thus, for example, "fatberg" [24] clearly meets all requirements - the phenomenon is clearly new (a consequence of the growth of modern cities); it is novel, simple, easy to pronounce and cannot be described in a simple phrase. Further this example is likely to be considered amusing by most readers and therefore easy to remember; clearly it has a place in the scientific literature. Although new terms are being coined, possibly daily, that do enhance communication, in contrast, the examples in Table 2 meet none of these requirements and their removal from the literature will cause no loss: removing them will actually improve the speed of comprehension of most readers, particularly non-native speakers.

6 Conclusion

A key thesis of this paper is that these newly invented technical terms neither support precision nor encourage efficient communication of ideas. We should all remember that, in this modern era, many (or perhaps most) of our readers are not native English speakers. So that causing them to slow down and consult dictionaries does not help to communicate our ideas: busy readers will often turn to more easily understood papers and cite them. Using simple terms – critics might say, unfairly, childish terms - does not reduce the impact of your writing: on the contrary, it encourages more to read a paper completely and cite it. Even native speakers will puzzle over new terms recently encountered and careful ones will waste time checking the precise meaning of the new word: some will wonder why a simpler term was not used and many will find that the "new" term was not really new at all, but was just used to "wrap" an old idea in new language.

Unfortunately, less critical readers will add the new word to their mental dictionaries, which will typically already contain 30,000+ words, unnecessarily overloading it.

7 Recommendations

How do we improve the overall standard of technical writing? Simpler language allows reviewers and readers to read your paper, to its conclusion, faster and increase the probability that reviewers will accept it and readers will cite it.

New technical writers should start with the advice of one anonymous author, who titled his article [25] as

<div align="center">

"Say Less, Offer More in Technical Writing."

</div>

They should then banish "myth one" from their memories and actively search for the simplest word that conveys the current idea. Sub-editors have an important role here. A (regrettably anonymous) sub-editor of *IEEE Computer* was an excellent mentor; he or she condensed a very early paper of one of us, which led to a dramatic improvement in many subsequent papers. However, reviewers are still being presented with too many papers that are not designed for a wider audience, because they are simply too long or the word choice deters readers. Reviewers have enormous power here as they can demand that papers be shortened or simplified.

General readers should not promote pompous or overly complex words by using them in their papers: they should not be afraid to edit descriptions of preceding authors" works to make them more concise and readable. This is a particular challenge for non-native speakers, who are understandably over-awed by previously published work and copy its faults.

Textbooks, especially those targeting technical writers, should emphasize simplicity - in both writing and word use.

8 A Final Note

Although this study focused on non-native speakers, Buswell et al. reported that some of the problems discussed here were still concerning engineering teaching staff in the United States in 2019 [26].

9 A Contrary View

A colleague, a native speaker and teacher of English, objected with the thesis of this paper; in particular, she felt that she needed to use the words in Table 2, because some of them had connotations beyond the simpler substitutions in our table and they were necessary in a technical paper.

In response, undoubtedly, in some disciplines, some words are commonly used and needed with specific connotations and readers needs learn them to follow the topic. Thus, they clearly should not be part of our list of words to avoid: every discipline has "new" words which must be learnt. Further, native speakers will naturally use words which are relatively unusual, simply because they know them, have used them often or like to add them to add style to their papers: simple papers will sometimes bore a fluent speaker. Whilst we understand that this problem will never go away, because many of the words in Table 2 have been part of the language for 500 years. However, good technical writers will strive to make their paper more widely understood by using simpler words – when they will suffice.

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