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Proof-reading Monospaced and Proportionally-spaced Typefaces: Should We Check Typewritten or Typeset Text?

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revision when typewritten rather than typeset suggested that more false positives may have been scored because typewriter faces carry a connotation of provisionality, and so subjects in the main experiment may have been applying stricter criteria to the typewritten text than to the other texts.

Introduction

With the growth of desktop publishing (DTP) documents that were once typewritten are now 'typeset' in printing typefaces and printed out on laser printers. Most laser printers have typewriter faces (usually monospaced, *figure 1*) but people seem to prefer printing typefaces (which are proportionally-spaced, *figure 1)*. A few people complain that typefaces are too formal for draft documents or documents intended only for a small circulation. But conventions for text presentation are changing, especially with the development of proportionally-spaced typefaces with a less formal appearance than traditional typefaces, intended specifically for DTP (*figure 2)*.

There is some evidence that proportionally-spaced type is read faster than monospaced (Payne, 1963), and so there may be functional justification for using well-designed, proportionally-spaced typefaces throughout document preparation. But we do not know if the advantage for proportional spacing applies across all document preparation tasks. It would be useful to know if it holds for proof-reading because changes in document production that have followedfrom DTP sometimes mean that documents are not checked as often as with traditional methods.

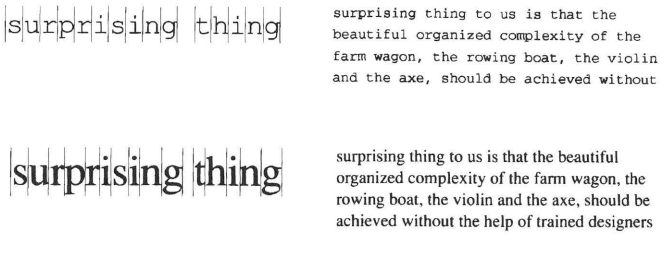

Figure 1
a. In monospaced, typewriter faces the character shapes are designed to fit a single, standard width.

b. In proportionally-spaced typefaces the horizontal spacing of characters is adjusted to fit each character shape.

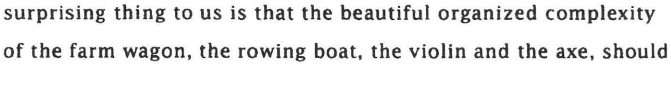

Figure 2
Proportionally-spaced typefaces with relatively informal styles, designed to be reproduced at medium resolution, may contribute to a decline in use of monospaced typewriter faces. The examples here are Lucida (a) and Stone serif (b).

Traditionally checks were carried out at least by author and typist, and in professional publishing, by editor and typesetter too. Multiple checks were necessary as texts were transformed across technologies from manuscript, to typescript, to typeset galleys. Because DTP combines authoring, page make-up and output of master copies in one system, desktop published documents may only be checked once, if at all, and possibly only by the author. So we should be sure that any checks that are made use text formats that maximize the chances of errors being detected.

One contributor to the ease of error detection may be the cohesion of word contour a particular typeface yields. People detect spelling errors that disrupt word contour (for example, 'eleven' to 'elelen') more easily than errors that preserve word contour (for example, 'eleven' to 'elenen') (Haber and Schindler, 1981; Healy, 1981; Healy, Volbrecht and Nye, 1983; Monk and Hulme, 1983). We might predict that the smoother the contours of words the more disruptive an error will be, and the easier its detection. We might also predict that proportional spacing, where letters occupy a horizontal space customized to individual letter shapes, might yield smoother word contours and easier error detection than monospacing, where the letter shapes are adapted to uniform spaces. And proportional spacing might bring about a general improvement in error detection if detecting spelling errors is relatively effortless and 'releases' cognitive capacity for the detection of other kinds of errors.

Below we report studies of the impact of monospacing and proportional spacing on error detection, starting with a pilot study in which we tested a range of monospaced typewriter faces and proportionally-spaced typefaces.

Pilot study

Method

We timed twenty subjects (students of the University of Reading, aged 18–25) as they proof-read ten single-page texts (from popular magazines, each approximately 350 words long). Five of the texts were set in different monospaced typewriter faces and five were set in different proportionally-spaced typefaces (the

typeface used for each text was rotated across subjects). Twelve plausible typing errors, consistent with the classification of errors given by Damereau (1964), had been introduced into each text. The kinds of errors introduced at specific positions in the text were determined semi-randomly (Watts, 1989). The errors were held in a consistent position across a particular text in each typeface by ensuring that line breaks occurred at the same point within the text.

At the end of the testing session subjects ranked all the texts according to how much they liked the appearance of the text and for how easy they felt the appearance of the text made error detection.

Results and discussion

We found no significant differences between monospacing and proportional spacing either in reading times, or in error detection, although the range of performance was greater for monospacing than for proportional spacing *(see table 1)*. However, subjects preferred the appearance of proportionally-spaced texts compared to monospaced texts ($T_{(20)}=21$, $p<.001$), and gave a higher ranking for the ease with which they expected to detect errors with proportional spacing compared to monospacing ($T_{(20)}=49.00$, $p<.05$).

Table 1
Mean times taken and number of errors detected in monospaced and proportionally-spaced texts in pilot study. The range for each condition is given in parentheses.

text type	monospacing	proportional spacing
times *seconds*	149.0 (86–219)	147.0 (92–205)
errors detected *max. 60*	47.7 (19–57)	47.8 (34-56)

The discrepancy between subjects' preference for proportional spacing and their performance in proof-reading resembled Tinker's (1963) finding that people's judgments of typeface legibility did not correspond closely with speed of reading. Nevertheless the strength of the preference begged the question whether, given a more difficult proof-reading task, there might still be an advantage for proportional spacing. This would be consistent with Payne's (1967) findings that there was no significant difference between speed of reading monospaced and proportionally-spaced texts when text content was simple, but that there was an advantage for proportional spacing when content was complex. We decided to re-examine the differences between monospacing and proportional spacing using longer, more complex texts than those tested in this study.

Main experiment

We compared proof-reading monospaced and proportionally-spaced texts and included a further condition: irregularly-spaced text (*figure 3*). The irregular spacing violated the spatial relationships usually recommended for legibility (character-spacing consistently less than word-spacing), so word contours were disrupted. The irregularities we created simulated the appearance of texts produced by inadequate or inappropriately used text processing systems (Black, 1990a).

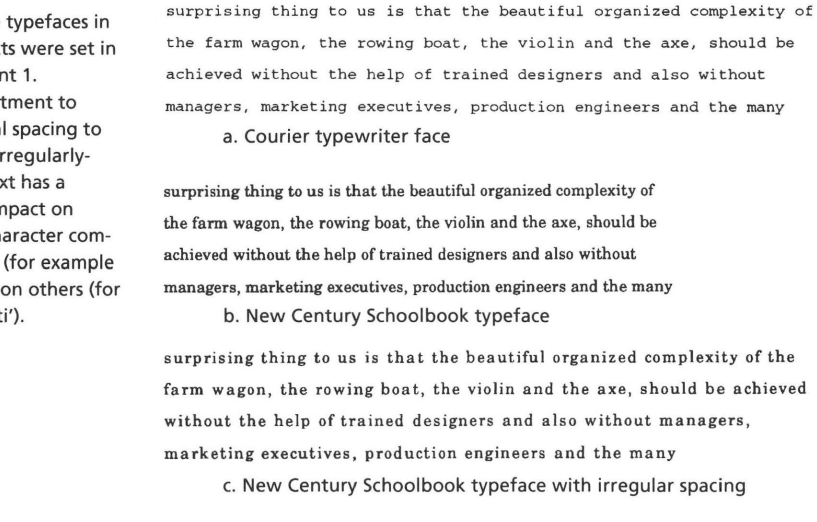

Figure 3
The three typefaces in which texts were set in Experiment 1.
The adjustment to horizontal spacing to produce irregularly-spaced text has a greater impact on certain character combinations (for example 'ie') than on others (for example'ti').

We predicted that reading times would be shorter and error detection better with proportional spacing than with monospacing; but worse with the irregular spacing than with monospacing.

We controlled error type, comparing detection of errors that disrupted word contour and errors that did not disrupt word contour. We predicted that disruptive errors would be detected more frequently than non-disruptive errors, but that where the typeface gave less effective information about word contour, subjects would depend less on global word-recognition strategies. Consequently the difference in detection of disruptive and non-disruptive errors should be reduced with irregular spacing and, to a lesser extent, with monospacing, compared to proportional spacing.

Additionally we included non-spelling errors (for example punctuation errors, repetition or omission of words) for a more general index of effectiveness of proof-reading in each typeface condition. The greater demands of detecting spelling errors in the monospaced and irregularly-spaced texts could reduce error detection overall. But a trade-off between ease of detecting spelling errors and overall accuracy was also possible. By making proof-reading easier, proportional spacing could reduce vigilance and so non-spelling errors might be missed. In contrast vigilance might be higher in the monospaced and irregularly-spaced conditions.

Method

Design

The experiment was a 3 x 2 mixed design, comparing typeface (monospaced, proportionally-spaced, irregularly-spaced) between subjects and error types (disruptive, non-disruptive) within subjects. The dependent variables were the length of time taken to proof-read the texts and the number of errors correctly identified.

Subjects

Forty-two students at Reading University (ages 20–34) volunteered for the experiment. All spoke English as their first language and had some experience of proof-reading.

Materials

A 9,000 word text drawn from *Design Methods* (Jones, 1990) was reproduced on twenty-three A4 pages, each of forty lines. Thirty spelling errors disrupting word profile and thirty maintaining word profile were introduced into the text from pages three to twenty-two. The errors were distributed so that there was an average of three of each kind of error (range two to four) on each page. Two additional filler errors (mistakes in punctuation, word repetitions and omissions) were introduced on each page from three to twenty-two (a total of 40 errors). There were errors similar to target errors on the first two and final pages. The position of the errors on the pages was determined semi-randomly and was consistent across conditions.

The texts were set in MicroSoft Word, version 3.01, on an Apple Macintosh computer and reproduced on an Apple LaserWriter Plus: the monospaced in Courier; the proportionally-spaced in New Century Schoolbook; and the irregularly-spaced text in New Century Schoolbook with an additional 1pt ($^1/_{72}$ inch) horizontal spacing added to each character. All the texts were set, ranged left, in 10pt type with 15pt vertical space between the baselines of successive rows of type.

Procedure

Subjects were asked to proof-read the text as quickly and effectively as possible, marking any errors they spotted. Their proof-reading times were recorded.

Results

Times

There were no significant differences in proof-reading times across the conditions (*see table 2*).

Table 2
Mean times to proof-read texts in each type-face condition in main experiment.

text type	monospacing	proportional spacing	irregular spacing
times *minutes*	50.1	47.9	48.2

Table 3
Number of disruptive and non-disruptive errors detected in each typeface condition in the first ten target pages and in the total twenty target pages in main experiment.

errors detected in first 10 target pages

text type	monospacing	proportional spacing	irregular spacing
disruptive errors *maximum 30*	24.4	25.8	24.8
non-disruptive errors *maximum 30*	21.1	22.8	19.4
total *maximum 60*	45.5	48.6	44.2

errors detected in total 20 target pages

text type	monospacing	proportional spacing	irregular spacing
disruptive errors *maximum 60*	48.3	49.6	48.8
non-disruptive errors *maximum 60*	38.7	38.5	38.7
total *maximum 120*	87.0	88.1	89.5

Error detection

The mean number of target errors of each type (disruptive and non-disruptive of word profile) detected in each condition are shown in table 3 (two separate sets of scores, for errors detected on the first ten target pages and total errors detected are given).

The mean total scores were 87 (73%), 88.1 (73%) and 89.5 (75%) respectively for the monospaced, proportionally-spaced and irregularly-spaced typefaces, with no significant differences between conditions, both over the first ten pages and over the total twenty target pages. Significantly more disruptive than non-disruptive errors were detected 48.9 (82%)and 38.6 (64%) respectively (significance for first 10 pages, $F_{(1,39)}=75.00$, $p<.001$; for total 20 target pages $F_{(1,39)}=108.28$, $p<.001$). There were no interactions between typeface condition and error type for either the first ten pages, or the total twenty target pages.

The mean totals of filler errors detected were 26.6 (67%), 27.0 (68%) and 21.4 (54%) respectively in the monospaced, proportionally-spaced and irregularly-spaced conditions (*see table 4*). The effect of typeface condition was significant over the total 20 pages, $F_{(2,39)}=5.68$, $p<.01$. Planned comparisons of the means showed a significant difference between the scores for the monospaced text and the irregularly-spaced text $F_{(1,39)}=6.14$, $p<.05$.

Table 4
Number of filler errors detected in each typeface condition in the first ten target pages and in the total twenty target pages in main experiment.

filler errors detected in first 10 target pages

text type	monospacing	proportional spacing	irregular spacing
errors *maximum 20*	14.2	14.3	12.3

filler errors detected in total 20 target pages

text type	monospacing	proportional spacing	irregular spacing
errors *maximum 40*	26.6	27.0	21.4

The mean number of false positives, that is, marks made by subjects where they believed there was an error, although an error had not been intended by the experimenters (for example, queries of the legitimate use of capitals, spellings or punctuation) were 12.2, 7.2 and 5.1, respectively in the monospaced, proportionally-spaced and irregularly-spaced text. There was a significant difference among the conditions, $F_{(2,38)}=3.629$, $p<.05$. Comparisons of false positives in each condition over the first ten target pages and over the second ten target pages showed no significant difference in the monospaced text but significantly more false positives in the first half of both the proportionally-spaced and irregularly-spaced texts ($t_{18}=2.399$, $p<.05$, two-tailed and $t_{18}=2.25$, $p<.05$, two-tailed, respectively) (*see table 5*).

Table 5
Mean number of false positives detected in each typeface condition in the first ten target pages and in the second ten target pages in main experiment.

text type	monospacing	proportional spacing	irregular spacing
false positives in first 10 target pages	6.5	4.9	3.9
false positives in second 10 target pages	5.7	2.3	1.2

Discussion

The primary measures (reading time and error detection) suggest that the processes underlying the detection of spelling errors are robust enough to survive variation in the horizontal spacing of words when text is monospaced, proportionally-spaced or irregularly-spaced. The higher rate of error detection for disruptive errors compared to non-disruptive errors confirmed the importance of global contour-recognition processes in all conditions.

The secondary measures (detection of filler, non-spelling, errors and marking of false positives) suggest differences among the three conditions. The detection of significantly fewer filler errors with irregular spacing suggests that it was more

demanding in proof-reading than the other two conditions. The greater difficulty of proof-reading irregularly-spaced text was perhaps only evident in the failure to detect filler errors because there were more spelling errors than fillers, so subjects' attention was directed specifically towards them. If a more even distribution of error types had been used there might have been a more even distribution of detection and omissions.

There was a rather different pattern in the scoring of false positives: false positives were significantly higher in the monospaced condition. This pattern did not relate to the number of target errors detected (there were no significant differences across conditions). A possible cause of the different pattern for false positives may have been assumptions made by the subjects about how provisional or final the text they were reading might be. The subjects were not told where the text came from. The typewriter face used in the monospaced condition may have suggested provisional status more than the other faces, and so may have prompted more suggestions for alternatives to the acceptable forms given in the text. In order to check whether suggesting a connotative influence on proof-reading was plausible, we carried out a post-test examining people's assumptions about the provisional or final status of typewritten and typeset text.

Post-test and further discussion

Six pages of the text used in Experiment 1 were presented to twelve judges, drawn from the same subject group as in the experiments, but who had not participated in the experiments themselves. Two consecutive pages of the text were in monospaced, typewritten format, two were typeset in proportionally-spaced format and two were typeset in the irregularly-spaced format used in the experiment. The format of consecutive pairs of pages was systematically varied across judges. The judges read the texts and were then asked to rate on a scale of 1 to 7 the amount of editorial intervention that each pair of pages required.

The judges rated the need for editorial intervention as higher for the monospaced texts than for the other two conditions ($X^2_r=7.16$, $p<.05$, d.f.=2).

Table 6
Post-test ratings of editorial intervention required for texts presented in monospaced, proportionally-spaced or irregularly-spaced formats (1 no intervention; 7 substantial re-writing).

text type	monospacing	proportional spacing	irregular spacing
mean rating (1 to 7)	4.7	3.6	3.6
range	(3-6)	(2-5)	(2-6)

In considering the results of the post-test we return to the starting point of the study: to find out whether effectiveness (speed and accuracy) in proof-reading is influenced by the horizontal spacing of text. The pilot study and main experiment failed to show the predicted difference between monospacing and proportional spacing, even though subjects preferred the appearance of proportionally-spaced texts and felt that it would be easier to detect errors in them.

The studies showed effective proof-reading where characters and spatial parameters had been designed together (either character shapes adapted to fit unit widths in monospacing, or character widths adapted to individual character shapes, as in proportional spacing). Proof-reading suffered only with irregular spacing where canonical relationships between character and word-spacing were disrupted. So the results of the studies would not support recommendations that proof-reading should be carried out exclusively in either proportionally-spaced or monospaced text.

Despite these findings the false positives in the monospaced condition suggest that text format may, nevertheless, have an impact on proof-reading, albeit at a different level from the one we considered initially. Text may be checked more thoroughly if its format suggests provisionality. The idea that different kinds of typefaces have different 'rhetorical significance' for users would not surprise type designers or typographers; and psychologists have investigated people's judgments of the connotative and semantic qualities of typefaces (Bartram, 1982; Walker, Smith, Livingston, 1986). But a functional impact of

different typefaces is difficult to isolate, and typeface choice has not been investigated at a level beyond legibility studies.

In the case of text preparation, the suggestion here, that the connotation of provisionality carried by typewriter faces affects proof-reading strategies, complements observations that inexperienced designers may not experiment as fully when they are drafting on screen as when they are drafting on paper (Black, 1990b). In that case the screen representations tend to give feedback with a very finished appearance compared to the provisional appearance of pencil sketches, and so may divert the inexperienced user from full testing and experimentation.

Finally we note authors' anecdotal reports that they see errors in text, once it has been typeset in a typeface, that they missed several times when checking typescripts. Such reports suggest that although a typewriter face may indicate provisionality, and the need for careful checking, author familiarity with the format of a typescript may also mean that errors are missed. Seeing text in more than one format may increase the likelihood of detecting errors. So desktop publishers may be wise to mimic the conventional progression from typewritten drafts to typeset documents, even though DTP provides typefaces from the earliest stages of document preparation. A typewriter face will cue the provisional status of early drafts, and so encourage stringent checking. A typeface at a later stage (which, in DTP, will not involve re-keying text and the possibility of introducing new errors) will increase the chances of detecting errors that, due to over-familiarity, may have previously been missed.

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Computers as Theater

Brenda Laurel
New York: Addison-Wesley,
Publishers, 1992
211 pages, cloth,
8 full color pages, $19.50
ISBN 0-201-51048-0

How many times have you seen it taped onto a wall near a personal computer or terminal? A xerox copy of Jeff MacNeeley's character "Shoe," sledge hammer in full swing, slicing through a balky personal computer over the droll caption "Press any key to continue." Its humor pivots on a nagging truth: after all of our efforts to create computing systems which users like, they're just not there yet.

In *Computer as Theater*, Brenda Laurel offers a model of dramatic theater "to improve the quality of human-computer experiences through new approaches to their design," which is "meant to give readers a new place to stand when considering the design of human computer activity."

The book concerns the "user-computer interface. It is a term used often, but as yet there's no consensus concerning what it means. In a previous *Visible Language*, (23:3 3/4, 266) Gui Bonsiepe wrote "...as the handle of the hammer couples structurally the human body to the tool, the interface works as the 'handle' for the program." That "handle" consists of physical hardware (controls, displays) and software (program control structures and images captured from video and optical sources or generated by software). Laurel focuses on software, using, as her proving ground, the games and informational programs she worked on at Atari and Oz. I'd like her to go further, though. How would she deal with the bane of large organizations these days: menu-driven phone answering systems? How would she deal with the fact that software is always "canned?" In true human conversations, both parties listen to and respond to each other. But computer software presents only choices pre-determined *by program designers* and doesn't listen to user needs at all. How can it approach genuine drama if one party — software — is deaf?

This book easily belongs to software program designers and programmers, who influence the form and style of mass-produced software. It also appeals to intellligent users: the guerrilla brigade of multi-media producers using CD ROM and hypermedia. Animate programs have the most potential to show the benefits of her dramatic concepts.

What are the book's core points? Two chapters on "Dramatic Foundations" present elements of qualitative structure and ways to orchestrate action based on Aristotle's *Poetics.* The preface notes "by examining the world of human-computer activity with the same rigor and logic as

Aristotle applied to the literary arts, we can arrive at a set of principles that may provide greater acuity, robustness and elegance than the piecemeal science that often guides the design of human-computer activity." It's a tall order. She reviews *Poetics*' key features and, on page 50, draws a parallel between drama and human-computer activity using Aristotle's six qualitative elements of structure. Do they really translate one-to-one? I don't think so. For example, drama's purgative effect comes from *humans* observing *humans*. It is a leap to ascribe human traits to agents embodied in software code. It's a further leap to expect humans to imbue them with actual human traits.

A chapter follows on "Dramatic Techniques for Orchestrating Human Response." Her writing seems to assume that existing software is a good match with user needs and goals, and that systems are well-designed. We know what technology offers us — its process is clear, but its utility isn't. As an artist, Laurel can bring meaning to the use of computers. Why *do* the things she invites us to? What results do people get if they do, or do not? How is our life better? More comfortable? Am I more satisfied as a result? Wiser?

The fifth chapter presents twelve "Design Principles for User-Computer Activity," these are tips on how to implement her theories. Few of them reflect the previous text on dramatic models. Each is abstract enough to allow for broad interpretation. For example, the first states: "Think of the computer, not as a tool, but as a medium." Fair enough. The reader then needs to know the depth and scope of that idea. Instead, the text which follows fails to mention how the reader is to use that guideline, or what will happen if one does or does not.

The final chapter, "New Directions in Human Computer Activity," shows how her ideas work. It wasn't until she discussed The Guides project that I began to enjoy the book. A good story in a few pages told what chapters of theory hadn't.

How well grounded are her main points? Laurel's experience provides her with familiarity and insight into programs and their development, but it also seems to limit her analysis. She reviews individual software programs, yet misses some "big picture" issues. For example, programs, operating systems and equipment are very often incompatible. It's a major problem between users and computers and it's one which deserves her attention.

Where does this book fit? It isn't an omnibus, such as Ray Kurzweil's *The Age of Intelligent Machines* (MIT Press, Cambridge Massachusetts, 1990). It's not a "how-to" book, like the hundreds of programming guides which line bookstore shelves. Instead, it fits somewhere in-between. It's a monograph on applications design. Instead of a scholarly hard-bound text, a more popular medium would be better suited to her avant garde audience and intent. It's an irreverent skateboarder dressed in an ill-fitting tuxedo. Ted Nelson's *Computer Lib* was a better combination of message, medium and audience. Another format point: we really need to see how her ideas play.

Text is a poor medium to convey the complexity of the ideas she presents. We need a dramatic medium, such as a disk or videotape with commentary to show us the meaning of her ideas in action.

Rather than smoothing the presentation of thoughts, her editorial style gets in the way, skipping from scholarly to technical to chatty: coined words are used but not explained and personal family anecdotes are lumped in with research report citations. Is this a scholarly piece? A magazine article? An electronic mail message between pals? To her credit, Laurel is working on challenging material, striving to make sense of a number of evolving trends. It's not easy to both break new ground and also be clear — yet, even as a visionary, she needs to tell us what her ideas mean. What implications do they have for us? Laurel's book spends a lot of type discussing theory. We could learn a lot more if she would just tell us her ideas and show how they work. *Computers as Theater* is full of interesting insights, but the book gets in the way.

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Modern Typography, an essay in critical history

Robin Kinross
London: Hyphen Press, 1992
206 pages, paper, illustrations, $30.00
ISBN 0-907259-05-7

Underpining this book is the premise that typographers need to incorporate critical reflection into their practice. This goes hand in glove with the author's insistence that "design" is a verb rather than a noun. This particular time, which is heavily marked by typographic style and technological manipulation, has no critical viewpoint. The typographic goal is often "Design" as a noun with a capital D. This is the situation for which Kinross provides the antidote. The circular logic of the modern — is it new? Yes. Good. Oops, now its old. Look for the new — is it new?. . . encourages novelty and rule breaking as the means to continually invent the new. While this description is a kind of sequence in time, it is not a critical process, new ends are quickly judged against the just previous ones.

It is legitimate to ask: What is critical reflection for the typographic designer? Several critical frameworks can be applied: reflection on order, hierarchy and system, basically a questioning of visual syntax, which is the most common framework; reflection on content and form in relation to a particular audience, this can relate back to visual syntax as well as to legibility, media and aesthetic characteristics; reflection on content and its expressive dimension in order to engage the reader; performance testing to determine the utility of a design; and reflection on the history of typographic philosophy and practice. Kinross develops this last frame by carefully developing the answer to the question: What is modern typography? From its beginnings with Moxon's *Mechanik Exercises* (1683) in which the craft of typography separated from the craft of printing until almost the present day, the author weaves together a broader context for looking at history marked by a longer view of modernism as an idea remarkable for more than its appearance alone. Many typographic histories use the same tried and true benchmarks with the same tired analyses and comparisons which over the years have developed into a "right" history rather than into a dialogue or scrutiny yielding new insights. These typical histories often stay rigorously close to type design itself as a craft or perhaps introduce technological change as it alters the craft, but these are not histories that seek to locate typographic development in a larger cultural framework.

This is not the case in *Modern Typography,* where the author is concerned with rooting type design and typographic application in its cultural context. Just as different typographic sensibilities marked various locations such as Germany, Italy or France in the first century of printing, Kinross explores the differences between Germany,

the low countries, Switzerland, Great Britain and the United States in this century. In some cases this is a long overdue revisionist history, such as the debunking of the Bauhaus typography myth, or the observation that Ulm conceived of, but never really put into practice, a critical approach to typography. There are ideas to ponder here.

In his broad overview of modern typography, the author does not fail to flag for the reader the primary debate which still continues between the instrumental, serving nature of typography (the traditionalists) and typography as an expressive, constructive medium (beginning with Lissitzsky's new typography and ongoing today in avant-garde typographic application and type design). Wisely, the author does not take a stand.

Despite the broad sweep of the material within this book some important historic twentieth century language phenomena are overlooked. These various language reform movements beginning with Herbert Bayer and lowercase only typography through the Shaw competitions and such mid-century innovations as the Initial Teaching Alphabet deserve our attention. It is a mistake, in my judgment, to divorce typography from visible language in its completeness. Yet another omission is the interesting history of the search for machine readable letterforms such as those by Wim Crouwel. The need for language reform continues while machine readability of letterforms has become a non-issue. Both of these episodes were the result of rationality and modernism as applied to language and its typographic form or to letterform and its compatibility to then current technology. These two examples demonstrate another critical framework that seeks to examine the verb "design" in relation to some need, i.e., a less confusing orthography. In times of technological ferment, selection of the "right" problem for investigation may not be obvious. Machine readable type is a cautionary example as computing power and memory overtook the limited search space of the original visual problem. Another phenomena that the author does touch upon is that of legibility testing. The author mentions the earliest testing (late 18th century) through the 20th century and observes that the psychologist's legibility testing was without benefit of printer consultation leading to a persistent unreality. Even the simplist typographic application contains many variables — size, line-space, line length, typeface to mention only the most obvious of them — bringing these variables into a productive harmony (legibility) is less a matter of formula and more a matter of empirical judgment by a skilled eye and mind. Even today, psychologists create legibility studies without the benefit of a typographer. They know how to test, how to isolate a variable and how to do statistical analyses. Because the design of the test material often is so far removed from reasonable typographic performance, practitioners look at the statistical

results with suspicion, wondering what value the results of an obviously flawed design has in terms of practical application.

Like others examining the recent past, Kinross marks 1970 as a new phase in the western world, resulting from technical, economic, political and philosophical shifts. The end of expansion, difficult economic times, the oil embargo, and according to some, an event as specific as the Concorde's lack of acceptance in this country, signaled a shrinking technological desire. The optimism and belief in progress that created an easy acceptance for modernism was eroding. The author, however, is not won over by post-modernism's liberating effect on typography in particular. Instead, he finds it reactive rather than constructive, bringing to the fore the avant-garde past of Dada and early new typography. He observes that these, once political and critical typographic ideas, have become domesticated and are used for stylistic ends.

In contrast to the flap and fashion surrounding post-modernism, the author maintains that the modern project is not complete — evidence of its continuation is visible in the rational discussion of metrification of type measurement and interest in typographic nomenclature and classification. These are more than theoretical ideas or issues of convenience, they are essential to production and global trade. In conclusion, the author says: "The attempt of this essay has been to point to the effort of reason that has extended over centuries and which, in typography, has shown itself in a concern for fundamental issues: the means by which the processes of production can be controlled; the ways in which the needs and desires of readers and users can be incorporated into the shaping of products; the description and ordering of the activity and its materials. . . There is some connection between this critical rationality and an approach to the production of artefacts and their eventual form." (144)

Where does this leave us in the search for critical typographic practice? Kinross is beginning a critical discussion with this book — he gives us a new vision of the modern. He is putting cultural history and typography together as a demonstration project. We have outgrown a purely craft or purely aesthetic orientation to typography — we need somethingelse. Designers' fascination with typography, and in a larger sense with visible language, is that the system is clear, it has rules that are marked sometimes particularly in the breaking. In contrast, the realm of the image seems disordered and vague. Reading between the lines in *Modern Typography*, I get the idea that this is the first of several books, that the author is, in the end, stalking something more inclusive than typography, perhaps design as a verb.

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