

Measuring Readability of Management Information System Journals

PARVIZ PARTOW-NAVID
CALIFORNIA STATE UNIVERSITY, LOS ANGELES

MEHDI BEHESHTIAN ARDEKANI
LOYOLA UNIVERSITY OF CHICAGO

ABSTRACT

Researchers and practitioners in the management information systems research area use MIS publications to acquire information about new developments in the field. Some publications are more difficult to understand than others and may not be effective if the reader is unable to completely comprehend the contents. Therefore, an important concern is the readability of journals in the field. This paper presents results of a survey conducted to measure the readability of MIS journals based on the Gunning Fog Index, the Flesch-Kincaid Formula (Rightwriter), and the views of practitioners and academic researchers. A statistical analysis of the survey results and a comparison of the three techniques are also included.

INTRODUCTION

Technical journals inform practitioners and researchers about current developments in the field. The readability of its articles have a major effect on how well the reader is informed by the articles appearing in the journal. The words selected by the author may have a strong effect on the learning process and the idea communicated. Flesch [4] has shown that readable texts may be read in about half the time of less readable ones — with higher comprehension. However, a study conducted by Armstrong [1] found that those materials that were rated “easy” in readability were evaluated to be less respectable and less professional.

Very little information is available regarding the readability of management science journals, operations research, and operations management textbooks [3,8,9]. The purpose of this paper is to present the results of a survey that analyzed the readability and comprehension of nine specific MIS journals.

Survey Methodology

The research used a group of nine journals from MIS publications. A journal's readability was measured using a three-step procedure. In the first step, a random sample from each of the nine different journals was selected. To minimize bias and to provide an external confirmation of the samples' validity, they were shown to 20 practitioners and academic researchers who were asked to evaluate the samples and to rank them in terms of readability. Additionally, they were asked to suggest enhancements. Table 1 shows the relative ranking of the journals according to this procedure.

In the second step, the Gunning Fog Index (GFI) was

Table 1. Readability of Articles Using Questionnaire Result from 20 Practitioner and Researchers

Name of the Journal	Total Score
Interfaces	95
Journal of Systems Management	87
IEEE Transactions on Computers	79
Management Science	74
Communications of the ACM	68
Sloan Management Review	57
Decision Sciences	49
Data Management	46
MIS Quarterly	40

used to measure readability of the sampled journals. The Flesch-Kincaid Formula (Rightwriter) was applied in the third step to the sample of journals selected. Journals were ranked based on their readability score in the above three measurement tests. Conclusions on their readability were drawn utilizing the ranking results.

Validity

The validity is defined as a criterion of judging whether

an instrument has measured what it is supposed to measure [7]. There are three different categories of validity: content, predictive, and construct. The instrument for the journal readability was examined in terms of all three validity categories. We placed the greatest emphasis on construct validation since it is probably the most important form of validity from a scientific research point of view [7].

Construct Validity

In this study readability is defined as the ease of understanding or comprehension based on the style of writing. We are not measuring the legibility of the print (typography) or the ease of reading due to the pleasantness of writing [8]. Bogert presented the readability formulas and their utilization [2]. The following two measurement tools were used to determine the readability of the journals in the study:

1. Gunning Fog Index — This index measures only the difficult of the writing style. Five steps are used to determine the writing style difficulty [5]:

(a) Select a passage of 100 words or more.

(b) Find the average sentence length by dividing the number of words in the passage by the number of sentences.

(c) Find the number of difficult words per 100. A difficult word is defined as a word with three syllables or more.

(d) Add the average sentence length and the number of difficult words per 100.

(e) Multiply the resulting figure by 0.4 to arrive at the reading grade level at which the passage was written.

For example, if a sample from an article contained 141 words in 11 sentences with 33 difficult words, the index would be calculated as follows:

GFI = Gunning Fog Index

$$GFI = ((141/11) + ((33/141) * 100)) + 0.4 = 14.48$$

2. Flesch-Kincaid Formula (Rightwriter) — This is a computerized writing style analyzer developed for IBM and IBM-compatible computers. Rightwriter provides analysis and summary of sentence structure and writing style. It uses the Flesch-Kincaid formula to calculate a readability index. This index is based on sentence length and number of syllables per word [9]. Rightwriter can analyze texts created by any word processor that generates ASCII files such as WordStar, WordPerfect, etc. In this report, we employed WordStar to create the text files.

Both of the above procedures generate a numeric value generally between 6 and 20 — the more difficult texts having higher scores. The procedures are designed to estimate the grade level of education required to read and comprehend the material. For example, a Gunning Fog Index of 13 suggests a readability level equal to first-year college, a similar level for comprehension of the Wall Street Journal.

Twenty samples were taken at random from each journal for the year 1988. A minimum of 100 words were sampled,

however, we did not use quoted material. The following nine journals were surveyed:

1. Communications of the ACM
2. Data Management
3. Decision Sciences
4. IEEE Transactions on Computers
5. Interfaces
6. Journal of Systems Management
7. Management Information Systems Quarterly
8. Management Science
9. Sloan Management Review

Statistical Analysis

The Spearman test for rank-order correlation was used for statistical analysis [6]. Spearman's rank order-difference correlation was calculated using:

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \quad (1)$$

where:

d_i^2 = the difference between Gunning Fog and Flesch-Kincaid rank for the i th unit

n = number of items in the instrument

r_s = Spearman's rank difference correlation coefficient

i = denotes different items.

The hypothesis can be summarized as follows:

H_0 : Flesch-Kincaid and Gunning Fog rankings are statistically independent.

H_1 : Flesch-Kincaid and Gunning Fog rankings are not independent.

Table 2. Readability of the Articles using Gunning Fog Index

Name of the Journal	Reading Average Level
Interfaces	14.45
IEEE Transactions on Computers	14.51
Management Science	15.51
Communications of the ACM	15.91
Journal of Systems Management	15.92
MIS Quarterly	17.04
Sloan Management Review	17.18
Data Management	17.19
Decision Sciences	17.50

Using (1) and $n = 9$, r_s among Gunning Fog and Flesch-Kincaid ranks is 0.0049. The critical value $r_{s, \alpha/2}^*$ for $\alpha = 0.05$, is equal to 0.70. Since $r_s < r_{s, \alpha/2}^*$ null hypothesis is rejected, Gunning Fox and Flesch-Kincaid rankings are assumed to be dependent.

SURVEY RESULTS AND CONCLUSION

The journals differed noticeably in their readability. Table 2 shows the relative ranking of the journals according

to their Fog index. Table 3 indicates the readability index of the journals using Rightwriter. Table 4 results show that the five easiest-to-read journals are almost the same in the three measurement tests. Specifically, the only difference between Flesch-Kincaid and Gunning Fog indices are the shifts in the second and third positions.

Interfaces was unanimously selected as the most readable journal by all three measures. *Journal of Systems Management* was selected as the second easiest journal to read by practitioners and fifth by the other two techniques. The

Table 3. Readability of the Articles Using Flesch-Kincaid Formula (Rightwriter)

Name of the Journal	Level
Interfaces	13.18
Management Science	13.47
IEEE Transactions on Computers	13.53
Communications of the ACM	13.71
Journal of Systems Management	13.94
Decision Sciences	14.67
Data Management	14.69
MIS Quarterly	14.79
Sloan Management Review	15.59

Table 5. Average Sentence Length of the Articles

Name of the Journal	Sentence Length
Interfaces	17.58
Management Science	20.42
IEEE Transactions on Computers	18.19
Communications of the ACM	20.25
Journal of Systems Management	19.17
Decision Sciences	20.08
Data Management	19.01
MIS Quarterly	20.06
Sloan Management Review	20.01

Figure 4. Readability of the Articles Comparative Ranking of the Journals

Name of the Journal	Flesch-Kincaid	Gunning Fog	Researchers
Interfaces	1	1	1
Management Science	2	3	4
IEEE Transactions on Computers	3	2	3
Communications of the ACM	4	4	5
Journal of Systems Management	5	5	2
Decision Sciences	6	9	7
Data Management	7	8	8
MIS Quarterly	8	6	9
Sloan Management Review	9	7	6

correspondence among them is not quite clear. The association between the hardest-to-read journals is even less decisive. For example, *Decision Sciences Journal* has been ranked number 7 by the Rightwriter, and as the least readable by the Fog index. It is important to notice that *Interfaces* uses shorter sentences compared with the other journals (see Table 5). This might be one reason for its unequivocal selection as the most readable journal.

Since the main goal of publishing articles in journals is to communicate new theory and findings to practicing managers and academicians, the readability of information systems journals should be of prime importance. It is possible to simplify difficult material without any distinct change in the content by following steps such as:

- (a) eliminating non essential words
- (b) replacing easy words for difficult ones
- (c) breaking long sentences into two or more less complex sentences.

We suggest that journals start publishing the readability index of their articles. This will inform readers of the paper's difficulty. By the way, the readability index of this paper is 12 based on the Rightwriter analysis.

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ABOUT THE AUTHORS

Parviz Partow-Navid is a professor of Information Systems in the School of Business and Economics at California State University, Los Angeles. He received his Ph.D. from the University of Texas at Austin in 1981. His research and teaching interests are in the fields of information systems, decision support systems, and expert systems.

Mehdi Beheshtian Ardekani is an associate professor of information systems at Loyola University of Chicago. He obtained his Ph.D. in operations research from the University of Texas at Austin in 1983. His teaching and research interests are in the fields of information systems, data base management systems, decision support systems, and end-user computing.