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ABSTRACT

The learning difficulties described by students in statistics courses continue to engage researchers from several disciplines. One source of difficulty for graduate students in educational statistics courses is the reading difficulty of the textbook. Instructors making decisions about a textbook typically have little information about the reading difficulty of the text. Although reading difficulty is almost always assessed using a reading difficulty formula, such formulas have not been evaluated for use with graduate students majoring in the social sciences. An evaluation study examined the extent to which five reading difficulty formulas often used with populations in kindergarten through grade 12 consistently and validly differentiate among introductory statistics texts used in a school or college of education. The 5 formulas were applied to 10 textbooks commonly used in introductory statistics classes. The agreement among these formulas in rank ordering texts appears to be moderate at best. Preliminary findings suggest that these formulas are of only modest utility in assessing the reading difficulty of statistics texts, and that the development of new formulas is indicated. (Contains 5 figures, 4 tables, and 32 references.) (SLD)

Evaluating the Consistency and Validity Properties of Reading Difficulty Formulas for Statistics Texts Used in Education

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April, 1996

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Abstract

The learning difficulties described by students in statistics courses continues to engage researchers from several disciplines. One source of difficulty for graduate students in educational statistics courses is the reading difficulty of the textbook. Unfortunately, instructors pondering text adoption decisions typically have little information about the reading difficulty of a text. Although reading difficulty is almost always assessed using a reading difficulty formula, these formulas have not been evaluated for use with graduate students majoring in the social sciences. An evaluation study was done to examine the extent to which five reading difficulty formulas often used with K-12 populations consistently and validly differentiate among introductory statistics texts used in a school or college of education. Preliminary findings suggest that these formulas are of only modest utility in assessing the reading difficulty of statistics texts, and that the development of new formulas is indicated.

Introduction

The learning difficulties described by students in introductory statistics courses have not gone unnoticed, and the statistical education literature has identified several factors that are associated with a student's perception of statistics and with their success in these courses. One of the more prominent of these factors is the text used in the course (Cobb, 1987).

Harwell, Herrick, Curtis, Mundfrom, and Gold (1996) documented the need for an objective method for evaluating introductory statistics texts and offered a literature-based evaluation framework that could be used to assist instructors struggling with course adoption decisions and journal reviewers of such texts. Construction of paper-and-pencil instruments by these authors was guided by the finding that college students (and, presumably, graduate students) possess sufficient knowledge, ability, and motivation to overcome deficiencies in the style of a text if the content meets the needs of a course, particularily if the course is outside a student's major (Redei, 1984). This finding is especially relevant for students taking introductory statistics in a school or college of education because most are not majoring in statistics.

A key finding of Harwell, et al. was that the reading difficulty of the text appeared to play an important role in the students motivation and perception of the course. Students who felt their statistics text was difficult to read were frustrated and generally felt the text was of little help, whereas students who felt the reading level of the text was "about right" were less frustrated and generally believed the text was useful. These results were consistent with work by Major (1955) and Schwartz, Sparkman, and Deese (1970) that suggested that readers could provide valuable information about text readability. Harwell, et al. also suggested that comparisons of the reading difficulty of introductory statistics texts would provide important evaluative information.

Ideally, reading difficulty would be assessed using a test constructed for that purpose, but the burden of developing such instruments has led to the use of reading difficulty formulas as a substitute. Unfortunately, available formulas for assessing reading difficulty typically target K-12 populations and pay only modest attention to college students and even less to graduate students. Moreover, these formulas are rarely used for numericallyoriented texts, which suggests that they may not generalizable to introductory statistics texts. The apparent differences encountered by readers of, for example, a history text versus a statistics text with its numerous equations and computations, makes such generalizations suspect. In any event, the extent to which the formulas agree among themselves in rank-ordering the reading difficulty of introductory statistics texts in education (i.e., consistentcy), and the validity with which they differentiate among these texts, is not known.

Statement of the Problem

The research question of interest was: How consistently and validly do several reading difficulty formulas differentiate between the reading difficulty of introductory statistics texts used in education? The results may allow one or more of these formulas to be recommended for use in course adoption decisions and to assist journal reviewers of these texts. On the other hand, if none of the reading difficulty formulas show evidence of consistency (i.e., agreement) and validity, development of new and improved formulas would be indicated.

Review of the Literature

Evaluating reading difficulty has a long history. For example, Farr, Jenkins, and Paterson (1951) evaluated the reading difficulty of employee handbooks for a large North American car manufacturer, Roit (1984) examined the reading difficulty of government documents provided to parents of handicapped children, Plake (1988) studied the reading difficulty of various licensure and certification materials, Prout (1989) examined the reading difficulty of selected child and adolescent self-report measures, Visser (1994) evaluated the reading difficulty of AIDS/HIV education materials, and Giordano (1985), Hill (1984), Quereshi (1991), and Redei (1984) assessed the reading difficulty of educational texts for K-12 and college students.

Assessing reading difficulty has traditionally been done using a reading difficulty formula or RDF, which typically measures, directly or indirectly, sentence length and word difficulty (Meyer, Marsiske, & Willis, 1993). The intent is to use the scores produced by a RDF to distinguish between texts of varying reading difficulty, allowing a more accurate match between texts and students. The practical value of a RDF was described by Klare (1974) as "...

a predictive device in the sense that no actual participation by readers is needed." (p. 64) Klare emphasized that these formulas do not indicate why something is more or less difficult to read.

A RDF typically involves a linear combination of a small number of predictors weighted by estimated regression coefficients obtained from a norming study in which a proxy for reading difficulty, such as a standardized reading comprehension test, serves as the dependent variable. Klare noted that more than 30 RDFs are available, and offered evidence that the use of sentence length and word difficulty are often sufficient to make reasonably good predictions about readability.

Perhaps the most commonly used RDF is that due to Flesch (1948), which has the form:

Reading Ease (RE) = 206.835 - .846 WL -1.015 SL (1)

where WL = number of syllables per 100 words, SL is the average number of words per sentence, and WL and SL are predictor variables in a multiple regression equation (Klare, 1974). The dependent variable used in developing the regression equation was a test of reading comprehension. In evaluating reading difficulty for a text, one simply computes values for SL and WL for an arbitrary number of pages in the text , averages these values, and substitutes the averages into the above equation. Lower (possibly negative) values of Reading Ease indicate easier-to-read material. Other reading difficulty formulas given positive reviews by Klare included the following:

New Reading Ease (NRE) = 1.599(# of one-syllable words per 100 words)- (2)

1.015(average sentence length)-31.517 (Farr, et al., 1951)

Danielson & Bryan (DB) =1.0364(# of characters per space)+ (3)

.0194(# of characters per sentence)-.6059 (Danielson & Bryan, 1963)

FOG1 = (.4)average sentence length +%words with ≥ 3 syllables (Gunning, 1942) (4)

FOG2 = (.4)average sentence length +%words with ≥4 syllables. (5)

In all cases, large positive scores indicate more difficult material.

Klare emphasized that the validity of these formulas must come from evaluation studies, yet few evaluation studies have been done and apparently none for populations of graduate students majoring in the social sciences.

For this and other reasons these formulas have been criticized (Dryer, 1984), yet still appear to be widely used (e.g., Meyer, et al., 1993; Plake, 1988).

Methodology

The purpose of the study was to evaluate the consistency and validity with which various reading difficulty formulas differentiated among introductory statistics texts used in a school or college of education. The target population was graduate students who take an introductory statistics course as part of their training. The study was conducted in two stages.

First, the extent to which the reading difficulty formulas consistently rank-ordered the reading difficulty of the texts was investigated. In experimental design terms, two independent variables were manipulated in this stage: textbooks (N = 10) and number of pages used to extract readability information (J = 3 or 6). Each RDF served as a dependent variable.

The texts which were selected were judged to be the most frequently used in introductory statistics classes by an informal survey of several members of the Educational Statisticians, a Special Interest Group within the American Educational Research Association. Each text was divided into J =3 or 6 sections of approximately equal size and from each section a page was randomly chosen. Although J = 3 is probably the most commonly used value, two values of J were used since there does not appear to be any agreed upon minimum number that should be used in extracting readability information. Using multiple pages per book (in effect, replications) is also consistent with the recommendation of Fitzgerald (1981).

On each of the J randomly selected pages, the numbers of syllables, 1-syllable words, 3-syllable words, and 4-syllable words were counted for the first 100 words in a randomly selected paragraph on that page and recorded by the co-author, a graduate student majoring in research methodology. In addition, the number of characters and number of sentences within each 100-word block were recorded. The coded variables represented terms needed by the various RDFs. The quality of the coding was checked by having the first author select one page at random from each of 4 texts randomly selected from the 10, and code the quantities used to compute the RDFs. Comparing the two sets of codings produced a simple percent agreement value virtually equal to 100%, suggesting that the coded values were accurate.

For each RDF, 3 scores were obtained for each text for the J = 3 condition and 6 scores for the J = 6 condition. An examination of the means, medians, standard deviations, etc. of the 10 (text) x 2 (number of pages) data matrix for each RDF suggested that there was little difference between using 3 versus 6 pages, and subsequent analyses used the J = 6 data.

Results

Consistency of the Reading Difficulty Formulas

The consistency or agreement among the 5 formulas in rank-ordering the reading difficulty of the texts was investigated in three ways. First, the reading difficulty scores were plotted against texts (see Figures 1-5). The plots for three sets of scores (DB, FOG1, FOG2) appear to be similar and somewhat different from the plots for RE and NRE. The DB, FOG1, and FOG2 plots also suggest that there are three groupings of texts: those more difficult to read (texts 2, 4-7), those easier to read (texts 3,9), with the remaining texts being of average reading difficulty. Because the RE and NRE results were quite similar only NRE results are reported from here on.

Summary statistics for the reading difficulty scores by text are reported in Table 1 as z-scores. The reading difficulty variables were treated as linear transformations of one another because they are, by definition, attempting to measure the same thing (i.e., reading difficulty), use many of the same terms in their calculation (e.g., average sentence length), and showed between-formula correlations exceeding .70. In addition, a principal-axis factoring with oblique rotation suggested that a single factor seemed to underlie the RDFs. This factor accounted for 85% of the variance with factor loadings that exceeded .9 for every RDF.

Each value in Table 1 is the average of 6 ratings (one from each of 6 pages) for an RDF. Averages close to zero indicate that the texts' reading difficulty rating by a RDF is near the mean of all such ratings assigned to the texts by that RDF; a large negative value means that text was judged to be easier to read than other texts by the RDF, and a large positive value that that text was judged more difficult to read. The value in parentheses is the standard deviation of the 6 ratings.

The results in Table 1 suggest that the agreement among the DB, FOG1, and FOG2 formulas is quite good for several of the texts and somewhat poor for others. For example, the Toothaker text was rated as quite easy to read by DB, FOG1, and FOG2; similarly, the Hays text was rated fairly difficult to read by these same RDFs. On the other hand, DB and FOG1 rated the Glass and Hopkins and Howell texts as being of average reading difficulty whereas FOG2 rated them as more difficult than average. One consistent pattern in Table 1 is that NRE almost always disagreed with the other RDFs. For example, Hays was rated as relatively easy to read and the Hinkle, Wiersma, and Jurs texts as more difficult to read by NRE, whereas the other RDFs rated these two texts in the opposite direction. On the whole, the DB, FOG1, and FOG2 RDFs strongly agreed on the reading level of only 4 of the 10 texts (Hays; Hinkle Wiersma, & Jurs; Popham & Sirotnik; Toothaker).

Table 1 is instructive but additional analysis of the ratings was done to further summarize the findings. Because gauging the magnitude of differences among average z-scores in Table 1 can be difficult (For example, do average z-scores of .10, .33, .37, and .04 for a text suggest agreement?), the values in Table 1 were ranked from 1 to 10 within each column, where a rank of 1 indicated a text whose reading level was more difficult than average. Agreement was assessed by examining the rankings within texts, across pairs of RDFs. Pairs of rankings were said to agree exactly if the ranks assigned to the texts by two RDFs were identical. With a possible range of 0-100%, the exact agreement computed for pairs of RDFs reported in Table 2 was 28.3% (17/60, where 60 = 6 pairs x 10 texts). The definition of agreement was then relaxed to allow pairs of rankings within a ±1 range to be considered to be in agreement. Thus, if the rankings of a text assigned by two RDFs were 3 and 4, they would be considered to agree. With this definition, the overall agreement rate among the RDFs was 45% (27/60); if the definition of agreement is further relaxed to ± 2, the overall agreement rate was 60%. Percent agreements for pairs of RDFs for the ±1 and ±2 agreement criteria are reported in Table 2. The strongest agreement for all three definitions of agreement was between FOG1 and FOG2, and in general the poorest agreement involved NRE.

Next, a oneway analysis of variance was performed for each RDF, treating Texts as a random effect. The results of these analyses are reported in Table 3. Statistically, NRE did not differentiate among the 10 texts whereas the remaining RDFs did with similar efficiency. The square root of the estimated components suggests that the spread of the reading difficulties in the population of texts is similar for DB, FOG1, and FOG2, and noticeably different for NRE.

The results reported in Tables 1-3 suggest that the strongest agreement was between FOG1 and FOG2 followed by FOG1 and DB, and FOG2 and DB. As suggested by the results in Tables 1 and 2, the poorest agreement was between NRE and the remaining formulas. Similarly, the only statistically non-significant result for the ANOVAs was for NRE. Thus, there is evidence that the DB, FOG1, and FOG2 indices produce similar rank-orderings of reading difficulty. The NRE formula, on the other hand, showed noticeably less agreement with the other formulas. Still, the overall consistentcy among DB, FOG1, and FOG2 for the more relaxed definition of agreement was, at best, moderate.

Preliminary Validity Findings

The results in Tables 1-3 bear on the consistency with which the RDFs rank-ordered the reading difficulty of the texts, but do not provide information about the correctness or validity of the rankings. Preliminary validity evidence was generated by comparing the rankings of text reading difficulty generated by the RDFs with rankings produced by content experts. The process used to assess validity had two components, analysis of data from the Harwell, et al. study and collection of data from additional content experts in statistical education.

The Harwell, et al. study evaluated several statistical texts, 4 of which were also examined in our study. Harwell, et al. recruited a total of 6 instructors (content experts) with 3 or more years experience teaching statistics who were asked to rate the reading difficulty of texts using items from an instrument piloted by Harwell, et al. Approximately 253 students spanning four universities in the United States were also recruited in the Harwell, et al. study and asked to respond to virtually the same questionnaire items given to instructors. These items included "How would you describe the reading level of the textbook?" (1= very easy, 5=very difficult), "The text is easy to understand and follow" (1=strongly disagree, 5=strongly agree), and a series of check-off questions, such as "The writing style is ___ " (terse, wordy, simple, balanced, etc.).

Responses to the above items were used to provide validity evidence. The rationale was that a text which was ranked as difficult to read by the content experts <u>and</u> a RDF provides validity evidence because the RDF rankings agree with those of identified content experts. For example, suppose a RDF ranked one of the texts used in Harwell, et al. (say, text A) as the most difficult to read and another text (say, text B) as the easiest to read. If the content expert data indicated that, among the texts, A was the most difficult to read and B was the easiest, that would serve as validity evidence for that RDF. An analysis of student data that also suggested that A was the most difficult to read and B the easiest would provide some validity evidence, although the content expert data would carry more weight.

Analysis of the Harwell, et al. data for 4 of the 10 texts examined in this paper is given in Table 4. Although the data are preliminary, these results show little agreement with the rankings in Table 2. For example, Table 2 suggests that the Popham and Sirotnik text is among the most difficult to read whereas two content experts thought it was among the easiest to read. Similarly, the Table 2 rankings suggest the Hays and Glass and Hopkins texts were of approximately average reading difficulty for the sample of 10 texts whereas the content experts thought they were relatively difficult to read. Additional validity data are currently being collected from newly recruited content experts for all 10 texts examined in this study. Unfortunately, the latter data are not yet complete and our validity findings are necessarily preliminary.

Conclusions and Implications

Our results so far raise concerns about applying traditional reading difficulty formulas to graduate level statistics texts. The agreement among these formulas in rank-ordering texts appears to be, at best, moderate, and preliminary validity findings are not encouraging. The information from the current study will generate specific recommendations for using one or more of the reading difficulty formulas (or possibly none). Should the preliminary findings hold up, then new reading difficulty formulas targeting statistics texts would need to be developed.

References

Cobb, G.W. (1987). Introductory textbooks: A framework for evaluation. **Journal of the American Statistical Association, 82,** 321-339.

Danielson, W.A., & Bryan, S.D. (1963). Computer automation of two RDFs. **Journalism Quarterly, 39,** 201-206.

Dreyer, L.G. (1984). Reading and responsibility. **Journal of Reading, 27,** 334-339.

Farr, J.N., Jenkins, J.J., & Paterson, D.G. (1951). Simplification of Flesch reading ease formula. **Journal of Applied Psychology, 35,** 333-337.

Fitzgerald, G.G. (1981). How many samples give a good readability estimate-The Fry graph. **Journal of Reading, 24,** 404-410.

*Freedman, D., Pisani, R., Purves, R., & Adhikari, A. (1992). **Statistics** (2nd. ed.). New York: W.W. Norton.

Giordano, G. (1985). Determining the readability of textbooks. **Academic Therapy, 20,** 533-538.

*Glass G.V., & Hopkins, B.K. (1984). Statistical methods in education and psychology (2nd. ed.). New York: Prentice-Hall.

Gunning, R. (1952). **The technique of clear writing**. McGraw-Hill: New York.

Harwell, M.R., Herrick, M.L., Curtis, D., Mundfrom, D., & Gold, K. (1996). Evaluating statistics texts used in education. **Journal of Educational and Behavioral Statistics, 21,** 19-38.

*Hays, W.L. (1981). **Statistics** (3rd. ed.). New York: Holt, Rinehart, & Winston.

Hill, W.R. (1984). The readability of content textbooks used in middle and junior high schools. **Reading Psychology, 5,** 105-117.

*Hinkle, D.E., Wiersma, W., & Jurs, S.G. (1982). **Basic behavioral statistics**. Boston: Houghton-Mifflin.

*Howell, D.C. (1992). **Statistical methods for psychology** (3rd. ed.). Boston: PWS-Kent Publishing.

Jacobson, M.D. (1965). Reading difficulty of physics and chemistry textbooks. **Educational and Psychological Measurement, 25,** 449-457.

Klare, G.R. (1974). Assessing readability. **Reading Research Quarterly, 10,** 62-102.

Landrigan, D.(1974). Readability and human interest scores of thirty-four textbooks: A reply. **American Psychologist, 29,** 571-572.

Major, A.G.(1955). **Readability of college general biology textbooks and the probable effects of readability elements on comprehension.** Unpublished doctoral dissertation, Syracuse University.

*Marascuilo, L.A., & Serlin, R.C. (1988). **Statistical methods for the social and behavioral sciences.** New York: Freeman.

Meyer, J.F.B., Marsise, M., & Willis, S.L. (1993). Text processing variables predict the readability of everyday documents read by older adults. **Reading Research Quarterly, 28,** 235-249.

*Mosteller, F., Fienberg, S.E., & Rourke, R.E.K. (1983). **Beginning statistics: With data analysis.** Reading, MA: Addison-Wesley.

Plake, B. (1988). Application of readability indices to multiple-choice items on certification/licensure exams. **Educational and Psychological Measurement, 48,** 543-546.

*Popham, J., & Sirotnik, K. (1984). **Understanding statistics in education** (2nd. ed.). New York: Harper Row.

Prout, H.T. (1988). Readability of child and adolescent self-report measures. **Journal of Consulting and Clinical Psychology, 56,** 152-156.

Quereshi, M.Y. (1991). Logical versus empirical readability and human interest scores. **Psychological Reports, 68,** 1035-1040.

Redei, G. P. (1984). What to look for in selecting college textbooks. **Journal of College Science Teaching, 14,** 2,103-105.

Roit, M.L. (1984). The readability of P.L. 94-142 parent materials: Are parents truly informed? **Exceptional Children, 50,** 496-505.

Schumm, J.S., Vaughn, S., & Saumell, L. (1992). **Journal of Reading Behavior, 24,** 481-503.

Schwartz, D., Sparkman, J.P., & Deese, J. (1970). The process of understanding and judgements of comprehensibility. **Journal of Verbal Behavior, 9**, 87-93.

*Shavelson, R.J. (1988). **Statistical reasoning for the behavioral sciences** (2nd. ed.). New York: Allyn & Bacon.

*Toothaker, L.E. (1986). **Introductory statistics for the behavioral sciences**. New York: McGraw-Hill.

Visser, A.P. (1994). Current perspectives on AIDS/HIV education and counseling. **Patient Education and Counseling**, 24, 191-198.

* Text used in the current study.

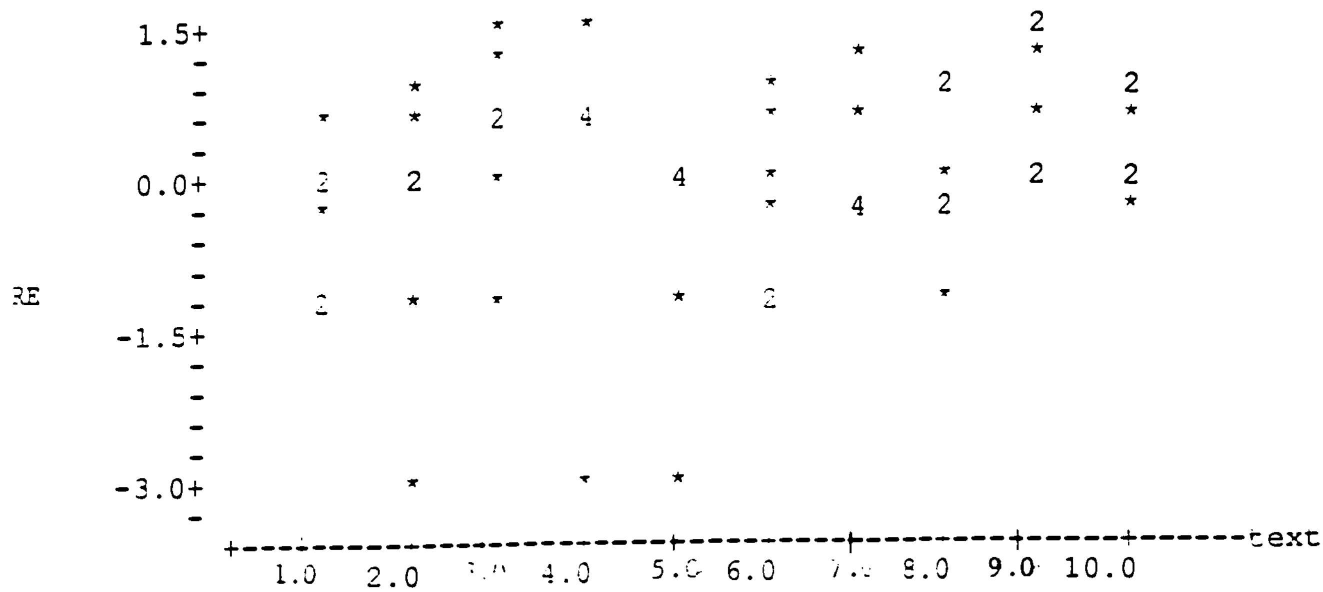

Figure 1
Reading Ease Scores by Text

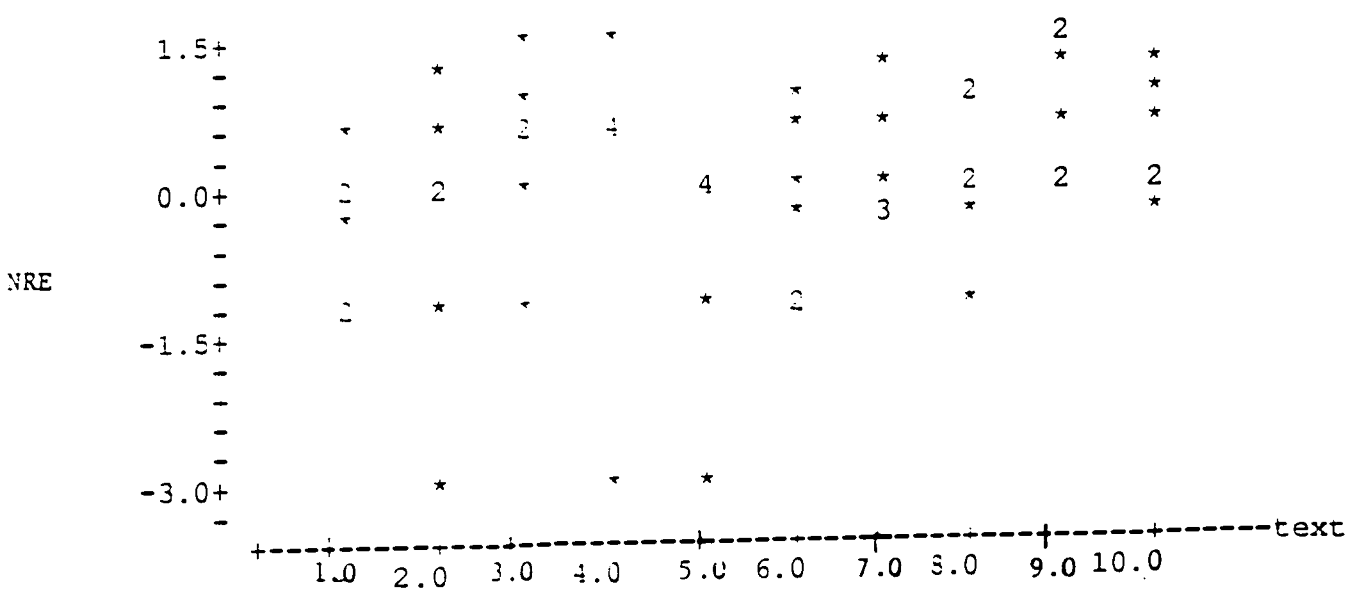

Figure 2
Reading Ease Scores by Text

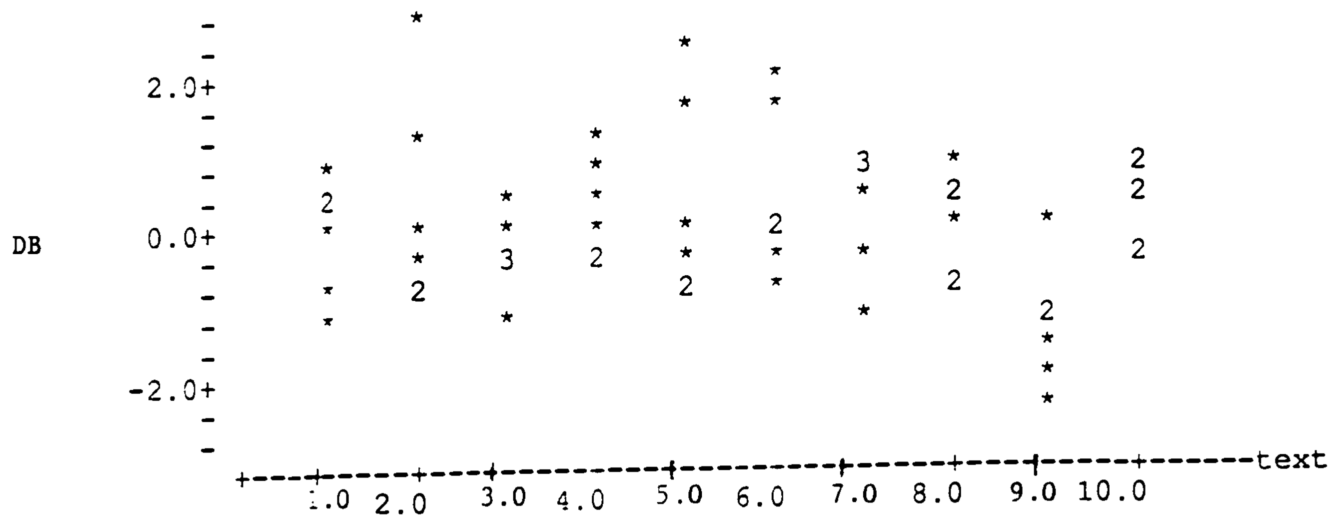

Figure 3

Danielson-Bryan Scores by Text

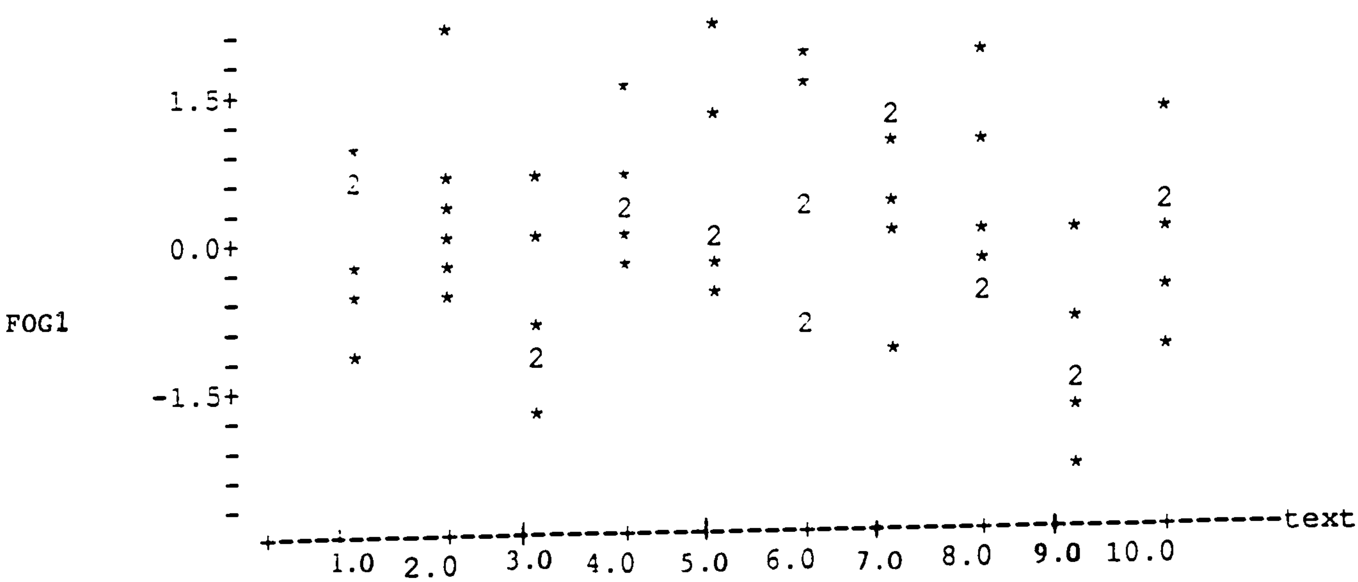

Figure 4

FOG1 Scores by Text

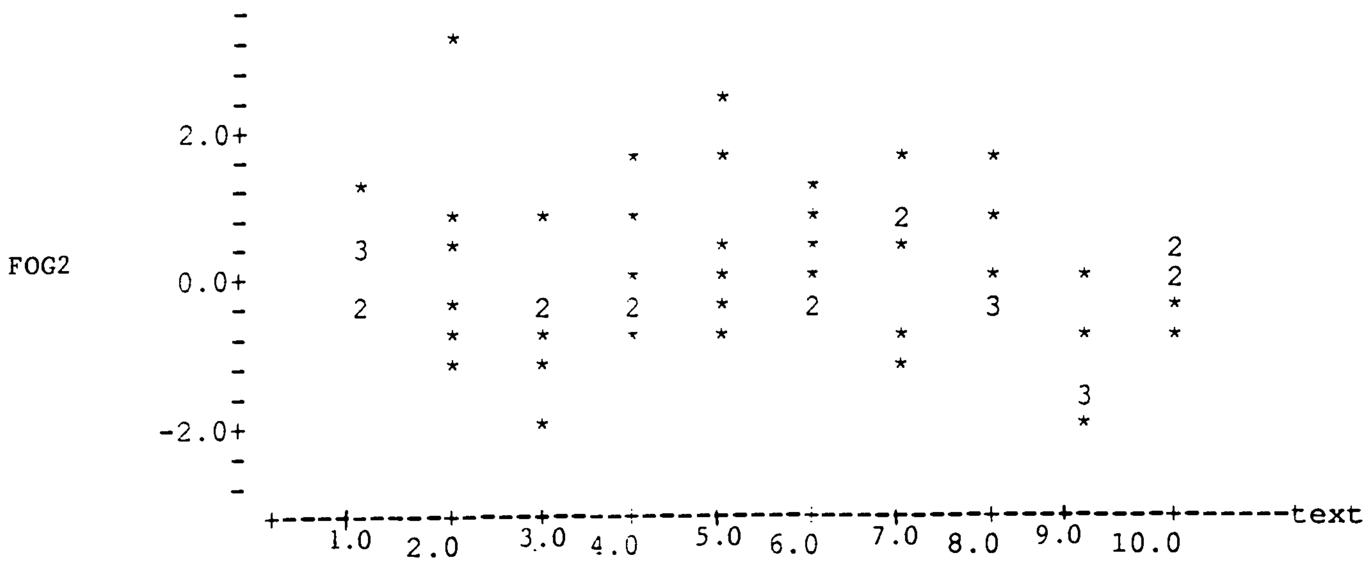

Figure 5

FOG2 Scores by Text

Table 1
Descriptive Statistics for Reading Difficulty Formula by Text

Text	NRE	DB	FOG1	FOG2
Glass & Hopkins	-.36 (.69)	-.02 (.74)	.05 (.78)	.34 (.53)
Hays	-.47 (1.42)	.35 (1.45)	.39 (.88)	.38 (1.47)
Hinkle, Wiersma, & Jurs	.38 (.92)	-.36 (.57)	-.7 (.91)	-.64 (.9)
Howell	.10 (1.5)	.33 (.56)	.37 (.67)	.04 (.94)
Popham & Sirotnik	-.78 (1)	.33 (1.22)	.41 (1.01)	.54 (1.17)
Marascuilo & Serlin	-.19 (.91)	.46 (1.15)	.31 (1.13)	.20 (.7)
Freedman, Pisani, Purves, & Adhikari	.15 (.53)	.2 (.83)	.38 (.95)	.27 (.97)
Mosteller, Fienberg, & Rourke	.07 (.85)	.07 (.69)	.18 (.92)	.19 (.88)
Toothaker	.73 (.72)	-1.46 (.82)	-1.37 (.83)	-1.26 (.78)
Shavelson	.36 (.57)	.16 (.54)	0 (.83)	-.06 (.47)

Note. NRE, DB, FOG1, and FOG2 are the four reading difficulty formulas investigated in the current study. The tabled values represent the ratings of the formulas for the texts expressed as z-scores and the values in parentheses represent the standard deviation of the ratings.

Table 2
Percent Agreement Among Reading Difficulty Formulas

Percent Agreement Among Rankings

	NRE	DB	FOG1	FOG2
NRE		30%(40%)	40 (50)	20 (40)
DB			50 (80)	50 (70)
FOG1				80 (80)

Note. NRE, DB, FOG1, and FOG2 represent the four reading difficulty formulas. The 30% agreement rate for the NRE/DB pairing indicates that when rankings were considered to agree if they were within ± 1, these two reading difficulty formulas agreed on 3 out of 10 texts or 30%; if the definition of agreement is ± 2, the two formulas agreed on 4 out of the 10 texts or an agreement rate of 40%.

Table 3
Oneway Analysis of Variance Results

Readability Formula	F	p	σ
NRE	1.27	.28	
DB	2.35	.027	.93
FOG1	2.54	.017	.94
FOG2	2.11	.046	.95

Note. NRE, DB, Fog1, and Fog2 represent the four reading difficulty formulas. F = computed F test, p = p-value, σ = square root of the estimated variance component.

Table 4
Summary of the Harwell, et al. content expert data for selected items

Item	Text: GH	HWJ	MS	PS
Reading level about right	3/4	2/3	1/1	1/1
Difficult	1/4	1/3	0/1	0/1
Text easy to understand and follow				
Agree	2/4	2/3	1/1	1/1
Writing style understandable				
Agree	1/4	1/3	1/1	0/1

Note. GH = Glass and Hopkins, HWJ = Hinkle, Wiersma, and Jurs, MS = Marascuilo and Serlin, PS = Popham & Sirotnik. In the first row of data in the table, the 3/4 means that 3 out of 4 content experts that the reading level of the Glass and Hopkins text was about right, whereas the remaining content expert thought it's reading level was too difficult.

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