Six Steps to Improving Your Military Communications

David K. Spencer

The university admissions board member picks up the next application. After sorting through the forms, she comes to the letters of recommendation and starts reading. Shortly into the first letter, her eyes narrow. It's difficult to read. A quick glance at the page shows why. The text is set in a too-small Arial font, peppered with white blotches from the double spaces between sentences, and strewn throughout with double hyphens and typewriter quotation marks. The bottom of the page shows a military signature block. Shaking her head, she puts the letter aside. If the writer wasn't going to try to make his letter readable and professional, she wasn't going to read it.

The above scenario is a real possibility. Military writers are told to "write well. It's important." And we try. We spend hours creating memos, reports, operations orders, unit SOPs, letters of recommendation, and PowerPoint briefings. After carefully crafting the content of our message—the most important part—we begin the fine-tuning. We run spellcheck, open our dictionaries, and occasionally knock the dust off of our style guides on the bookshelf.

But what about typography—how our text is presented? How do we ensure that our products look professional and are readable? Recruits are trained to march in ranks before their first parade; likewise, staff officers and non-commissioned officers need an orientation in typography to maximize the readability of their products.

Decades ago, military writers relied on typewriters, using workarounds to simulate the conventions of professionally printed products. Typists used consecutive hyphens for em dashes, underlined words to signify italics, and struck the space bar twice between sentences. Today's military writer is not hampered by these mechanical limitations. Line and letter spacing can be adjusted precisely, countless proportional fonts are available, and various formatting options are possible. However, this dazzling array of options also creates challenges. Many of us are not familiar with the basics of creating readable text.

Is typography important? Only if we want our audience to easily read and understand our products. And our audiences are becoming increasingly broad. Our military relies more than ever before on our joint, interagency, intergovernmental, multinational, and civilian partners. If we carefully craft a document that is riddled with careless and amateurish typography, our credibility is damaged and our readers may simply dismiss the message.

Relying on our opinions to create aesthetically pleasing text can be problematic. Text that appears attractive has been shown to actually impair readability through scientific study. It is important to understand that "[m]ere opinions are not always safe guides to legibility of print."[1] Also, text that we personally find appealing may be difficult for others to read, such as those with colorblindness or less than perfect vision. We must consider the readability of our products for our intended audience. Although there are various measures of readability, this article defines it in terms of the speed at which text can be read without fatigue, backtracking, or confusion.[2]

This article first identifies the works that currently guide military writing. Within this framework, six typographical areas are examined that involve the most common "type crimes"[3] in military written works. The standards for readability and professional appearance are based on evidence from scientific studies and the advice of experts. These are more relevant standards for our products than simply doing things because "that's the way we've always done it." By considering these factors, military writers can create professional products that transmit "a clear message in a single, rapid reading."[4]

What Guides Our Writing Now?

A number of government works guide our writing. These manuals typically provide limited guidance on typography, sometimes pointing users to non-military works, such as the *Chicago Manual of Style*, for further reference.

The most relevant guide for military writers may be the U.S. Government Printing Office's (GPO's) style guide. An act of Congress authorized the GPO to "determine the form and style of Government printing." Established in 1894, the GPO's comprehensive guide "is the product of many years of public printing experience, and its rules are based on principles of good usage and custom in the printing trade."[5] Professionally printed military manuals generally adhere to the GPO's standards. Other relevant manuals above the service level include the Department of Defense's *Manual for Written Material* (change 1, 2009), and the *Joint Officer Handbook* (2010).

We use a variety of service-specific writing guides. The U.S. Air Force relies on *Air Force Handbook 33-337: The Tongue and Quill* (2004); the Army uses *Army Regulation 25-50: Preparing and Managing Correspondence* (2002); and the Navy and Marine Corps widely refer to the *Naval Institute Guide to Naval Writing* (1997). All of the services use additional internal style guides, such as the Army's dated *Effective Writing for Army Leaders* (1986), and the Navy's *Naval War College Writing and Style Guide* (2007), among others.

Some of these works offer sparse typographic guidance. Others, such as the Air Force's *Tongue and Quill*, are more comprehensive. However, with the exception of the GPO *Style Manual*, these manuals generally provide limited and dated guidance on typography that is often obsolete or degrades readability. Unfortunately, typographic standardization is also lacking across the services, and organizations within services sometimes choose typographic conventions that run contrary to our most important military writing guides and best practices. Finally, military writing guides are not fully aligned with internationally accepted best practices identified in style guides, manuals on typography, and scientific studies.

Style guides are widely used throughout the United States. Many are updated by boards of experts to reflect current English language usage and best practices. The predominant guides in the U.S. are the *Chicago Manual of Style*, the American Psychological Association's (APA's) *Publication Manual*, Turabian's *A Manual for Writers*, and the Modern Language Association's (MLA's) style guides. The *Chicago Manual of Style* features prominently in the reference lists of many government style guides. Comprehensive style guides provide guidance on typography ranging from paragraphs to entire chapters. Many smaller style guides—as well as military writing guides—point to these works for additional guidance.

Modern standards for typographic best practices are captured in typography manuals. These works include *About Face: Reviving the Rules of Typography* (2004), *The Complete Manual of Typography* (2003), *Designing with Type: The Essential Guide to Typography* (2006), *The Elements of Typographic Style* (2005), *Thinking with Type* (2004), and *Type Rules!: the Designer's Guide to Professional Typography* (2010), among many others.

Non-military style guides and typography manuals rely on scientific studies to help determine best practices based on readability and legibility. This article relies on scientific studies published in books or journal articles that are widely cited by typographic experts, or have other forms of peer review or oversight. Examples include Miles Tinker's work, representing 32 years of studies on the legibility of type in the mid-20th century, and Colin Wheildon's work, comprising eight years of studies between 1982 and 1990.

The above references provide a framework to analyze military writing practices and determine how we can best reform our "type criminals."
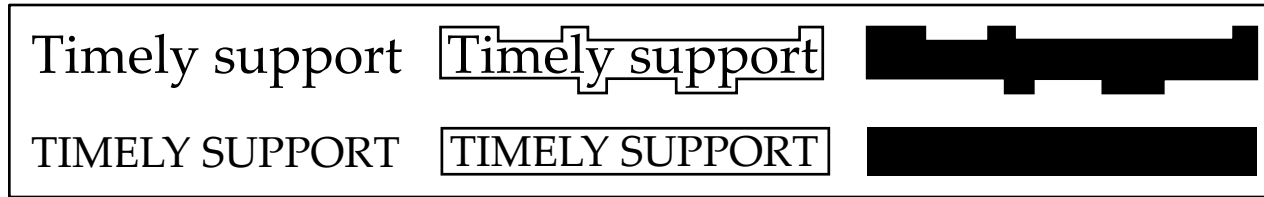
Figure 1. The lower case text on top has a distinctive shape that aids in reading compared to the uniform shape of the all caps text below.

ALL CAPS

Military writers seem to love using all capital letters (all caps) in body text. It is not clear why. Military manuals provide for limited uses of all capital text, such as signature blocks, acronyms, and certain naming conventions. But, outside of these provisions, military writers commit a type crime when setting more than a few words in all caps, and offenses are rampant. Operations orders, memos, PowerPoint slides, and many other products are routinely composed in all capital text. The *Tongue and Quill* even advises users to prepare briefing manuscripts in all caps.[6]

Some typographic conventions are debated, even by experts, but this one is not. The consensus is that text set in all capital letters is much harder to read than lower case.[7]

Considering the evidence that all-capital printing retards speed of reading to a striking degree in comparison with lower case and is not liked by readers, it would seem wise to eliminate such printing whenever rapid reading and consumer (reader) views are of importance.

CONSIDERING THE EVIDENCE THAT ALL-CAPITAL PRINTING RETARDS SPEED OF READING TO A STRIKING DEGREE IN COMPARISON WITH LOWER CASE AND IS NOT LIKED BY READERS, IT WOULD SEEM WISE TO ELIMINATE SUCH PRINTING WHENEVER RAPID READING AND CONSUMER (READER) VIEWS ARE OF IMPORTANCE.

Figure 2. An example of lower case text on the top, and a less readable, all caps version on the bottom. Both passages are set in a 12-point Times New Roman font.[11]

Using all caps is the single best way (typographically) to make your written product difficult to read.[8] The height variations in lower case text aid the human eye. All capital text prevents readers from using the natural shapes of the words to aid in reading. As a result, recognizing words in all caps "becomes a task instead of a natural process."[9]

Miles Tinker summarizes other reasons to avoid all caps in his important book, *Legibility of Print*.

There are still other reasons to avoid all caps. Many people view them as the

All-capital print greatly retards speed of reading in comparison with lower-case type. Also, most readers judge all capitals to be less legible. Faster reading of the lower-case print is due to the characteristic word forms furnished by this type. This permits reading by word units, while all capitals tend to be read letter by letter. Furthermore, since all-capital printing takes at least one-third more space than lower case, more fixation pauses are required for reading the same amount of material. The use of all capitals should be dispensed with in every printing situation.[10]

equivalent of shouting. Also, even though we operate in digital environments, we still print prolifically. Printing in all caps burns through more paper and ink to produce text that is harder to read. Finally, there are better ways to emphasize key points, warnings, and headers. Sparing use of italicized and bold text are better choices according to typographic experts, and these uses are allowed by our writing manuals.

Except for specific circumstances (such as naming conventions and hardware/software limitations), military writers should avoid all caps. Many applications will allow users to easily change between all capital and lowercase text (e.g., Shift+F3 for Microsoft Word), significantly enhancing the readability of our final products.

Sentence Spacing

There is no quicker way to anger a writer than by telling him that putting two spaces between sentences is a thing of the past. Similar risks are undertaken by telling writers that it is possible to split infinitives and end sentences with prepositions without committing grammar infractions. Many of us are passionate about these topics and understandably resist altering conventions that were drilled into us in school.

Learning to type on a typewriter left indelible impressions on many staff officers and NCOs. Striking the space bar twice after a sentence is a reflexive habit for many of us. Other typewriter conventions linger, as well, such as underlining text in place of italics, using straight quotes instead of typographic (curly) quotes, and using hyphens in place of dashes. Decades ago, when typewriters were used to create documents in the military, these were normal workarounds. But times have changed.

Most typewriters used a monospaced font. In other words, all of the letters occupied the same horizontal space, whether a lower case "i" or a capital "M." Placing two spaces between sentences was judged necessary to create an extra break between sentences on typewriters.[12] Today's military writers have a variety of proportional fonts available, where each letter is assigned its own horizontal space that is appropriate for its width (such as the type you are now reading). Modern proportional fonts, which have been found to be more readable than monospaced fonts (such as

Road conditions will degrade friendly movement throughout the sector. Only one hardball road remains, which is heavily congested during the day. Secondary roads have been eroded by heavy rains during the past 60 days.

Road conditions will degrade friendly movement throughout the sector. Only one hardball road remains, which is heavily congested during the day. Secondary roads have been eroded by heavy rains during the past 60 days.

Figure 3. The text on the left is set in Courier New, a monospaced font. The text on the right is set in Garamond, a proportional font.

Courier New),[13] negate any perceived need to create a clear break between sentences with extra spacing.

Claims of greater readability for both single and double sentence spacing are widespread on the World Wide Web. However, these claims have little basis in evidence. Scientific studies suggest that the "holes" and "rivers" created in body text by exaggerated sentence spacing can impair readability.[14] However, studies conducted on sentence spacing in 2002–2009 had inconclusive results.[15]

Since scientific studies do not yet provide a clear answer on the readability of sentence spacing conventions, military writers must look to the advice of experts. They say that the

modern convention for printed and digital media is single sentence spacing.[16] From the 1920s to the 50s, professionally printed books, magazines, and newspapers in the United States began separating sentences with a single space, and the World Wide Web's Hypertext Markup Language (HTML) collapses extra spacing to a single space. Also, most style guides in the U.S. recommend or prescribe a single space between sentences, including the latest editions of the *Chicago Manual of Style* (2010), Turabian's *Manual for Writers* (2007), and the MLA's *Style Manual* (2008). For example, *Chicago* tells us that "one space, not two, should be used between two sentences,"[17] and the GPO *Style Manual* states that "A single justified word space will be used between sentences. This applies to all types of composition."[18] This is echoed by the Navy's Online Style Guide.[19] Yet, further illustrating that the military has not shed all outdated conventions, the DoD's *Manual for Written Material* still stipulates two spaces after periods and colons, and the Air Force's *Tongue and Quill* still allows either use—actually favoring double sentence spacing.[20]

Typographers provide clear advice on this matter. These experts tell us that multiple spaces between sentences have "no place in typesetting"[21] and constitute a "serious type crime."[22] They have been labeled "primitive (and entirely obsolete),"[23] "amateurish, unsophisticated, and unprofessional,"[24] and "absolutely, unequivocally wrong."[25] It is unclear whether double sentence spacing "will cause your work to be ridiculed"[26] in a strictly military setting in the near future since many service members learned to type on the IBM Selectric and its relatives. However, we should consider how this looks to our external partners. Choosing the modern convention and discarding the double sentence spacing that most of our intergovernmental and multinational partners find alien will ensure a more professional appearance.

Habits are hard to break. Military writers who are more comfortable using double sentence spacing for e-mails, text messages, and personal correspondence are not likely to hear complaints from the other end. Preliminary drafts can even contain two spaces between sentences for those who find it difficult to break the habit. The spaces can be removed later with a "find and replace" function.

Serif vs. Sans Serif

Serifs are small added details at the ends of letters. Some fonts are created without these details and go through life "sans" serif. Arial font, a sans serif font, is a favorite of many military writers. But is it readable? For example, Arial is nearly identical to Helvetica—an extremely popular sans serif font worldwide. Yet, Helvetica can be challenging to read in body text.[27]

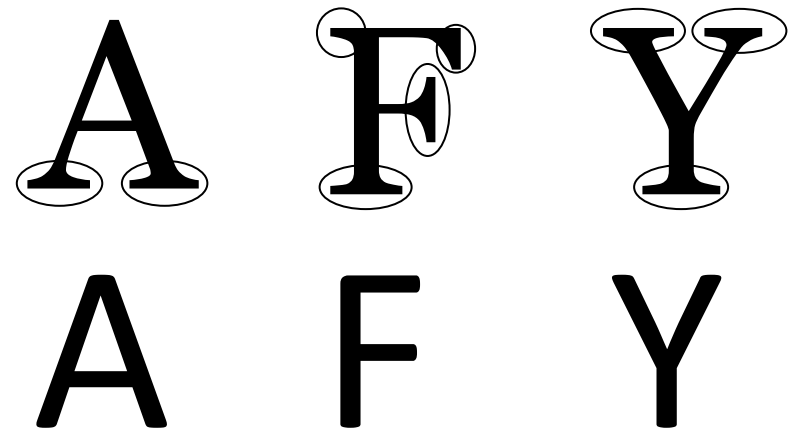The topic of serif vs. sans serif fonts has been debated and

Figure 4. The serifs in the top row of text (Georgia font) are circled. The bottom row is Calibri—a sans serif font.

studied at great length. To complicate matters, there are many variables to consider: font size, reader age, and use in digital media are only a few. Many professionals argue that sans serif fonts can look "clean, uncluttered, and attractive"—regardless of its effect on readability.[28] Sans serif fonts are also widely used on the web, where serifs can be more difficult to see due to relatively low screen resolutions.

Military writers are usually concerned with practical matters. Most of us are not graphic designers. "Clean" text that is more difficult to read does not help us to communicate "a clear message in a single, rapid reading." In most cases, we need to compose readable body text in reports, orders, memos, and various other documents.

Although scientific studies can be contradictory on this matter, there are indications that serif fonts enhance readability in printed body text. Tinker claims that "With more extended reading, typefaces with serifs are preferable."[29] Kathleen Tinkel states that a review of various factors and evidence in studies "suggests that most sans serif typefaces may be slightly less legible than most serif faces."[30] Nevertheless, says Ilene Strizver, "when a sans serif typeface is desirable, its readability can be maximized by paying close attention to the line spacing, column width, and occassionally the overall letter spacing."[31] However, many military writers don't have the expertise or time to make the subtle modifications necessary.

Some serif fonts can be difficult to read as well. For body text, military writers should choose readable serif fonts such as the ones already identified in the writing guidelines of the various services. The DoD's *Manual for Written Material* prescribes Times New Roman, the Air Force's *Tongue and Quill* opts for Times New Roman, and the Army's *AR 25-50* prefers Times Roman and Times New Roman (serif fonts).[32] The *Naval Institute Guide to Naval Writing* does not provide explicit guidance on this matter.[33]

The results of Colin Wheildon's scientific studies reinforce these recommendations. Wheildon noted that about half of his test group for sans serif typefaces "showed poor comprehension," slightly less than half "complained strongly about the difficulty of reading the type," about a fifth "had difficulty focusing on the type after having read a dozen or so lines" and about a tenth "had to backtrack continually to try to maintain concentration." Yet, these same readers had no difficulties in reading a serif font immediately afterward. Wheildon concluded from his studies that "Body type must be set in serif type if the designer intends it to be read and understood."[34]

Care must be used in applying these principles to PowerPoint briefings and digital media. Serifs can be hard to see on low-resolution screens, so serif fonts designed for the screen (such as Georgia) or readable sans serif fonts should be used for text-heavy slides. The use of sans serif fonts for headers, labels, and bullets is not likely to impair readability. In some cases, they may be good choices. However, mixing serif and sans serif fonts on the same slide could be visually confusing to the viewer. Readable typefaces are preferred when possible, but common sense must be applied when preparing briefings.

The case is still out regarding the readability of serif vs. sans serif fonts in digital media. However, for printed material, serif fonts appear to be the better choice.

Colored Type and Backgrounds

There are entire works written on the benefits and drawbacks of Microsoft PowerPoint and similar presentation software. These programs, however, will likely be used by the military for the foreseeable future. Moreover, well-composed and professional presentations aid leaders in summarizing necessary information.

Presentation slides have their own personalities. Some are

text-heavy and others feature graphics with only a few words for labels and bullets. In the latter case, simply choosing a legible font should suffice. However, once we introduce body text onto a slide, we should consider how the color of the text and background will affect readability and comprehension.

A high contrast between text and background colors maximizes readability.[35] For slides that comprise mostly text, dark text on a light-colored background is the most readable. This includes printed and digital products. Safe color combinations for both screen and print include blue, black, or green text on a white background. A 2009 study found blue on white to be the most readable, and also an excellent choice when combining printed copies with the digital presentation.[36] Light text on dark backgrounds—even with high contrast—should be avoided if possible. Studies have shown this to be less readable in print, and at least one study has suggested that screen readability could be similar.[37]

Colors can make a presentation more attractive. However, some color combinations can significantly impair readability.[38] Bad color combinations include red text on a green background, green

Figure 5. The slide on the left features dark backgrounds and light text, creating readability challenges. The slide on the right offers more readable text. Both feature Georgia in the body text—a serif font designed for the screen.

on red, fuchsia on blue, green on yellow, red on yellow, and white on fuchsia. Mixing blues and reds can also "quickly fatigue the eyes."[39]

A variety of techniques will maximize the readability of our presentations. When including text on a slide, choose dark fonts that provide a high contrast with light backgrounds. Optimal font size will depend on the size of the screen, viewing distance, and other factors, but the *Tongue and Quill's* recommendation of 22–26 point font size for body text on a screen is a reasonable guide.[40]

Leading

Leading (pronounced "ledding") is the space between lines of text. This topic is important as leading "has an important effect on the legibility of type."[41]

The purpose of leading is sometimes misunderstood. Draft work is typically prepared with double line spacing. This helps the reviewer to make notes and corrections to the document itself. However, double line spacing impairs readability. When the final product is prepared for reading, line spacing should be returned to a more readable condition.

Scientific testing provides us with solid answers on leading that is most readable. For font sizes 6–12 (representing many type sizes used in military documents and presentations),[42] 2–4 points of additional leading provides maximum readability.[43] This translates to slightly more than single spaced lines. Some word processing programs have line spacing options of just over one space. These offer reasonable approximations of readable leading for common font sizes and line widths.

Hyphens vs. Dashes

Dashes have been used in professionally printed material for hundreds of years. Yet, when the typewriter was introduced in the late 19th century, most English language QWERTY keyboards offered only the hyphen as a close approximation. If you're still using hyphens, or a series of hyphens, in place of en dashes and em dashes (or even minus signs), it's time to put the typewriter behind you.

Dashes are punctuation marks with their own meanings. For example, em dashes can be used to set off parenthetical phrases, or signal a major shift in a sentence. The most common use of en

5-mile run
1914–1918
Drop it—or else

Figure 6. The top line shows an example of hyphen use. The middle line illustrates a common use for the en dash—to indicate numerical ranges. The bottom line shows one possible use of the em dash—to indicate a major shift in a sentence. The text is set in Palatino Linotype.

dashes is to indicate a numerical or other range, such as "1130–1300," "pages 35–43," or "January–March."

Hyphens can be used for a variety of purposes, but have different meanings than dashes. Yet, military writers frequently misuse the hyphen—another "type crime"—when en dashes are called for. Consecutive hyphens in place of em dashes are also still seen. Some computer applications will automatically format hyphens into dashes, but this may produce unintended results.

Using proper dashes in e-mails, text messages, and informal correspondence can be time-consuming, even with keyboard shortcuts. For these informal uses, most readers will understand if

hyphens appear in place of dashes. However, these symbols have different meanings. When polishing a final product, use hyphens and dashes appropriately.

Other Considerations

There are other errors that reduce the readability and professionalism of our final products. For example, overuse

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        He further emphasized the contrasting attitudes of the
police state and free nations in relation to the pact, as follows:

        "For us, war is not inevitable.  We do not
believe that there are blind tides of history which
sweep men one way or the other.  In our own time we
have seen brave men overcome obstacles that seemed
insurmountable and forces that seemed overwhelming.
Men with courage and vision can still determine their
own destiny.  They can choose slavery or freedom --
war or peace.

        "I have no doubt which they will choose.  The
treaty we are signing today is evidence of the path
they will follow."

        Secretary Acheson Indicts Soviet Policy . - Testifying
before the Senate Foreign Relations Committee at the inauguration
of public hearings on the Atlantic Pact, April 27, Secretary
Acheson described widening evidences of Soviet pressure and
penetration: (1) in the UN, the basic purposes and principles of
the Charter cynically violated; (b) in Eastern European countries,
their right to self-determination extinguished by force or threats
of force, human freedoms suppressed, and economic problems dealt
with by dictation rather than international cooperation; (c)
in other areas, the same methods attempted -- penetration by
propaganda and the Communist Party, attempts to block cooperative
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Figure 7. A 1949 U.S. Government document illustrating various typewriter conventions stemming from the typewriter's limitations: hyphens in place of dashes, double sentence spacing, straight quotation marks, double carriage returns between paragraphs, and underlining in place of italics—all set in a monospaced font.[48]

of italics could degrade readability,[44] as could combining too many different fonts and font styles, or using fonts that are too big or too small for easy reading.[45] Also, the use of typewriter quotation marks has been called the "single most visible sign of unprofessional type."[46]

Numerous typewriter conventions still commonly seen in military works can degrade the professionalism of the products. These include underlining in place of italics, using the tab key for indents,[47] and using double carriage returns between paragraphs.

Conclusion

Adhering to the typographic principles discussed above will make our final written products more readable, understandable, and professional. Most military writers don't have the time to become experts in typography. However, addressing the six typographic issues above will improve the appearance of our products by aligning them with best practices.

Using two or more sub-optimal typographical techniques makes products even more difficult to comprehend, diminishing "to a striking degree the legibility of print."[49] Military works commonly feature multiple typographic issues. An all caps document set in an oversized sans serif or monospaced font with poor leading likely impairs readability significantly. We should adjust our practices in composing products.

Changing our practices, however, is only possible to the extent that our manuals and organizations permit. Proponents of military writing manuals and guides should consider making the final adjustments necessary to bring them on line with typographic best practices. Our organizations should adhere to these standards, avoiding guidance that impairs the readability and professionalism of our products.
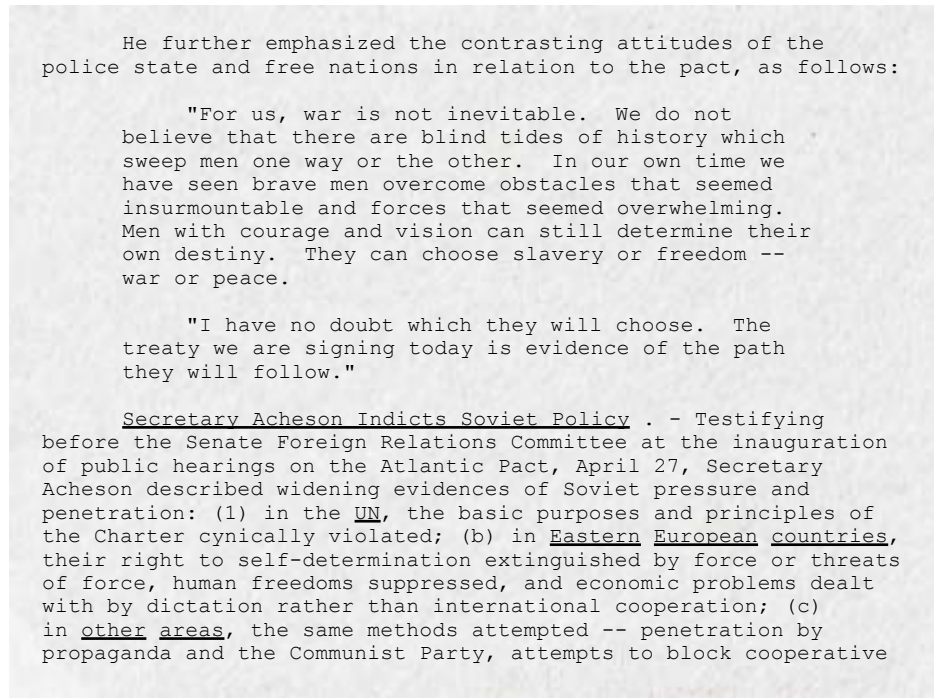
Six Steps to Improving Your Military Communications

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Writing classes in our military schools should cover proper typography. Our writers will then have the tools needed to apply these standards in practice.

When fine-tuning our work, we should ensure that our prose is effective and clear and our grammar and spelling are correct. However, we also owe it to our readers to provide products that are easily understood without distractions created by careless typography.

Notes

1. Mal Warwick, in Colin Wheildon, *Type & Layout: How Typography and Design Can Get your Message Across – Or Get in the Way* (Berkeley: Strathmoor Press, 1995). 12–13; Miles Tinker, *Legibility of Print* (Iowa: Iowa State University Press, 1963), 50. The quote is Tinker's. Tinker uses the word "legibility" in the way that I use the word "readability" (p. 4). The term "legibility" is less useful for military writers since it is more concerned with the visual appearance of the letters and words in text.

2. Miles Tinker gives various possible measures of readability: (1) "Speed of Perception," (2) "Perceptibility at a Distance," (3) "Perceptibility in Peripheral Vision," (4) "Visibility," (5) "The Reflex Blink Technique," (6) "Rate of Work," (7) "Eye Movements," and (8) "Fatigue in Reading." Tinker, *Legibility of Print*, 5–7.

3. This term is used in various works. See, for example, Ilene Strizver, "Top Ten Type Crimes," *Fonts.com*, <http://www.fonts.com/AboutFonts/Articles/FineTypography/TopTenTypeCrimes.htm> (6 January 2010).

4. This is part of the Army's standard for writing. Headquarters, Department of the Army, *AR 25-50: Preparing and Managing Correspondence* (U.S. Army, Washington D.C., 2002), 7.

5. U.S. Government Printing Office Style Board, *U.S. Government Printing Office Style Manual: An Official Guide to the Form and Style of Federal Government Printing* (Washington, D.C., 2008), v.

6. U.S. Air Force, *Air Force Handbook 33-337: The Tongue and Quill* (U.S. Air Force, 1 August 2004), 123.

7. Wheildon, *Type & Layout* , 62–64; Miles Tinker, *Bases for Effective Reading* (Lund Press: Minneapolis, 1965), 136–138.

8. Donald G. Paterson and Miles Tinker, *How to Make Type Readable* (Harper: New York, 1940), quoted in William F. Long, Ralph P. Garzia, Timothy Wingert, and Sylvia R. Garzia, "The Ergonomics of Reading," in Ralph P. Garzia, ed. *Vision and Reading* (Mosby: New York, 1996), 91. Long et al. also list as a source: Tinker MA, Paterson DG: Influence of Type Form on Speed of Reading, *J Appl Psychol* 12:359–368, 1928.

9. Wheildon, *Type & Layout* , 64.

10. Tinker, *Legibility of Print*, 65.

11. The text is quoted from Tinker, *Effective Reading*, 138. I capitalized the repeated text on the bottom of the figure for contrast.

12. Two spaces also offered an approximation of the exaggerated single word space (em space) widely used by professional printers in the U.S. when the typewriter was introduced.

13. See for example, Donald R. Payne, "Readability of Typewritten Material: Proportional Versus Standard Spacing," *Journal of Typographic Research* 1, no. 2 (1967): 135–136.

14. See, for example, A. J. Campbell, F. M. Marchetti, and D. J. K. Mewhort, "Reading Speed and Text Production: A Note on Right-Justification Techniques," *Ergonomics* 24 no. 8 (Taylor & Francis, 1981), 633–640, cited in Karen A. Schriver, *Dynamics in Document Design* (John Wiley & Sons: New York, 1997), 270.

15. See, for example, Xiaopeng Ni, Robert Maribe Branch, Kuan-Chung Chen, and Gregory Clinton, "The Effects of Text Spacing on Screen Reading Time and Comprehension," *International Journal of Instructional Media* 36 no. 4 (2009), 383, 384 and 392. The University of Georgia authors noted that their 2009 study on "on-screen reading tasks" was a follow-up to their previous studies, which also provided no clear results, including a 2002 study by Loh, Branch, Shewanown, & Ali, and a 2003 study by Clinton, Branch, Holshuh, & Shewanown.

16. For example, Theodore Rosendorf, author of *The Typographic Desk Reference*, states that "typographers, typesetters, and graphic designers… In other words, the people producing the things you read (magazines, websites, and the books on your shelves), have and will provide you text with a single space between sentences." Theodore Rosendorf, e-mail message to author, 31 January 2011.

17. University of Chicago Press, *Chicago Manual of Style: The Essential Guide for Writers, Editors, and Publishers*, 16th ed. (University of Chicago Press: Chicago and London, 2010), 308.

18. *U.S. Government Printing Office Style Manual*, 16.

19. U.S. Navy, "U.S. Navy Style Guide," *Navy.mil*. <http://www.navy.mil/tools/view_styleguide_all.asp> (14 January 2010).

20. U.S. Department of Defense, *Manual for Written Material* (26 October 2010), 35, <http://www.dtic.mil/whs/directives/corres/pdf/511004m_v1.pdf> (22 July 2011); U.S. Air Force, *Tongue and Quill*, 292. It is noteworthy that the DoD's *Manual for Written Material*, the *Tongue and Quill*, and the *Naval Institute Guide to Naval Writing* all point to the GPO *Style Manual* and the *Chicago Manual of Style* as further references (among others). Inserting an extra space after colons is another outdated typographic convention.

21. James Felici, *The Complete Manual of Typography* (Peachpit Press: Berkeley, 2003), 80.

22. Ilene Strizver, *Type Rules!: the Designer's Guide to Professional Typography*, Third ed. (John Wiley & Sons: New Jersey, 2010), 196.

23. David Jury, *What is Typography?* (Mies, Switzerland: Rotovision SA, 2006), 57.

24. Robin Williams, *The Mac is Not a Typewriter: A Style Manual for Creating Professional-level Type on Your Macintosh*, 2nd ed. (Peachpit Press: Berkeley, 2003), 14.

25. Ilene Strizver, "Double Spaces Between Sentences…NOT!" *International Typeface Organization and Monotype Imaging*. U&lc Issue 41.1.1. <http://www.itcfonts.com/Ulc/4111/DoubleSpaces.htm> (6 January 2010).

26. Robin Williams, "Thirteen Telltale Signs," *Adobe Magazine* (July/August 1995), 42, <http://www.adobe.com/products/adobemag/archive/pdfs/9507lsrw.pdf> (10 February 2010).

27. Victoria Squire, Hans Peter Willberg, and Friedrich Forsmann, *Getting it Right with Type* (London: Laurence King Publishing, 2006), 36, 38.

28. Wheildon, *Type & Layout*, 56-57.

29. Tinker, *Legibility of Print*, cited in William F. Long, Ralph P. Garzia, Timothy Wingert, and Sylvia R. Garzia, "The Ergonomics of Reading," in Ralph P. Garzia, ed., *Vision and Reading* (New

York: Mosby, 1996), 92.

30. Kathleen Tinkel, "Taking It In: What Makes Type Easy to Read," *Adobe Magazine* (March/April 1996), 43, <http://www.adobe.com/products/adobemag/archive/pdfs/9603fekt.pdf> (28 December 2010).

31. Ilene Strizver, email to author, 1 August 2011. Ilene Strizver is the author of *Type Rules!: the Designer's Guide to Professional Typography.*

32. U.S. Department of Defense, *Manual for Written Material*, 38, 64; U.S. Army, AR 25-50: *Preparing and Managing Correspondence*, 4. The *Tongue and Quill* is written primarily in a serif font and recommends serif fonts for faxes (151) and letters (168).

33. Some Navy writing manuals do address this topic. For example, the *Department of the Navy Correspondence Manual* lists 12-point Courier New—a monospaced serif font—as "the preferred font style and size for official correspondence." Three proportional fonts—two serif and one sans serif— are listed as options for informal correspondence. Secretary of the Navy, *Department of the Navy Correspondence Manual* (U.S. Navy: Washington DC, August 2010), 2-13, <http://doni.daps.dla.mil/SECNAV%20Manuals1/5216.5.pdf> (6 May 2011).

34. Wheildon, *Type & Layout*, 57, 59–60. (The fifth quote was italicized in Wheildon's text.)

35. Tinker, *Legibility of Print*, 151. Tinker states that when the contrast drops below 70%, readability is impaired.

36. Claire Timpany, "The Effect of Type and Colour on Readability in Print and Screen Based Environments," in G. Siemens & C. Fulford (eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* (Chesapeake, VA: AACE, 2009), 803, 804, 806; K. Preston, H. P. Swankl, and Miles A. Tinker, "The Effect of Variations in Color of Print and Background and Legibility," *Journal of General Psychology* 6 (1932): 459–461, cited in Timpany, "Type and Colour," 799; Tinker, *Legibility of Print*, 146. Preston, et al, also note that black on yellow is legible in print.

37. Tinker, *Legibility of Print*, 130; Alyson L. Hill, "Readability of Screen Displays with Various Foreground/Background Color Combinations, Font Styles, and Font Types," *Proceedings of the Eleventh National Conference on Undergraduate Research*, vol. II. (1997): 742–746 (page range of article; no specific page numbers listed).

38. Wheildon, *Type & Layout*, 86–87.

39. Hill, "Readability of Screen Displays"; Timpany, "Type and Colour," 798–799. Timpany also refers to "Le Courier's legibility table" and a study by Hill: A.L. Hill, *Readability of Website with Various Foreground/Background Color Combinations, Font Types, and Word Styles* (1997), <http://hubel.sfasu.edu/research/AHNCUR.html> (Timpany accessed this study on 17 February 2005).

40. U.S. Air Force, *Tongue and Quill*, 127.

41. Tinker, *Legibility of Print*, 106. Tinker's use of the word "legibility" equates to the use of "readability" in this article.

42. For example, *Army Regulation 25-50* favors a 12-point font. U.S. Army, *AR 25-50*, 4.

43. Tinker, *Legibility of Print*, 106–107; Ilene Strizver, telephone interview, 18 January 2011. Tinker recommends 1–4 points of leading, but Strizver recommends 2–4. Optimal leading varies depending on the font type, font size, and other factors.

44. This refers primarily to italicized body text as opposed to the use of italics for emphasis. See, for example, Tinker, *Legibility of Print*, 55–56. Tinker notes a "small but statistically significant" effect on readability while noting that readers "do not like it." However, Wheildon concluded that italics do not impair readability. Wheildon, *Type & Layout* , 103–105.

45. Tinker, *Legibility of Print*, 72–73. Tinker found 11-point font in printed body text to be the most readable, with a decrease in readability as font size increases or decreases.

46. Williams, *The Mac is Not a Typewriter*, 16.

47. There is no "correct" indent, but most professionally published material uses only enough space to visually indicate a new paragraph is starting, e.g. an em space. The optimal indent will depend on various factors, such as leading, line width, text size, etc. Carelessly using an unadjusted tab to start a new paragraph might insert too much space, resulting in gaps in the text.

48. U.S. Department of State, "United States Policy and the USSR, Department of State, c. April, 1949," Harry S. Truman Presidential Library, 3, <http://www.trumanlibrary.org/whistlestop/study_collections/berlin_airlift/documents/PDFs/10-2.pdf#zoom=100> (6 January 2010). The Web document page number is 3. The typewritten page number is 2.

49. Tinker, *Legibility of Print*, 168–169.

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