

MARK TWAIN AND TWENTY-FIRST CENTURY WRITERS ABOUT SCIENCE AND TECHNOLOGY

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Abstract: Mark Twain is still widely known for his novels *The Adventures of Tom Sawyer* (1876) and *Adventures of Huckleberry Finn* (1884), but no longer for his writing about science and technology. Yet, Twain's interest in science and technology, and particularly scientific and technological innovation, was woven into much of his fictional and non-fictional writing throughout his life. Furthermore, not only was Twain an enthusiastic advocate of science and technology, but he was also an enthusiastic advocate of clarity, consistency and conciseness in writing and his writing advice remains timely and relevant to modern writers about science and technology. This paper brings together some of this writing advice and shows its continuing relevance and importance to scientific and technical writers in the twenty-first century.

Keywords: Mark Twain; twenty-first century writers about science and technology; clear, consistent and concise writing

1. Introduction

Although it has been over one hundred years since the death of Mark Twain (the pen name of Samuel Langhorne Clemens, 1835-1910), he is still widely known for his novels *The Adventures of Tom Sawyer* (1876) and *Adventures of Huckleberry Finn* (1884) and their depictions of sleepy, small-town life in rural southern America before the advent of the American Industrial Revolution in the second half of the nineteenth century. However, he is no longer widely known for his writing about science and technology. Yet, born in 1835, Twain lived through the height of the American Industrial Revolution and his interest in science and technology and particularly scientific and technological innovation, as evidenced in his writing, continued until his death.

To illustrate, in Twain's short story *From the 'London Times' of 1904* (1898), the narrator envisions a global communication network connected by telephone. This fictional "limitless-distance" telephone of 115 years ago closely resembles the modern-day smartphone.

"The improved 'limitless-distance' telephone was presently introduced, and the daily doings of the globe made visible to everybody, and audibly discussible, too, by witnesses separated by any number of leagues. [...] The connection was made with the international telephone-station, and day by day, and night by night, he called up one corner of the globe after another, and looked upon its life, and studied its strange sights, and spoke with its people, and realised that by grace of this marvellous instrument he was almost as free as the birds of the air [...]" (1898)

In Twain's novel *A Connecticut Yankee in King Arthur's Court* (1889), the central character, Hank Morgan, introduces nineteenth-century scientific and technological innovations into sixth-century England in the (ultimately mistaken) belief that he can recreate post-industrial living environments and work places in pre-industrial England.

"I exposed the nineteenth century to the inspection of the sixth. [...] Now look around on England. A happy and prosperous country [...] The telegraph, the telephone, the phonograph, the typewriter, the sewing-machine, and all the thousand willing and handy servants of steam and electricity were working their way into favor." ([1889] 2006: 528)

Furthermore, Twain's writing about science and technology, and particularly scientific and technological innovation, was not confined to his fictional output. In the autobiographical essay *The First Writing Machines* (1905), he boasts:

"In a previous chapter of this Autobiography I have claimed that I was the first person in the world that ever had a telephone in his house for practical purposes; I will now claim – until dispossessed – that I was the first person in the world to *apply the type-machine to literature*. [...] That early machine was full of caprices, full of defects – devilish ones. It had as many immoralities as the machine of to-day has virtues." ([1905] 1994: 7-8)

Baron (2000) and Watson (2012) suggest that Twain purchased a typewriter manufactured by the Remington Typewriter Company. Their suggestion is supported by the fact that the Remington Typewriter Company used the above quotation from *The First Writing Machines* in a 1905 magazine advertisement to promote sales of a new version of its typewriter. This advertisement is shown in Figure 1. It is also relevant to note here that Twain invested heavily in the development of an automatic typesetting machine by the inventor James Paige. Paige's development ultimately failed. However, Twain was correct in recognising the automatic typesetting machine as a technological innovation of the future.

The literature that Twain is referring to in his boast that "I was the first person in the world to *apply the type-machine to literature*" is widely agreed (for example, van Dulken 2006; Goody 2011) to be *Life on the Mississippi* (1883), the first literary manuscript submitted to a publisher in typed form¹. Moreover, *Life on the Mississippi* contains numerous scientific and technical descriptions of what Twain describes as "the marvelous science of piloting" ([1883] 2006: 221), as does, for example, *Roughing It* (1872) of mining and prospecting and *Pudd'nhead Wilson* (1894) of fingerprinting.

Nevertheless, some readers may look at the publication dates of Twain's writing and ask: "How is Twain relevant to me as a twenty-first century writer about science and technology?". Well, Twain was not only an enthusiastic advocate of science and technology. He was also an enthusiastic advocate of clarity, consistency and conciseness in writing and his writing advice remains timely and relevant to modern writers about science and technology. This paper brings together some of Twain's writing advice and shows its continuing relevance and importance in the twenty-first century.



The Remington
Typewriter
of
1875

**Thirty
Years Ago
To-morrow**



The Remington
Typewriter
of
1905

Mark Twain

wrote the following letter:

"E. REMINGTON & SONS.

"Hartford, March 19, 1875.

"Gentlemen:—Please do not use my name in any way. Please do not even divulge the fact that I own a machine. I have entirely stopped using the Typewriter, for the reason that I never could write a letter with it to anybody without receiving a request by return mail that I would not only describe the machine, but state what progress I had made in the use of it, etc., etc. I don't like to write letters, and so I don't want people to know I own this curiosity-breeding little joker.

"Yours truly,

"SAMUEL L. CLEMENS."

TO-DAY

Mark Twain says in his "Unpublished Autobiography."

Replying to his publishers, who asked him whether this letter of thirty years ago was genuine, Mark Twain answered by sending an extract from his unpublished autobiography, of which this is part:
[From *Harper's Weekly*, March 18, 1905]

"1904. Villa Quarto, Florence, January.

"Dictating autobiography to a typewriter is a new experience for me, but it goes very well, and is going to save time and 'language'—the kind of language that soothes vexation.

"I have dictated to a typewriter before—but not autobiography. Between that experience and the present one there lies a mighty gap—more than thirty years! It is a sort of lifetime. In that wide interval much has happened—to the type-machine as well as to the rest of us. At the beginning of that interval a type-machine was a curiosity. The person who owned one was a curiosity, too. But now it is the other way about: the person who doesn't own one is a curiosity.

"In a previous chapter of this Autobiography I have claimed that I was the first person in the world that ever had a telephone in his house for practical purposes; I will now claim—until dispossessed—that I was the first person in the world to apply the type-machine to literature. That book must have been *The Adventures of Tom Sawyer*. I wrote the first half of it in '72, the rest of it in '74. My machinist type-copied a book for me in '74, so I concluded it was that one.

"That early machine was full of caprices, full of defects—devilish ones. It had as many immoralities as the machine of to-day has virtues."

[Copyright, 1905, by Harper & Brothers—Courtesy of *Harper's Weekly*.]

REMINGTON
Typewriter Company
New York and Everywhere

Figure 1. A magazine advertisement from 1905

2. “Employ a simple and straightforward style.” (Twain [1895] 1994: 68)

The language of scientific and technical writing is often a means to an end; that is, it enables readers to learn how to use new scientific and technical technologies. It is, therefore, important that readers are able to fully understand the scientific and technical writing in order to be able to fully use the new scientific and technical technologies. The use of a simple, straightforward style, as Twain was advising 118 years ago, can help readers to understand scientific and technical writing.

The importance of this for modern scientific and technical writers is illustrated in a 2008 survey conducted by *The TechGuys* and reported on by Crystal in *On read rage* (2008). The survey found, among other things, that as many as 67% of 247 end users of new technical devices in the UK were unable to make full use of them because they could not understand the instruction manuals. The choice of the title “On read rage” and the repeated use of the word “remarkable” in the following extract from Crystal’s summary of the findings convey the depth of this problem.

“The survey showed that, nationally, 67% of people say they don’t get the full use of their technical devices because the manual is too difficult to understand. [...] A remarkable 20% admit to throwing the manual across the room. And an even more remarkable 8% have taken their frustration out on the piece of equipment they were trying to set up. This is ‘read rage’, indeed.” (2008)

Crystal goes on to provide reasons for this lack of understanding.

“Why are the manuals so hard to understand? [...] there is the actual choice of words and constructions. Many manufacturers assume that the user will know all the technical terms about their product, and do not bother to explain them. [...] Sentences can be long and complex.” (2008)

Yet, as far back as 1880, Twain was advising that writers simplify their vocabulary and shorten their sentences.

3. “[...] use plain, simple language, short words, & brief sentences.” (Twain 1880)

A long sentence generally contains multiple coordinating or subordinating clauses and thus requires readers to work hard to cognitively identify and process the information contained in the clauses and the relationships between them. This is exemplified in the following sentence taken from a modern instruction manual for a technical deviceⁱⁱ.

“Assemble the saw blade (C) to the saw arbor making sure the teeth of the blade point down at the front of the table, as shown in Fig. 12, and assemble the flange (D) and arbor nut (E) (turn counterclockwise) to the saw arbor and tighten arbor nut (E) as far as possible by hand, being sure that the saw blade is against the inner blade flange.”

In the essay *The Art of Composition* (1890), Twain makes clear that “long, involved sentences confuse him, and that he is obliged to re-read them to get the sense” ([1890] Twain & Neider 2000: 228). This is also likely to be particularly the case for readers with

limited English language and/or literacy skills. In this context, two points need to be highlighted. First, the readers of English language technical writing, such as instruction manuals for technical devices, may include non-native English speakers with limited English language skills. Kohl points out that instruction manuals are “not necessarily translated into all the languages of the countries where the products are sold [...] Thus, non-native speakers of English constitute an important part of the audience” (2008: 267).

Second, the readers of English language technical writing, again such as instruction manuals for technical devices, in countries with English as a native or official language (whether de facto or otherwise) may include native speakers with limited English literacy skills. The results of two surveys illustrate this point. First, a nationwide survey conducted by the US Department of Education in 2003 found that as many as 22% of American adults 16 years of age and older have only basic document literacy and 12% have below basic document literacyⁱⁱⁱ. Second, a nationwide study conducted by the UK department for Education and Skills between 2002 and 2003 revealed that as many as 16% of British adults 16 years of age and older have a literacy level at, or below, the level expected of an 11 year old^{iv}.

It is thus particularly important that writers use short sentences for readers with different English language and/or literacy skills. With regard to this advice, it should be noted that there is general agreement that the use of short sentences in modern scientific and technical writing does not carry with it an implied judgement on the intelligence of the target readers (for example, Young 2002; Wallace & Webber 2009).

One widely recommended way to shorten sentences in modern literature on scientific and technical writing is to avoid the use of unnecessary words (for example, British Standards Institute 1993; Council of the European Union 1998; Andrews 2001; Burnett 2005; Martinez, Peterson, Wells, Hannigan & Stevenson 2008). This echoes what Twain was advising 133 years ago.

4. “Eschew surplusage.” (Twain [1895] 1994: 67)

The use of unnecessary words can make it difficult for readers to understand scientific and technical writing as it necessitates them being able to identify and eliminate them. This is again especially true for readers with limited English language and/or literacy skills.

Twain states that “style – good style – [has] no barnacles on it in the way of *unnecessary*”, retarding words (the shipman scrapes off the barnacles when he wants his racer to go her best gait and straight to the buoy)” ([1892] 1917b: 563-564). In effect, he is advising that writers be concise, but not telegraphic. Barker (2003) points out that telegraphic sentences are in fact common in modern scientific and technical writing. However, they can be difficult for readers to understand as syntactic clues to meaning – such as articles (the, a, an), demonstrative adjectives (this, that, these), relative pronouns (that, which, when) and conjunctions (and, but, or) – are omitted in order to shorten sentences.

Modern scientific and technical writers should thus use the number of words necessary to make their meaning clear, but no more or less. However, it is widely recognised in

modern literature on scientific and technical writing that this in itself does not necessarily ensure clarity. Each word also needs to be used consistently (for example, Council of the European Union 1998; Kirkman 2001; Rubens 2001; Hargis et al. 2004; Robinson 2009). This also echoes what Twain was advising as far back as 1895.

5. “Use the right word, not its second cousin.” (Twain [1895] 1994: 67)

The use of different words with the same meaning, or the same word with different meanings, can make it difficult for readers to understand scientific and technical writing as it necessitates them being able to determine which meaning is intended each time from the context of the text. This is again particularly true for readers with limited English language and/or literacy skills.

The first of these problems can be simply illustrated by considering the number of words that are widely used, often interchangeably, in modern instruction manuals for technical devices to denote depressing a key on a keyboard. A partial list might include *press, punch, touch, strike, tap* and *hit*.

Twain makes clear that a writer should “Say what he is proposing to say, not merely come near to it” ([1895] 1994: 67) and that “the difference between the *almost right* word and the *right* word is really a large matter – ‘tis the difference between the lightning-bug and the lightning” ([1890] Twain & Neider 2000: 228). In this regard, it is interesting to note that many modern manufacturers have developed a controlled or simplified form of English with a one-word-one-meaning vocabulary for their scientific and technical writing in order to make it easier for readers with different English language and/or literacy skills to understand (for example, Caterpillar Fundamental English (Caterpillar Inc.), NCR Fundamental English (NCR Corporation), Perkins Approved Clear English (Perkins Engines), Bull Controlled English (Groupe Bull) and Ericsson English (Telefonaktiebolaget LM Ericsson)).

6. “Use good grammar.” (Twain [1895] 1994: 68)

The meaning of a sentence depends not only on the meaning of the individual words it contains, but also on the way that the individual words are put together grammatically. Budinski claims that “Most readers of technical documents are interested in the technical content of a document, and they may be tolerant of less-than-perfect grammar” (2001: 101). However, the use of poor or less-than-perfect grammar in, for example, instruction manuals for technical devices may, at best, slow down or distract readers and, at worst, confuse or even mislead them, causing them to injure themselves or damage the technical devices.

In fact, Budinski himself points out in the next sentence that “the writing goal should be perfection. Punctuation and grammar are the basic rules of language, and a disregard of these rules often leads to poor readability or misinterpretation” (2001: 101). However, Twain was aware that attaining perfection in grammar is by no means an easy task.

“I write good grammar myself [...] That is to say, my grammar is of a high order, though not at the top. Nobody’s is. Perfect grammar – persistent, continuous, sustained – is the fourth dimension, so to speak; many have sought it, but none has found it.” ([1898] Twain & Paine 2003: 17)

7. [...] you need not expect to get your book right the first time. Go to work and revamp or rewrite it.” (Twain [1878] 1917: 324)

The more sophisticated modern science and technology becomes, the greater the need not just for good grammar in scientific and technical writing, but for clarity, consistency and conciseness. Yet, few scientific and technical writers are likely to produce clear, consistent and concise writing in their first draft. The final piece of Twain’s writing advice to be introduced in this paper is the above advice that writers revise their work. In fact, Twain was not only an advocate of revising. He was also an inveterate reviser of his own writing, as is clear from the following extract from an 1879 *New York Times* article.

“I have been writing a new book, and have it nearly finished, all but the last two or three chapters. The first half of it, I guess, is finished, but the last half has not been revised yet; and when I get at it I will do a great deal of rewriting and a great deal of tearing up. I may possibly tear up the first part of it, too, and rewrite that.” ([1879] Twain & Scharnhorst 2006: 26)

Twain thus did not just advise others as to how to write. He himself practiced what he advised and set an example for others.

8. Conclusions

In conclusion, it is hoped that this paper has shown that over one hundred years after the death of Twain, his advice to write clearly, consistently and concisely is still relevant and important to twenty-first century writers about science and technology. It seems appropriate to conclude this paper, and to sum up this advice, with Twain’s own words.

“That is the way to write English – it is the modern way, & the best way. Stick to it; don’t let fluff & flowers & verbosity creep in [...] a wordy, diffuse, or flowery habit, once fastened upon a person, is as hard to get rid of as any other vice.” (1880)

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ⁱ In *The First Writing Machines* ([1905] 1994: 7-8), Twain in fact mistakenly identifies his first typewritten manuscript as being *The Adventures of Tom Sawyer*.

ⁱⁱ This sentence is taken from page 11 of the instructional manual for the Delta 10" Table Saw (Model 36-600).

ⁱⁱⁱ The term 'document literacy' refers to the ability to understand the meaning of non-continuous text such as that found in technical writing. The key findings of this study are available at http://nces.ed.gov/naal/kf_demographics.asp [accessed April 2013].

^{iv} The key findings of this study are available at <http://webarchive.nationalarchives.gov.uk/20130401151655/http://www.education.gov.uk/aboutdfe/foi/disclosuresaboutchildrenyoungpeoplefamilies/a0065050/illiteracy-amongst-children-and-adults> [accessed April 2013].

^v The italics have been added for emphasis.