

GRAPHIC DESIGN AWARENESS IN A COMPUTING ENVIRONMENT

Cathy Ozubko
Information Section
Client Services
Computing Services
University of Alberta
Edmonton, Canada T6G 2H1
(403) 432-2463

INTRODUCTION

Have you ever thought, "This would look much better if it were typeset" or "If I could put this in bigger letters, the organization would be much clearer",...? Though the output device you use may impose certain limitations, it is not an excuse for your documentation to be ineffective and unreadable. Learning how to be aware of and make some basic design decisions within these limitations will help you make the most of what you have. Whether you go on to consult a graphic designer or send your pages straight to the printer, you should be confident that you have made some careful considerations.

Graphic design is a discipline that has evolved in the 20th century. It differs somewhat from commercial art in that it takes a much broader, problem-solving approach, incorporating other sciences like ergonomics and psychology. The aspect of graphic design that is of most concern to people in publications in our computing centers is typography. The choice of character style, page size, space between words, emphasis of headings, etc. are all typographical decisions that must be made before presenting text to readers. A person can no more become a graphic designer overnight than he can a doctor of medicine, but he can increase his awareness by learning how to look at and evaluate the effectiveness of a document.

For people in the information environment who do not have ready access to a graphic designer, and to help those who do to communicate better with him, this paper will explain some of the basic principles of good design. The focus will

Permission to copy without fee all or part of this material is granted provided that the copies are not made or distributed for direct commercial advantage, the ACM copyright notice and the title of the publication and its date appear, and notice is given that copying is by permission of the Association for Computing Machinery. To copy otherwise, or to republish, requires a fee and/or specific permission.
© 1985 ACM 0-89791-167-9/85/0010/0223 \$00.75

be on applying these principles to any textual material produced on a computer output device, to recognize the limitations created by the device, and how to effectively work within these limitations.

The equipment that each computing center has for printing text and the software that drives the printers are so diverse that this paper will deal first with the limitations that are present regardless of what equipment is being used, and later with the particular problems that different types of devices might present. The topic will be applied to any type of printed information, with a final word about designing a newsletter.

IDENTIFYING THE LIMITATIONS

The limitations of formatted information in the computing environment arise mainly from the type of output device being used. The rate at which the technology and affordability of printers are changing means that not many of us will be limited by impact printers such as the line printer, daisy wheel, or dot matrix printers. For those of us who are, these types of printers impose problems such as poor quality of print, lack of choice of type styles, poorly simulated emphasis fonts, limited variable linespacing, and inaccurate placement of the image on the page.

Laser or ink-jet printers are becoming increasingly accessible and have the potential of offering all the options for laying out a page that a typesetter does. In many cases, any limitations are imposed by the software and they mainly include lack of access to character styles and sizes, and limited variable linespacing.

The resolution and quality of a phototypesetter are still far better than any laser printer and this makes the typesetter the best choice for producing a master for printing or duplication multiple copies. However, the nearly unlimited choice of design capabilities of a phototypesetter is often a trap for someone who has no graphic design experience and creates the potential for hazardous misuse of the available options.

DESIGN CONSIDERATIONS APPLICABLE TO MOST OUTPUT DEVICES

The following are some basic design principles that can be applied to the formatting of all printer information. All text formatting languages should supply the means by which to control these options on any output device.

Size of the Text Area

Though the physical size of the page may be pre-set, the actual size of the text area is variable. It is controlled by the size of the top, bottom, and side margins. The size of the margins dictates the length of the lines. A comfortable line length is one of the most important factors in the readability of a document and one that is often ignored. If a line is too long, the reader suffers fatigue because the eye is required to work too hard to find the

beginning of the next line. If a line is too short it may break up phrases that are usually read as a unit. The general rule is to set a line about two and a half alphabets long. Studies have shown that a line that is between fifty and seventy characters long is most comfortable for reading. Since the length of the line is dependent on the size of the characters, a possible solution to lines that are too long is to increase the size of the characters. Other, better solutions are to break the page into columns or increase the width of the left or right margin (creating space for innovative use of headings, figures, notations, etc.).

Alignment of the Text

There are many ways of aligning the lines of text within the margins of a page. Only two are practical for formatting technical information. Text that is justified has lines of equal length. In order for text to be justified the space between words varies depending on how much is required to fill up the line. Many text formatting languages have access to a dictionary which allows hyphenation to be turned on. Often the dictionary is not adequate and people choose not to use it, but to go back and put discretionary hyphens in manually. This is tedious and often inaccurate. If justification is used and hyphenation is not, the space between words can become extremely large and the result is text that is unreadable. The result of large gaps between words in lines of text is called rivers. The eye tends to want to read down the page, following the rivers created by the gaps, rather than flow easily across the page.

Many people think that justified text makes the page look neater, but if the problems it creates are not adequately addressed, it can be disastrous. The problems are exaggerated when the font (character set) is made up of characters that are monospaced, i.e., where each character takes up the same amount of space. In this case words may appear loosely held together. Large gaps between these words also result in text that is hard to read. When the text is put into columns, fewer words are likely to fit on a line, and so the chance of larger gaps appearing increases and makes the problems even harder to control. A good example of this is found in our daily newspapers, the narrow columns and justified text often create rivers.

The alternative to justified text is text that is aligned along the left margin and has a ragged right edge. Each line in the text will be a different length and the space between words will be fixed at a certain width. This width is usually calculated to be about one third the width of the M in the character style and size being used. It can be slightly smaller; the eye does not need more than a subtle break to recognize words. Most of the problems arising from using justified text do not occur in left-aligned text. It is a much better way of making sure your text is readable and effective.

Arrangement of the Text

Headings

On most printing devices, headings can be emphasized through the use of bold or italic type, underlining, or capitalization. Text, even in small amounts such as headings, is harder to read when capitalized. If the capability of increasing the size of the characters exists, capitalization and underlining

should generally be avoided. Using a light line which extends across the whole page or column, above or below a major heading, is an effective way to create a noticeable break in sections. Emphasis fonts such as bold and italic do not negatively effect the readability of a word and also create a noticeable break. Another way of setting off headings is by controlling the white space around them. Whether or not you are limited to moving one linespace at a time, you should always put more space above a heading than below. Even a slight difference counts. Often a heading is set with as much space above as below, and it is not clear whether it is part of the preceding text or the text below it.

If a wide margin is being used to shorten the line length, the headings may extend into the margin away from the body of the text. This is being used more and more in publications of all kinds today and is easy to do on most printing devices if an indent or tab setting is used to shorten the length of the text rather than changing the size of the left margin.

Paragraphs

In many cases paragraphs are set apart by inserting extra space between them and indenting the first line. It is not necessary to do both; either one provides enough of a break to indicate a new paragraph. If paragraphs are being indented, text that follows a heading at any level does not need to be considered a new paragraph and does not need to be indented. The heading is the indication that a new topic has begun and therefore it is redundant to indicate that again by starting a new paragraph. Not indenting the first paragraph also keeps the left edge of the text neater. In technical text there is already a lot of text leaving the margin in the form of examples and figures. The more aligned things are to the margin, the neater the page as a whole will look.

DESIGN CONSIDERATIONS FOR SPECIFIC PRINTER DEVICES

The division of output devices into categories is defeatist, but for the purpose of considering their effects on the formatting of information, they will be divided according to their most popular (not current or potential) limitations.

Line, Daisy Wheel, and Dot Matrix Printers

These types of printing devices are most limiting because of their few capabilities. They would not often be considered a means of producing multiple copies because the quality of the print is too poor and turnaround is slow. The principles of design mentioned in the first part of this paper apply as much to these types of printers as to any and it is for these printers that dedication in applying the principles will have the most effect on the readability of the text. Because of the lack of options offered by these printers, to create a layout that is visually interesting as well as readable may require a certain amount of cutting and pasting. The important thing is to make headings clear and to make the most use of the white space around them. A dashed or solid line can make up for the lack of emphasis capabilities. Wide left and right margins and left-aligned text will give the best results.

Laser or Ink-Jet Printers

Some laser or non-impact printers are capable of high quality output to be used as a master copy for offset printing. But they are really best for directly producing good quality, fast turnaround, low-cost copies. Output is limited to only a few sizes and types of paper.

The formatting of text on these devices is often affected by a limited choice of different character styles and sizes. The use of emphasis fonts and white space is important for organizing headings. Proportionally spaced characters, i.e., where each character in a word takes up a different amount of space, are more common on these printers. Also, characters smaller than the common six or eight characters to the inch offered by most impact printers can be accessed. So it is important to consider the effects that character size and style will have on the length of the lines. Often more than one column on a page or increased width of the margins will be needed.

As the software becomes more sophisticated and the technology of these printers improves, they will threaten the practicality of using a phototypesetter. Eventually the following discussion of a typesetter as an output device will merge with the discussion of laser printers.

Phototypesetters

The greatest attraction to date of using a typesetter over a laser printer is the resulting quality of the output. The quality of print, because of the photo processing, is unsurpassed in clarity and consistency. The fine resolution of each letter allows the type to be reproduced in offset printing without sacrificing the high quality.

The typesetter also offers the most diversity for formatting text. As mentioned earlier, danger lies in the overuse of the vast number of choices available. Because proportionally spaced characters are the best choice for text and most widely available on the typesetter, text should be set in columns or arranged so that the lines are short enough to be readable.

There are many more design considerations to be aware of than are mentioned in this paper and it is best to consult a graphic designer if you are in doubt. Things to watch out for initially are increasing or decreasing the size of type between elements of text (titles, headings, lists, and examples) too much or too little. Others are changing character style between these elements too many times and placing them too close together.

Choosing a character set that is best for ease of reading is important. Serif characters--those that have small strokes extending from them--are generally considered easier to read and more restful for reading solid amounts of text. A popular serif character set is Times Roman. Sans serif characters--without strokes--are often set in bold and used for setting off headings from a text body set in a serif face. Helvetica or Univers are common sans serif character sets.

The important thing about using a typesetter is learning how not to take too much advantage of its capabilities.

DESIGNING A NEWSLETTER

To start, determine the output device on which the newsletter is going to be produced. Then consider how to take full advantage of the capabilities of that device. The design principles presented here are only a part of that consideration. You must decide how to handle the added elements of a contents page, figures, tables, photographs, examples, etc. Sections and articles have to be organized in a way that is effective and not too busy. All these elements must become an integral part of the newsletter.

There will almost certainly be some cutting and pasting, but a good sound layout will minimize this. The initial design of this layout will need to be done by a graphic designer who has the skill to foresee how all the elements will interact with each other. If this is not feasible, keep in mind the basic design principles mentioned here and take the time to delve through some of the numerous books available on the subject.

CONCLUSION

Any formatted document, whether a newsletter, tutorial, or memo, has the potential of being effective and readable if some basic design principles are followed. Desk-top laser and non-impact printers are becoming increasingly available and affordable as accessories for microcomputers. They may soon become alternatives for the production of many newsletters which are currently being produced on phototypesetters. With this change will come the added capabilities of reproducing high-quality drawings and photographs. An example of this is already evident in the affordability and ease of use that has made the Macintosh the popular computer of people who never dared go near a terminal. But also evident in this example is the potentially disastrous effect that lack of design awareness has on effective visual communication. The Macintosh allows a user to go wild combining character styles and sizes with graphic elements. A person can produce a document on his own, cheaply, without time delays or communication problems caused by having to interact with other people. But the benefits of experienced counsel should not be sacrificed. It is what is lost at the expense of these conveniences that will most affect the intended reader.

Though the technology of the output devices we use is constantly changing and the number of people using them is increasing, our purpose remains: effective communication. It is the responsibility of people in the computing environment to be aware of the application of graphic design in their work.

BOOKS

Designing with Type, A Basic Course in Typography, James Craig

Phototypesetting: A Design Manual, James Craig

Designing for Magazines, Jan V. White

Layout, The Design of the Printed Page, Allen Hurlburt

Graphics, Design into Production, Alec Davis

Fundamentals of Modern Composition, John W. Seybold

ARTICLES

The Seybold Report, Aesthetics vs. Technology: Does Digital Typesetting Mean Degraded Type Design.

Chuck Bigelow, Vol 10, No 24, August 24, 1981

The Seybold Report. Aesthetics vs. Technology: Part II

Chuck Bigelow, Vol 11, No 11, February 8, 1982

IEEE Transactions on Professional Communication, Eighty Ways of Improving Instructional Text

James Hartley, Vol PC-24, No 1, March 1981

Computing Canada, Focus on Microcomputers, The Promise of Laser Printing for Micros

Jesse Berst and Patricia Kinley, Spring 1985