

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

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All other publishers—to the Editor at the address listed previously.

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.

Reading in the Medieval Monastery

Both in the Rule of St. Benedict (sixth century) and in other later monastic customs there are directions setting out how books should be read in the monastery. The Constitutions of Archbishop Lanfranc—composed before 1089—provide a good account of the arrangements for the giving out of the books to the brethren on Monday after the first Sunday in Lent: “Before the brethren go in to chapter, the librarian should have all the books save those given out for reading the previous year collected on a carpet in the chapter-house; last year’s books should be carried in by those who have had them and the librarian must warn them that this is to be done, in chapter on the previous day; . . . the librarian shall then read out the list of the books which the brethren had in the previous year. When each hears his name read out he shall return the book which was given him to read, and anyone who has not read in full the book he received shall confess his fault prostrate and ask for pardon. Then the aforesaid librarian shall give to each of the brethren another book to read, and when the books have been distributed in order he shall at the same chapter write a list of the books and those who have received them.” Similar directions are to be found in most monastic ordinals for men and women alike. It is improbable that the reading in monasteries was solely confined to the books solemnly given out in the way just described. This was the minimal requirement and those who had time and inclination could have access to other books. It must always be remembered that reading was not an easy matter in the Middle Ages and was often a slow business, for private reading was mumbled in a low voice.

Excerpted from “The Monastic Library” by Francis Wormald in *The Year 1200: A Background Survey, II* (New York: Metropolitan Museum of Art, 1970), 170.

An Index of the Quality of a Hyphenation Algorithm

Lindsay Molyneux

During the development of hyphenation algorithms some measure of performance is needed. A single parameter index is proposed and it is suggested that it might be used to assess hyphenation algorithms in general.

The need for hyphenation, that is the truncation of a word by a hyphen at the end of a line, arises when text is being set in type with a justified right-hand margin. In English there are no hard and fast rules as to where a hyphen may or may not be used, and the design of a computer algorithm is very much a process of trial and error. An essential part of this process is some method of judging whether a change in the algorithm leads to a better or worse performance. A simple and widely used index is often called “efficiency.”¹ This is calculated by using the algorithm to hyphenate a list of words and then dividing the number of hyphens that agree with some authority (good hyphens) by the number of hyphens listed by the authority. This gives a rough measure of the quality of the algorithm but the difficulty is to know what to do about the hyphens that do not agree (bad hyphens). These can be expressed as an error, but then the trials yield two numbers, which may be difficult to interpret in that an increase in efficiency may be accompanied by a decrease in accuracy. The problem then is to express the quality of the algorithm in one parameter. The core of the solution offered here is founded on the belief that bad hyphens have a more profound effect on the typographical process than have good hyphens. This is because a bad hyphen will probably need correction whereas the lack of a good hyphen may simply lead to the spaces on some lines being greater than normal.

The Formation of the Index

The index is formed by submitting a list of words for which hyphenation points are known from an authority (*Advanced Learner's Dictionary*, for example), and then comparing the results of the algorithm with the authority list. The index is then formed as follows:

1. Each pair of hyphenations (i.e., a word hyphenated by the authority and then by the algorithm) produces a "word index."
2. The index for the algorithm is formed by taking the mean of the word index values over a sizeable sample.
3. (a) A good hyphen is defined as a hyphen from the algorithmic hyphenation that matches a hyphen in the authority hyphenation.
 (b) A bad hyphen is defined as a hyphen from the algorithmic hyphenation that has no match in the authority hyphenation.
 (c) If there are no bad hyphens, then the word index is positive and is formed by dividing the number of good hyphens by the total number of hyphens in the authority hyphenation.
 (d) If there are some bad hyphens, then the word index is negative and is formed by dividing the number of bad hyphens by the total number of hyphens in the algorithm hyphenation.
 (e) If neither the algorithm nor the authority has any hyphenation points, then the word index is NULL and the result is ignored when calculating the mean.

In the example opposite, the authority hyphenation is listed first and the hyphens are represented by dots. The algorithmic hyphenation is listed under authority word and the hyphens are indicated by dashes.

Discussion

A useful guide to the nature of the index can be had by considering the effect of two common strategies used in the design of algorithms. If a "play safe" approach is adopted that lists only those hyphens which have a high probability of being correct, then, although the errors are low, the positive values due to good hyphens are also low and the algorithm has a low index. If, on the other hand, a highly active algorithm is designed, this will only have a high index if it is accurate. It is worth noting that, although any word with a bad hyphen gives a negative contribution to the index, the value is

	Good	Bad	Word Index
DIS.TRICT			
DIS-TRICT	1	0	+1
DIS.CUS.SION			
DI-SCUS-SION	1	1	-0.5
EN.VE.LOPE			
EN-VE-LOPE	2	0	+1
HY.DRAU.LIC			
HY-DRAULIC	1	0	+0.5
MAN.U.FAC.TUR.ER			
MA-NUFAC-TUR-ER	2	1	-0.33
GRO.CER			
GROCER	0	0	0
ABROAD			
AB-ROAD	0	1	-1
PLEASE			
PLEASE			NULL

$$\text{Index for routine} \frac{2.5 - 1.83}{7} = +0.096$$

A perfect algorithm will have an index of +1.0 while a poor routine will have a low or even negative index. Experiments suggest that an average algorithm will have an index of around +0.3 and that anything above +0.6 can be classed as good.

modified by dividing the number of bad hyphens by the total number produced by the algorithm. This is a crude way of weighting the negative results by the probability that the bad hyphen would find its way into the text.

The decision to regard words not hyphenated by either authority or algorithm as null is founded on the following reasoning. The list used for the trials will usually include words for which the authority has no hyphenation positions since, in practice, these words may well be submitted to the algorithm for hyphenation. They should be included in the test since, if the algorithm produces a hyphen, this is certainly a bad mark and must be included in the calculation of the final index. On the other hand, if it does not produce a hyphen, the score should not be taken zero since this, by increasing the number of the word count, would reduce the mean value of the index. The use of the null score has the effect of causing the algorithm to be "at risk" for all words and will penalize it if it makes a mistake.

Conclusion

A single parameter index has been proposed which was primarily devised as a tool for the development of hyphenation algorithms and is proving most useful in this work. It could, however, be used to compare the quality of routines developed in different centers, but for this purpose the principle on which it is founded and the method used in the implementation would have to gain general acceptance. It is hoped that this paper may stimulate discussion along these lines.

If the index is to be used in this way, then there is one safeguard against misleading results that should be observed. If the word list used in the test contains an unduly high proportion of words for which the authority has no hyphenation points, then (if the routine has a low activity) an unduly high index could be recorded since the null words would then be a significant proportion of the total. It is suggested therefore that the figures for any index should include the number of words used in the test and the proportion of words for which the authority had no hyphenation positions. It will be noted that these figures relate to the input to the algorithm and do not lead to an index with more than one parameter.

Dwight D. Brown² in the course of describing how a multiparameter index might be formed has argued that the judgement of the

performance of an algorithm should take into account the likelihood of a word being hyphenated and that the actual position of the hyphen should also be of importance. This approach could be applied to the proposed index by weighting the individual results according to his procedures.

Acknowledgement

The writer is grateful for discussions with members of the Newcastle University Computer Typesetting Research Project, particularly C. J. Duncan, Mrs. A. Petrie, and F. Sorrentino.

1. C. J. Duncan, "Why Computer Typesetting?" *Proceedings International Computer Typesetting Conference, July 1964* (London: Institute of Printing, 1965), pp. 2-19.
2. Dwight D. Brown, "Towards a Standard for Measuring the Accuracy of any Computer-hyphenation Program," *The Journal of Typographic Research*, II (July 1968), 245-258.