

The Journal of Typographic Research
Volume IV, Number 4, Autumn 1970

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linguistics	archeology	highway safety	electronics
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All manuscripts and inquiries about research articles and other contributions to the Journal should be addressed to the Editor. An Author's Guide for the organization, preparation, and submission of manuscripts is also available and includes special instructions for designers in preparing research reports. Authors are strongly advised to follow the general editorial style—headings, references, tables, captions—as shown in this and past copies of the Journal.

All copy must be double-spaced, including all references and long quotations in the text. All manuscripts should be submitted in *triplicate*, one of which should be an original typed copy. Authors are cautioned to retain a copy of their manuscript to guard against loss in the mail.

All illustrations should be prepared for publication by the author; duplicate copies may be photocopied or pencil-drawn.

Abstracts. Manuscripts should be accompanied by an abstract of 100–120 words, typed on a separate sheet of paper. An abstract of a *research paper* should contain statements of (a) the problem, (b) the method, (c) the results, and (d) conclusions. Results are most important, and every abstract should contain at least the trend of results. An abstract of a *discussion article* should state the topics covered and the central thesis of the article. Only complete sentences should be used in abstracts.

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News of Current Letterform Research

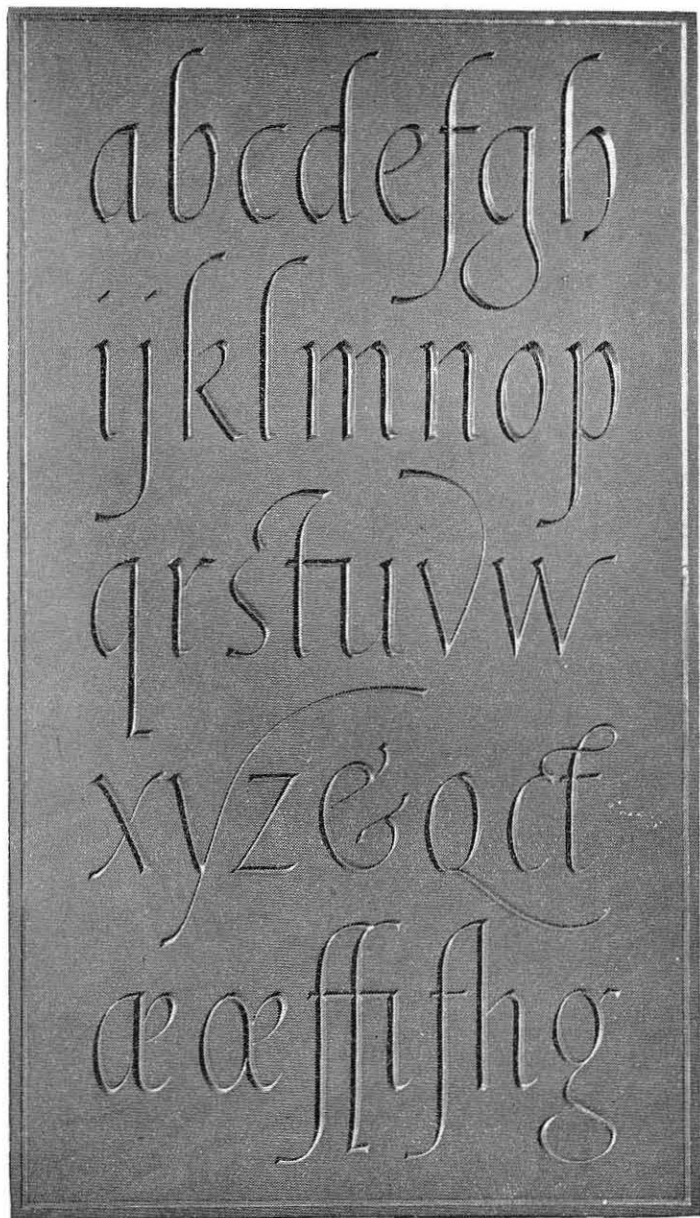
Developments in a variety of disciplines are revealing implications for letterform investigation undreamed of only a generation ago, but the Journal must be aware of specific research projects in order to report on them. Without a supporting association, the Journal must rely on reports of letterform research activity from *interested individuals*.

The Journal, therefore, encourages communication from research people, administrators, and students on individual and departmental research projects, theses, research grants, etc. Please send the Journal Editor a copy of any research report or an outline of the study—with the name and address of the people involved.

Joining the Journal Staff

Letterform research being an academic orphan, the Journal has no reservoir of talent to call upon for help in handling the myriad editorial and organizational jobs that need doing. Journal activities that involve communication with an international body of individuals and research groups can be particularly rewarding.

If you would like to join the Journal's staff, please write the Editor—mentioning, if possible, any particular area of activity you are interested in.



Slate Inscription. Derived from a 16th-century writing master, letters painted red, 21 × 12 inches.

Typographic Education: Headings in Text

Peter Burnhill

A class in typography was presented with the problem of designing a system for the allocation of intervals of space on the vertical axis of the page which would determine the grouping of a given set of textual elements. A binary progression of space units was evolved. The resulting system for paragraphs interspersed with headings of first, second, and third order rank is discussed and illustrated.

Problems in Teaching Typographical Design

Course work in typographical design is conditioned by two factors which influence professional practice in this area of design. The first is that to date there has been no critical evaluation of the conventions used in the written/typographical mode of language; instead, the books tell of mock battles over essentially stylistic matters. The second factor is the absence of a recognized language for bridging the gap between a choice of conventions and the manufacturing system selected for putting the material together; an aspect of this is the absence of rational systems of measurement and of terminology.¹ The total picture is one of no theoretical basis for the study and practice of this aspect of communication. Given this situation, the study of typography, in the context of a design course, can have no fixed syllabus but must, of necessity, be the subject of a design problem of a continuing nature.

Introducing Students to Design through Typography

The need to develop a theoretical foundation for the study and practice of typographical design determines the type of problem introduced in the early stages of course work. This does not mean the divorce of work from involvement with specific tasks or from the need to come to grips with the nuts and muttons of the subject. On the contrary, only through a close examination of particulars is there an

opportunity to develop concepts which may have a more general significance and which may result in the addition of pieces to the jigsaw puzzle. The following account of a project presented to a class in visual communication design at Stafford College of Art and Design (England) may serve to illustrate.

From a teaching point of view, the aim of the project was to introduce the group to the need to establish criteria for making choices in typography and to the design of rules for assembling material by industrial processes. The task was also concerned with the continuation of work on a problem which had been begun by a previous group of new students. The project was also linked with parallel studies being followed by the group at other times during the week: this work included finding out about the typographical mensuration system through the measurement of the dimensions of type bodies with micrometers and the charting of data; the design of a range of alphanumeric signs and associated symbols for use with an on-line digital plotter; the study of aspects of mathematics which have been found to be necessary to the education of designers; and an introduction to the theory and practice of computer programming.

The work which had been begun by the previous year's group of new students and which was to be taken up and developed by the new group, had been concerned with page editing and the analysis of problems which can occur at the foot of a page or column of text when information is carried over to the head of the next page or column. A set of rules and an algorithm had been constructed as a basis for automatic decision making at these points. The rules were based on the concept that space between textual elements is functional and is not to be changed to satisfy the arbitrary convention which requires columns of text to conform to a fixed depth. In the case examined, the text had a simple structure which consisted of paragraphs interspersed with headings of one value; in this case, problems of continuity could be resolved by the use of a floating base line with an overrun tolerance of one line. The question arose as to whether the same or a similar principle could be applied to material with a more complex structure. Before this could be investigated, it was necessary to design a system for the allocation of intervals of space on the vertical axis of the page which would determine the grouping of a given set of textual elements. This was the problem to which the group of new students was asked to find an answer.

The problem, which was introduced through discussion and examined collectively, can be stated as follows: Consider a manuscript, the textual elements of which consist of paragraphs of varying length and headings of first, second, and third order rank in text. Given that all possible combinations of the elements are to appear in the work and that all lines are to range from one left-hand vertical axis; what system of spacing on this axis is required to establish a dimensional correspondence to the relations which exist between the textual elements? As the problem was concerned with the need to design a spatial system for any material containing the elements described, a text as such was not given to the group in the first instance. The task was to find a general solution to typographical problems which fall into a particular category.

It was recognized that an interval of space in typography is not merely a device for separating textual elements but also a means for bringing related elements together, and that space is associated through this dual function with both preceding and following elements in a continuous sequence of overlapping pairs. However, from the point of view of analysis and of creating rules for the automatic assembly of the text, an interval can be thought of as being attached to one or the other of a consecutive pair of elements. During discussion opinion had varied as to whether an interval should be attached "before" or "after" a given element. For the purposes of this account, the "after" case is used.

An analysis showed that the labelling of seven elements was sufficient to account for the space to be attached to all elements which could possibly occur in pairs in the context of the text described. The elements were labelled and listed as:

- H1 a primary heading
- H2 a secondary heading
- H3 a tertiary heading
- P1 a paragraph preceding H1
- P2 a paragraph preceding H2
- P3 a paragraph preceding H3
- P4 a paragraph preceding another paragraph

With all possible elements listed, all the groups into which the elements fall sequentially could also be listed. These are:

P1 H1 H2 H3
 P1 H1 H2
 P1 H1
 P2 H2 H3
 P2 H2
 P3 H3
 P4

Much time was spent considering the legality of the subset H1 H3. This was ultimately rejected as linguistically illogical. (It has been suggested that the appearance of this combination in a manuscript might provide a rule for the need to consider rewriting the material.)

The next stage was to allocate dimensional values to the relations between the elements in a way which would ensure logical grouping in space.

After much discussion and the exploration of several numerical progressions, two possibilities were suggested: the sequence 1, 2, 3, 4, 5, etc.; and the binary progression 1, 2, 4, 8, etc. Of the two, the binary progression was recommended on the grounds that the growth rate is a constant one hundred per cent compared with the relative decline in the growth rate of the first sequence. It was thought that the doubling of the intervals represented by the binary development would best serve the reader's need to discern the hierarchical structure of the language at page level. It was also thought that the one-to-one relationship between the pattern of the binary notation and the order and value of the textual elements in a group might be useful in specifying material for automatic assembly.

The following table indicates the number of units of space required by the system to be set *after* each of the textual elements, together with their possible combinations and respective codings.

	<i>Units</i>				<i>Coding</i>			
	8	4	2	1	8	4	2	1
<i>Groups</i>	P1	H1	H2	H3	1	1	1	1
	P1	H1	H2		1	1	1	0
	P1	H1			1	1	0	0
		P2	H2	H3	0	1	1	1
		P2	H2		0	1	1	0
			P3	H3	0	0	1	1
				P4	0	0	0	1

Discussion of the precise value to be assigned to a unit of space on the vertical axis of the page was constrained by the following considerations:

1. That the dimension of a unit must be compatible with the mechanics of the system selected for assembling the text.
2. That the choice of unit should be such that the difference between intervals should be clearly discernible.

An obvious choice for a unit was the dimension represented by the line feed increment of the assembly system, that is, the distance between the base lines of consecutive lines of continuous text. It was argued that a unit of this dimension might be unacceptable in some classes of work in view of the amount of space required by the system, especially when the structure of the text includes three or more levels of order. To overcome this objection, it was suggested that a sub-unit of the line feed increment could be used. It was recognized that a choice would depend on both economic factors and the constraints imposed by the system of composition.

A series of specimen pages was composed and printed to illustrate the use of the spatial system in differing modes, each mode being repeated to show the inclusion of bold and italic face variants in the heading groups. The modes and variants were:

Mode 1.0: unit dimension, 12 points

1.1 : using roman face only

1.2: using roman with bold face for H1

1.3: using roman with bold face for H1 and italic for H3

Mode 2.0: unit dimension, 6 points. Variants as above.

Mode 3.0: unit dimension, 3 points. Variants as above.

The type size used throughout the work was 10-point cast on a 12-point body. Each variant of each mode consisted of four pages arranged to show all six of the possible heading groups.

The use of the attributes bold and italic, and the relationship between these and the spatial system designed to create a visual correspondence to the hierarchical structure of the text, has yet to be analyzed in detail. When this has been done, it may be possible to suggest a set of rules for the correlation of the two. Meanwhile, our inclination is to put bold and italic and similar attributes into a category of necessary redundancy (in some cases). We are reasonably certain that concern for the function of space should take precedence over all other choices and that once decided in relation to a particular context, the intervals should not be subject to modification.

Conclusion

In terms of course development and our approach to teaching, the spatial system proposed by the student group is more than a necessary preliminary to the associated problem of computer-assisted page editing. Concern for the dimensions of the joints which hold typographical language in place poses problems which are different in kind from those which arise from the assumption that the relations between textual elements are a matter of the horizontal and vertical dimensions of the rectangles which may be drawn around the elements.² The proposal to make binary progression the mathematical basis for the functional grouping of linguistic elements will be put to the test in configurations more complex than the material used in this analysis. Textual sequences which operate on both axes of typographical space provide almost unlimited problems for staff/student investigation. The field can be extended to include visual analogues which are not necessarily alphanumeric in content.

Acknowledgement

Acknowledgement must be made to the students who did the work on the problem, especially to Deborah Hildred, Andrew Smithers, and Pat Thorley who kept notes on the progress of a discussion which extended over several weeks and of which this account is merely the bare bones arranged in a line.

1. The only organization known to the writer which is directed to an investigation of these problems as a whole is the Typographers' Computer Working Group of the Society of Industrial Artists and Designers and the Society of Typographic Designers (London); Chairman, Maurice Goldring.
2. For an interesting paper based on the assumption that typographical design is concerned with establishing relationships between the dimensions of the sides of rectangles, see "A method of quantifying order in typographical design" by Gui Bonsiepe; in this Journal, Vol. II, July 1968, and in *Ulm* No. 21, the Journal of the Ulm School of Design.

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ON THE FOLLOWING PAGES

Figures 1, 2, and 3 show three pairs of pages from the 36-page specimen book produced to illustrate the system. All of the examples have been given a one-third reduction.

Measures preserved along either flank. The uplands again are bleak grouse moors. Under the eastern slopes of the Pennines, the county is traversed from north to south by a belt of Magnesian Limestone which produces a rich soil with luxuriant vegetation.

1.3/2

The geography of the Dales

Coal has long been the principal product and the Yorkshire Coal Measures are worked chiefly in the southwestern part of the county.

Physical background

Introduction

From the Mesolithic period, Tardenoisian flints occur along the Pennines, notably near Huddersfield, while finds of stray Maglemose harpoons from Holderness were followed in 1949–51 by the excavation of a classic site, Star Carr, Seamer, near Scarborough, at the seaward end of the Vale of Pickering; a winter camp of hunter-fisher folk earlier than the best Maglemose sites on the continent and dated by radioactive carbon (C14) technique about 7000 B.C. For all periods between the Neolithic and Early Iron Age B – as also for the Anglo-Saxon – evidence lies thickest in the chalk wolds. East of Bridlington have been found concentrations of fine flint implements with long and round barrows, including many of the Beaker folk. Notable Megalithic monuments elsewhere are the 20ft standing stones called the Devil's Arrows at Boroughbridge.

A great ceremonial centre is marked by three large earthen circles at Thornbrough. Cup-and-ringed-marked stones near Ilkley could belong to the Middle Bronze Age, like some of the numerous running earthworks. Arras and Hesselskew farms near Market Weighton are famous for their chariot burials of chieftains of the immediately pre-Roman Iron Age and it is significant that among other deposits of this kind, one was found in 1844 at Stanwick, where in 1951–52 Sir R.E. Mortimer Wheeler identified an 850 acre complex of earthworks as the last stronghold of the Brigantian king, Venutius, who revolted against the Romans in A.D.69.

Coal, the principal product

Associated with the Upper Coal Measures are important nodular Iron Ores. Brick, pottery and fire clay are also found, besides gannister and oil shale. Farther north, some Pennine foothills are closely pocked with the shallow pits of the old-time coal miners, who likewise worked westward at Ingleborough and eastward in the Estuarine Lias of Cleveland. Lead Ore (usually galena in calcite) was widely worked in the western dales from, perhaps, pre-Roman times until the Nevada boom in silver-lead. Many of the limestones

Figure 1. Mode 1.3: unit dimension, 12 points

Wensleydale, Nidderdale, Wharfedale and Ribblesdale, all north of Airedale (the Aire Gap), the only low-level pass through the Yorkshire Pennines and a point where the geological exposures alter. The northern massif is of Carboniferous Limestone and Yoredale Beds, capped by Millstone Grit. South of the Aire, the prominent rock is the Millstone Grit, which has been arched upwards approximately along the county boundary and has the Coal Measures preserved along either flank. The uplands again are bleak grouse moors. Under the eastern slopes of the Pennines, the county is traversed from north to south by a belt of Magnesian Limestone which produces a rich soil with luxuriant vegetation.

1.3/3

Early history

Building materials

From the Mesolithic period, Tardenoisian flints occur along the Pennines, notably near Huddersfield, while finds of stray Maglemose harpoons from Holderness were followed in 1949–51 by the excavation of a classic site, Star Carr, Seamer, near Scarborough, at the seaward end of the Vale of Pickering; a winter camp of hunter-fisher folk earlier than the best Maglemose sites on the continent and dated by radioactive carbon (C14) technique about 7000 B.C. For all periods between the Neolithic and Early Iron Age B – as also for the Anglo-Saxon – evidence lies thickest in the chalk wolds. East of Bridlington have been found concentrations of fine flint implements with long and round barrows, including many of the Beaker folk. Notable Megalithic monuments elsewhere are the 20ft standing stones called the Devil's Arrows at Boroughbridge.

A great ceremonial centre is marked by three large earthen circles at Thornbrough. Cup-and-ringed-marked stones near Ilkley could belong to the Middle Bronze Age, like some of the numerous running earthworks. Arras and Hesselskew farms near Market Weighton are famous for their chariot burials of chieftains of the immediately pre-Roman Iron Age and it is significant that among other deposits of this kind, one was found in 1844 at Stanwick, where in 1951–52 Sir R.E. Mortimer Wheeler identified an 850 acre complex of earthworks as the last stronghold of the Brigantian king, Venutius, who revolted against the Romans in A.D.69.

Settlements

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Figure 2. Mode 2.3: unit dimension, 6 points

Wensleydale, Nidderdale, Wharfedale and Ribblesdale, all north of Airedale (the Aire Gap), the only low-level pass through the Yorkshire Pennines and a point where the geological exposures alter. The northern massif is of Carboniferous Limestone and Yoredale Beds, capped by Millstone Grit. South of the Aire, the prominent rock is the Millstone Grit, which has been arched upwards approximately along the county boundary and has the Coal Measures preserved along either flank. The uplands again are bleak grouse moors. Under the eastern slopes of the Pennines, the county is traversed from north to south by a belt of Magnesian Limestone which produces a rich soil with luxuriant vegetation.

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Introduction

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A great ceremonial centre is marked by three large earthen circles at Thornbrough. Cup-and-ringed-marked stones near Ilkley could belong to the Middle Bronze Age, like some of the numerous running earthworks. Arras and Hesselskew farms near Market Weighton are famous for their chariot burials of chieftains of the immediately pre-Roman Iron Age and it is significant that among other deposits of this kind, one was found in 1844 at Stanwick, where in 1951–52 Sir R.E. Mortimer Wheeler identified an 850 acre complex of earthworks as the last stronghold of the Brigantian king, Venutius, who revolted against the Romans in A.D.69.

Coal, the principal product

Associated with the Upper Coal Measures are important nodular Iron Ores. Brick, pottery and fire clay are also found, besides gannister and oil shale. Farther north, some Pennine foothills are closely pocked with the shallow pits of the old-time coal miners, who likewise worked westward at Ingleborough and eastward in the Estuarine Lias of Cleveland. Lead Ore (usually galena in calcite) was widely worked in the western dales from, perhaps, pre-Roman times until the Nevada boom in silver-lead. Many of the limestones

Figure 3. Mode 3.3: unit dimension, 3 points. In these specimens it will be noticed that the interval between paragraphs is close to that which appears between consecutive lines of continuous text. A fully coordinated system would use the interline space as a basic unit rather than the base line to base line dimension. Unfortunately, the dimension which is arrived at by subtracting the x-height of the character set from the base line to base line dimension is not one which is included in the typographical measurement system as it stands at present. To our knowledge, the relationship between this dimension and its partner, x-height, has never been included

Wensleydale, Nidderdale, Wharfedale and Ribblesdale, all north of Airedale (the Aire Gap), the only low-level pass through the Yorkshire Pennines and a point where the geological exposures alter. The northern massifs of Carboniferous Limestone and Yoredale Beds, capped by Millstone Grit. South of the Aire, the prominent rock is the Millstone Grit, which has been arched upwards approximately along the county boundary and has the Coal Measures preserved along either flank. The uplands again are bleak grouse moors. Under the eastern slopes of the Pennines, the county is traversed from north to south by a belt of Magnesian Limestone which produces a rich soil with luxuriant vegetation. 3.3/3

Early history

Building materials

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Settlements

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as a constraint in the design of typefaces. It is our opinion that new faces designed for systems which are not constrained by the physical nature of three-dimensional types, should include this relationship and express it quantitatively. In designing the character set for output via a digital plotter, the student group included interline space as an integral part of the character field; both x-height and interline space could be expressed as multiples of the unit used to establish the coordinates required to store the character set in digital form in the computer.