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A Comparison of Three Readability Tests: Fry Readability Graph, FOG Index, Flesch Readability Test

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It was found that the Fry Readability Graph and the Flesch Readability Test gave the most consistent results for the whole set of fiction books checked out. It was also found that the FOG Index usually gave the highest grade level scores.

A COMPARISON OF THREE READABILITY TESTS:

FRY READABILITY GRAPH

FOG INDEX

FLESCH READABILITY TEST

A Research Paper

Presented to the

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Master of Arts

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by

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ABSTRACT

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Introduction

All written materials have a readability level. Some materials are written for elementary students to read, some for high school students to read, and some for adults. As the students move from grade to grade, they should become better readers. Because some students learn faster, have more ability, and/or have more parental support and motivation, they become better readers.

The students using a high school library will have a wide variance in their reading abilities. Therefore, when librarians are selecting materials for their libraries, they must take into consideration the reading abilities of their students. To help select reading materials on the correct levels for the students, librarians could use readability tests.

Readability tests have been in existence for a number of years and have been used for many purposes. A few of the purposes for using readability tests are: (1) to help teachers and administrators select textbooks for the classrooms; (2) to help librarians select materials at appropriate levels for their particular libraries; and (3) to help in the placement of students into sections for reading.

Teachers and adminstrators need guides to help them

select the appropriate textbooks and supplementary materials for the school classrooms. With a basic understanding of readability tests, they can select materials that most of the students can understand and use.

Librarians need to be able to use readability tests. With this knowledge they can help students to find books they can read and understand. Some publishers' catalogs state what age or grade levels their books are for, but if a librarian runs a readability test she/he will sometimes find discrepancies.

Normally, in the elementary grades, students are divided into reading groups. Readability tests can help teachers determine which students should be included in each reading group or section. Readability tests can also help teachers select outside reading for students.

Certain students seem to have reading problems but, with proper use, readability tests can be used to screen these students. Once identified these students can be placed in special classes or sections. High ability students can also be identified with the use of readability tests. Once identified, these students can be placed in higher level sections, advanced classes, or possibly be used to help slower students.

This study will be conducted in Riceville, Iowa; therefore, the reader will need to know a little about the town, the school, and the students. Riceville is a town with a population of about 900 people. It is a typical farm town

with several businesses. The community seems very supportive of the school as most all activies are well attended. In the last few years the community has built a new public library and community room and has celebrated a quasque-centenial (125 years).

The Riceville Community High School has approximately 260 students in grades 9 - 12, and all use the library at one time or another. The high school library is housed in one large well lighted room with a seating capacity of about forty. More tables can be brought in for large meetings. There are approximately 6,500 books that can be checked out for a two week period. These books include: Fiction, non-fiction, biographies, and story collections, hardbacks and paperbacks.

The future plans of most of the Riceville Community High School students can be placed in four categories: (1) continued schooling of some type; (2) find a job in the community or surrounding area; (3) become a farmer; or (4) get married and become a mother and housewife.

Many of the students go on to some type of higher education: (1) two year colleges; (2) four year colleges; (3) technical institutes; or (4) hair styling schools. After they have completed their schooling, most of the students move to other areas to find good jobs.

Some of the Riceville graduates try to find jobs but, because Riceville is a small community, many of the young people must move to larger cities to find work. Several

move to Rochester, Minnesota, each year to work at the Rochester clinic. At the clinic, some of the students train for speciality jobs.

Riceville is a farming community; therefore, many of the students become farmers. They either stay at home with their parents and help on the family farm or hire out to help other people with their farms.

Lastly, some of the students marry. The men usually find jobs at Riceville or away and the women usually stay at home.

Student home life and future plans seem to have an effect on student reading abilities. Students who plan to continue their education know they must be good readers to succeed in higher education institutions. Of course, as in all schools, the Riceville Community High School has some students who are very poor readers. These students are helped in every possible way by the instructors.

Statement of the Problem

Educators need to be aware of the grade level at which instructional materials are written. One then needs some type of test to determine the reading level of the written materials. Readability tests fulfill this need. By following all the directions for each formula one can determine on what grade level materials are written.

This research paper will look at the following questions:

(1) Is there a difference among the three readability tests for each book? That is, when the scores are calculated for each book, are the Fry, Flesch and FOG scores (readability grade levels) the same or different? If different, how large is the difference?

(2) Is there a difference among the three readability tests for the means, median, and mode for the total set of books checked out of the Riceville Community High School Library during the data collection period? Do the differences in the test scores hold steady when one compares each book score with the group score? If there is a difference, how many grade levels do the readability tests differ?

Hypotheses

The three hypotheses tested were:

(1) There will be a difference for all books among the three readability levels for the FOG Index, the Fry Readability Graph and the Flesch Readability Test as applied in this research with the FOG Index giving the highest grade level score and the Flesch Readability Test giving the lowest grade level score.

(2) For all books, the FOG Index will be at least two grade levels above the Fry Readability Graph and the Flesch Readability Test will be three grade levels below the FOG Index. (FOG Index = Fry Readability Graph + 2 grade levels = Flesch Readability Test + 3 grade levels.)

(3) There will be a difference for all books among the

means, medians, and modes of the three readability tests. The differences will be the same as above: FOG Index (means, median, and mode) will be two grade levels above the Fry Readability Graph (means, median, and mode) and will be three grade levels above the Flesch Readability Test (means, median, and mode). (FOG Index (means, median, and mode) = Fry Readability Graph (means, median, and mode) + 2 grade levels = Flesch Readability Test (means, median, and mode) + 3 grade levels.)

Significance of the Problem

This research will help the librarian to have a better understanding of grade levels of books which circulate from the collection. All books are selected strictly by the students. The librarian may make a few suggestions, but students are reading for pleasure, not for reading assignments. The librarian will be working with each book, so she will know exactly which titles and authors circulate. The knowledge gained will also help the librarian to select new library materials that the students will be interested in and capable of using.

Even though the readability scores obtained from running the FOG Index, Fry Readability Graph, and the Flesch Readability Test may not be the same as the scores included in catalogs by publishers, the publishers' scores give librarians a place to start when looking for books to buy. With some practice, librarians can calculate their own read-

ability scores, then compare them to the publishers' scores, and know how their scores differ. This will help them to select books that coincide with their students' reading levels.

Since the students are reading for pleasure, that is, they are reading because they want to and are reading what they want, with no one telling them what to read, it might be possible through the use of readability tests to help them raise their pleasure reading levels.

Lastly, this research may be of value to other teachers in the Riceville Community School system. The study may help instructors in the selection and assigning of reading outside of classroom instruction.

Assumptions

In preparing to do this study, the researcher is assuming the students of the Riceville Community High School will check out fiction books during the sixty (60) school days of the project. One must also assume that enough data can be collected within the time period to make the study representative of what is being read.

The major assumption is that the scores calculated from the readability tests are accurate and that one can compare scores calculated by using different readability tests.

Limitations of the Study

This study will be limited to all fiction books checked out of the Riceville Community High School Library by students in grades nine through twelve. A second limiting factor will be the data collection period. This collection period will be sixty (60) school days, from January 2, 1980, to March 31, 1980. The sixty day time period was selected because it represents one third of the school year and gives students plenty of time to check out books to assure that enough data can be collected to make the study worthwhile.

There are several readability tests that could have been selected for this study. This researcher chose the three which best met the requirements of this study: accessibility, easily understood, not excessively time consuming, and popular. These are the Fry Readability Graph, the FOG Index, and the Flesch Readability Test.

Definition of Terms

Fiction - In this study, materials in the Riceville Community High School Library classified in the fiction category. That is, literature that includes imaginative narratives, such as, novels and romances.

Check Out - The process whereby a student signs the book card, has the date due slip stamped and takes the book out of the library area. There is no guarantee that once a book is checked out, that it will be read.

Chapter 2

Review of the Literature

The review of the literature covered readability testing including: its historical precedents, a review of some of the testing methods, results of some comparative studies, and possible future trends.

Historical Precedents

Readability has probably been a concern of people since the beginning of symbol usage. In fact, it is even mentioned in the Bible: I Corinthians 14:9, "So with yourselves; if you in a tongue utter speech that is not intelligible, how will any one know what is said? For you will be speaking to the air!"[1]

At first only religious writers were concerned with readability.[2] This is to be expected, since they were the only literate persons of the day. Religious writers needed to write in such a way that the common people could understand what was read to them.

The next group of people to become interested in read-

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[1]I Corinthians. 14:9 (RSV, Catholic edition).

[2]George R. Klare, The Measurement of Readability (Ames, Iowa: Iowa State University Press, 1963).

ability was the educators. That interest continues today.

In the 1840's, the editors of the McGuffey Readers considered an important aspect of their books to be ease of understanding in terms of vocabulary. Then in 1898, F. W. Kaeding constructed a more scientific basis for relating vocabulary to reading difficulty by counting words. In 1889, N. A. Rubakin compiled a word list for interpreting reading ease.

The early readability formulas came in the 1920's. These have been used and improved constantly through the years. These early readability formulas have been the starting points for new and better formulas.

In chapter four of the book The Measurement of Readability[3] by Klare, there are thirty-four (34) formulas mentioned, with basic directions for each. These directions do not include any word lists; therefore, one would need to find the original work for each formula to be able to compute readability scores.

A Review of Some of the Testing Methods

The first three readability tests to be examined will be those to be used in this research study. They are the Fry Readability Graph, the FOG Index, and the Flesch Formula. The last four (4) will be methods that were considered and then discarded by this researcher. They are the Dale-

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[3]Ibid.

Chall Formula, the Botel method, the Spache Formula and the Lorge Formula.

The Fry Readability Graph is quite easy to use. One only needs to know the average sentence length and the average number of syllables from the sample passages. Most middle school students are capable of computing averages and have some knowledge of syllabication. They definitely know how to use a dictionary. Middle school students have had some practice in reading graphs. Therefore, anyone with a middle school education should be able to use and understand the Fry Readability Graph. This ease of use makes it a very popular readability formula.

In 1968, when Fry was developing the formula, he followed the example set by Flesch. Fry estimated the difficulty of vocabulary by word length.[4] The more syllables a word contained the more difficult it was considered. He also estimated the complexity of sentences by sentence length.[5] The longer the sentence the more difficult to understand it.

Fry did make a list of fifty (50) words that resulted in the estimated grade level being closer to the Dale-Chall and Spache formula grade levels. Since there are only fifty words on the list, administering the list test does not add

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[4]Joseph C. Kretschmer, "Updating the Fry Readability Formula," Reading Teacher, 29:555, March, 1976.

[5]Ibid.

appreciably to the time needed to calculate grade levels.[6]

As one looks at the actual graph included in the Fry Readability Graph, he/she immediately sees a curved line. This curved line was calculated by plotting several sample passages and smoothing the means. That is, instead of drawing a line through each dot placed on the graph, one draws the line through the area where the most dots are. Once plotted, this curved line was used by Fry to place grade lines.

"The readability graph's contribution seems to be in simplicity of use without sacrificing much, if any, accuracy, and its wide and continuous range from grade one up through college."[7] Since the graph is not copyrighted, copies are easy to obtain.

The FOG Index is another very workable formula. It uses average sentence length and difficult words, those with three or more syllables, to calculate approximate grade levels.

The FOG Index is a little more complicated then the Fry Readability Graph for it uses more mathematics. With the Fry Readability Graph, one only has to calculate average sentence length and count syllables, then look at the graph. With the FOG Index, one has to (1) calculate average sen-

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[6]Kretschmer, p. 556.

[7]Edward Fry, "Fry's Readability Graph: Clarifications, Validity, and Extension to Level 17," Journal of Reading, 21:242, December, 1977.

tence length, (2) count words of three syllables or more, (3) add (1) and (2), then (4) multiply by .4.[8]

The FOG Index is another readability test that students could use and understand. Teaching students to use the FOG Index would show them one of the ways to combine mathematics and English.

Rudolf Flesch also produced a readability test, which he published in book form. Since the test was published in a book, rather than in a journal, it could be much more detailed and Flesch could explain all the principles behind his thoughts. Therefore, he went into great detail on "How to Pick Samples,"[9] "How to Count Words,"[10] "How to Figure the Average Sentence Length,"[11] "How to Figure the Average Word Length,"[12] and "How to Find Your Reading Ease Score."[13] These will not be discussed here, but from the chapter titles one can see that Flesch put a great effort into writing his formula and explaining it so it would be used correctly. Because of Flesch's effort, his readability formula has become quite popular and is in general use. Directions for using the Flesch formula to compute the reading ease score and for translating that score to a grade level will be

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[8]Grace Leinen, FOG Index - Oklahoma," (Cedar Falls, Iowa: Reading Consultant, 1978). (Mimeographed)

[9]Rudolf Flesch, How to Test Readability (New York: Harper & Brothers, 1951), p. 1.

[10]Ibid. [11]Ibid. [12]Ibid., p. 3.

[13]Ibid., p. 4.

found in the Appendix section of this paper.

The last part of the book, How to Test Readability, is a question - answer section. In it Flesch asks and answers questions concerning reading, writing, speaking, and testing.

The directions for using the Fry Readability Graph, the FOG Index and the Flesch formula will be found in the Appendix section of this paper. These directions include the graph to show the Fry grade levels and the table to show Flesch grade levels as figured by reading ease scores.

Another popular readability test is the Dale-Chall Readability Formula.

> In 1963, Klare published a book in which he reviewed twenty comparative studies involving the Dale-Chall formula before concluding that the Dale-Chall Readability Formula was the most valid formula available at that time.[14]

In fact, even today, newly developed tests are measured against the Dale-Chall for accuracy.

The Dale-Chall formula is based on only two factors: (1) vocabulary load and (2) a factor of sentence structure based on average sentence length.[15]

> However, the application of the Dale-Chall formula is extremely time consuming. It requires that a sample of 100 words be taken every 10 pages, each word being compared to the Dale 3,000 word list, and the unfamiliar words be counted. Then, computations must

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[14]Marie Burkhead and Greg Ulferts, "Sampler Frequency in Application of Dale-Chall Readability Formula," Journal of Reading Behavior, 9:287, Fall, 1977.

[15]Jeanne Gardner Barry and Timothy E. Stevenson, "Using a Computer to Calculate the Dale-Chall Formula," Journal of Reading, 19:219, December, 1975.

> be made to determine the average sentence length and the percentage of words outside the Dale list. These figures are then applied in the formule: $X_c = .1579X_1 + .0496X_2 + 3.6365$, where X_1 is the relative number of words outside the Dale list and X_2 is the average sentence length.[16]

There has been some question as to the need to take samples from every ten pages. Two studies, Martin and Lee (1961) and Burkhead and Ulferts (1977), tested to see if a valid score could be obtained with fewer samples. In both cases they found no significant differences by using fewer samples.

Applying the Dale-Chall formula has been made simpler with the use of the computer. By using the computer, a readability score can be calculated much faster and with more accuracy.

This formula was discarded by the researcher because, it is too time consuming for general use, even with the aid of a computer. The researcher also lacked the Dale 3,000 word list, making it impossible to work the formula.

The Botel Formula is somewhat complicated and needs a word list. The formula has six main steps or directions. Each step gives specifications on how to complete that direction step.[17] The book Botel Predicting Readability Levels gives the details on how to use the Botel formula and the word list.

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[16]Burkhead and Ulferts, p. 287.

[17]Morton Botel, Botel Predicting Readability Levels (Chicago: Follett Educational Corporation, 1962) pp. 25-26.

The Botel formula was discarded because of the amount of time needed to compute each score. There does not seem to be much written in periodicals on the Botel method; therefore, it is not a method in wide use.

The Spache formula, as many other formulas, uses (1) average sentence length and (2) difficulty of words. A Beta weight is given to each word and a constant is added to get a grade level.[18] The Beta weight is set by a word list. One would need to own or make copies of the book Good Reading for Poor Readers to utilize the formula.

The article, "A Chart for the New Spache Formula," from Reading Teacher, carries a chart so grade levels can be figured without going through the formula. Still, one would need the book or a copy of several pages to get the Beta weights.

This formula was discarded by the researcher, because of a lack of the Beta weights. The formula was also time consuming and is not appropriate for testing senior high materials. The formula is appropriate for testing elementary reading materials.

The last formula to be discussed is the Lorge Formula. It is long and complicated. One must first decide on a sample; there are several rules given on how to select this sample. Secondly, a worksheet is to be filled out. The

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[18]Lou E. Burmeister, "A Chart for the New Spache Formula," Reading Teacher, 29:384-385, January, 1976.

third direction is to count the number of words; again, there are several pointers on how to do this. Then, the sentences must be counted. Next, prepositional phrases are to be counted and lastly, hard words are to be counted. There are special rules to be followed for special cases and a word list is needed.

This formula involves a lot of time and computing. One must prepare a worksheet for each book with the following mathematics:[19]

			Values
Average sentence length	_____ x	.06 =	
Ratio of Prepositional phrases	_____ x	9.55 =	
Ratio of hard words	_____ x	10.43 =	
	Constant		= 1.9892
Add the values and the constant			
		Readability Index	= _____

This formula was discarded because most instructors would not take the time to use it. Very few students would be able to apply and understand the formula.

As one can see by the preceding information there are several readability tests available for use. Some are much easier to use and are very popular, while others are very time consuming and not popular with a cross-section of the teaching community. This researcher chose the three readability tests which are the most popular with busy teachers.

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[19]Irving Lorge, The Lorge Formula for Estimating Difficulty of Reading Materials (New York: Teachers College Press, 1959), pp. 3-11.

The readability tests not selected were discarded because they were harder to use and understand. Teachers have so much to teach in a short time that they cannot spend a lot of time discussing readability tests. Teachers need tests that the students can use independently. Students are also very busy, so they cannot afford to spend hours computing readability scores.

Finally, many librarians do not have aides to help them. Therefore, they need to use readability tests that are not too time consuming, but that give acceptable scores. That is, tests that are in wide use and have been tested.

Results of Some Comparison Studies

Several studies have been done that compared different readability tests. Only a few of these studies will be discussed here. The selected studies are representative of most studies and contain formulas this researcher is using or considered using for this paper.

Kenneth Ricker did a test on science textbooks using the Fry formula, the FOG Index, and the SMOG formula.

His results were:[20]

Textbooks	Fry	SMOG	FOG Index
A	6	9	8
B	7	9	11

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[20]Kenneth S. Ricker, "But Can They Read It," Science Teacher, 45:23, March, 1978.

Textbooks	Fry	SMOG	FOG Index
C	7	9	8.9
D	7	8	8.3
E	9	11	11.5
F	-	12	12.6

Ricker explained part of the differences by the predictive criteria of each of the formulas. That is, how much of the material can be understood by students without the aid of an instructor.

> The Fry score of 6 for textbook A predicts that a student who reads at a sixth-grade reading level will be able to read the text with 50 to 75 percent comprehension. Both the FOG Index and the SMOG formula, on the other hand, attempt to predict the reading grade level neccessary to read with 90 to 100 percent comprehension.[21]

Another consideration is the degree of accuracy of each formula.

> For the Fry formula, the standard error for the prediction is about 0.5, which means that in every two of three cases the true grade-level score may fall within a one-year range of the score obtained. For the SMOG formula, the standard error is about 1.5; that is, in two-thirds of the cases the true score may fall within ± 1.5 grades of the calculated score, providing a range of three years. The author of the FOG Index did not report a standard error.[22]

The above information on degree of accuracy and reader comprehension must be taken into consideration when using the formulas and should be the basis for deciding how a textbook will be used - by itself or with teacher instruction. If a book is used by itself, the teacher gives assignments but does not go over the material covered by the

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[21]Ricker, p. 23.

[22]Ibid. pp. 23-24.

book. On the other hand, if a book is used with teacher instruction, the teacher lectures or discusses the material covered by the book.

A second study was done by Loyd J. Guidry and D. Francis Knight. They compared Newbery Award books by using the Dale-Chall, Flesch, Fry and Lorge readability formulas. They published their findings in a table with the following categories: Book Title; Mean Readability; Lorge - Readability Difference; Flesch - Readability Difference; Dale-Chall - Readability Difference; and Fry - Readability Difference.[23] Their findings were that the Lorge and Flesch readability tests were the most valid predictors for the selected set of books.

A third comparison was made by Joseph L. Vaughan, Jr. He stated that his reason for the study was that when the Fry Graph was used, its grade levels agreed with those of the Dale-Chall scores, but when the SMOG formula was used it disagreed with both the Fry Graph and the Dale-Chall scores. Therefore, a study needed to be done to see how much of a difference there was among the scores as calculated by using the Fry Graph, the Dale-Chall and the SMOG formulas.

Vaughan assembled his data into four tables, which

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[23]Loyd J. Guidry and D. Francis Knight, "Comparative Readability; Four Formulas and Newbery Books," Journal of Reading, 19:554-555, April, 1976.

revealed:[24]

> (1) the Dale-Chall and Fry scores consistently agree; (2) the SMOG scores consistently disagree with those obtained by both Dale-Chall and Fry; and (3) the SMOG scores consistently tend to be two grade levels higher than those of both the Dale-Chall and Fry.

When examining the study, one has to be very careful in interpreting the grade level scores. One needs to consider the readability tests - how they work; their predictive criteria - percentage of understanding; and how much time and work are involved in using them. One needs to remember that ...

> readability formulas are best thought of as guides or general indicators of a possible range of materials suited to any given child. They are not absolute. If they are reguarded as general indicators, they can be quite useful.[25]

Possible Future Trends

Dr. George Klare believes there are three directions future research might well go. (1) Basic research on critical underlying variables in the process of reading and learning from print, leading to some kind of a theoretical framework for understanding them.[26] By this Dr. Klare means taking into account more than just sentence length and word difficulty. One of these other factors might be human dif-

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[24]Joseph L. Vaughan, Jr., "Interpreting Readability Assessments," Journal of Reading, 19:637, May, 1976.

[25]Timothy C. Standal, "Readability Formulas: What's Out, What's In?", Reading Teacher, 31:646, March, 1978.

[26]Klare, p. 182.

ferences - memory, wanting to learn, educational level, motivation. (2) Basic research to identify and/or incorporate new factors important to accurate readability measurement into formulas.[27] Researchers are studying factors not now considered - like organization of the material and the content - to see what effects they have on readability. (3) Basic research for the refinement of factors and methods now used in readability formulas.[28] This is concerned with defining more completely the relations of factors used in figuring readability - words and sentences.

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[27] Ibid.

[28] Ibid.

Chapter 3

Methodology of the Study

This study compared grade levels of selected books as calculated by the FOG Index, the Fry Readability Graph, and the Flesch Readability Test. This researcher predicted: (1) the Flesch Readability Test would give the lowest grade level scores and the FOG Index would give the highest grade level scores; (2) the FOG Index grade level scores would equal the Fry Readability Graph grade level scores plus two grade levels and the FOG Index grade level scores would equal the Flesch Readability Test grade level scores plus three grade levels; and (3) the means, medians, and modes of the three readability tests would be the same as the individual tests, that is, FOG Index means, median, and mode would equal the Fry Readability Graph means, median, and mode plus two grade levels would equal the Flesch Readability Test means, median, and mode plus three grade levels. (FOG Index means = Fry Readability Graph means + 2 grade levels = Flesch Readability Test means + 3 grade levels.)

The books selected for this study included all fiction books checked out of the Riceville Community High School Library by students in grades nine through twelve during the sixty day data collection period. The data collection period was all school days from January 2 to March 31, 1980.

When each fiction book, checked out during the data collection period, was returned, this researcher manually calculated the three readability scores for that title. The formulas for calculating the readability scores will be found in the Appendix of this paper.

This author used the same word samples from each book to figure all three readability scores. This means that from each book three one hundred word passages were taken. The researcher decided to use three one hundred word samples from each book because: (1) the Fry Readability Graph requires three samples; (2) the FOG Index requires two or three samples; and (3) the Flesch Readability Test does not state how many samples to use. By using the same samples, the readability tests should give comparable results.

A 3x5 inch card was kept for all authors, with every title by them listed separately. This eliminated the recalculation of readability scores for fiction books previously checked out. In Appendix D, there is a sample of an author card.

At the end of the data collection period all the scores were recorded in columns. (See Appendix E.) The plus (+) - minus (-) difference column after the Fry Graph grade level column and the one after the Flesch grade level column reveal how much the grade levels of the Fry Graph and the Flesch differ from the FOG Index.

Next, the means, medians, and modes for each readability test were calculated. These figures were then

compared to see how they differed.

Chapter 4

Analysis of Data

The data for this research paper were obtained from the fiction circulation records from the Riceville Community High School Library during the sixty school days from January 2, 1980 to March 31, 1980. As each fiction book checked out of the library during the data collection period was returned, this researcher manually calculated three readability scores using the following methods: (1) the Fry Readability Graph; (2) the FOG Index; and (3) the Flesch Readability Test. These scores were then placed on author cards, which were kept in alphabetical order. At the end of the data collection period and after all the fiction books were returned, this author listed all the titles with their grade level scores and manually calculated how much of a difference there was between the FOG Index grade level scores and the scores for each title as calculated by the Fry Readability Graph and the Flesch Readability Test. (See Appendix E.) Finally, the researcher manually calculated the means, medians, and modes for each readability test. (See Appendix F.)

The first hypothesis was that there would be a difference for all books among the three readability levels as calculated by the FOG Index, the Fry Readability Graph and

the Flesch Readability Test, with the FOG Index giving the highest grade level scores and the Flesch Readability Test giving the lowest grade level scores, must be rejected by this researcher.

Table 1

Comparisons Among Readability Levels for all Books

Readability Tests	Number of Books
FOG = Fry	1
FOG ≠ Fry	176
FOG = Flesch	1
FOG ≠ Flesch	176
Fry = Flesch	108
Fry ≠ Flesch	68

There was not always a difference among the scores for individual titles. (See Appendix E.) The book Where Tomorrow by Bob Young, had the same grade level score (7) when tested using the FOG Index and the Flesch Readability Test. There was also one title, John Townsend's The Intruder, in which the grade level scores as calculated by the FOG Index and the Fry Readability Graph were the same (8). There were also one hundred and eight (108) books that had the same grade level scores when tested using the Fry Readability Graph and the Flesch Readability Test. No titles yielded the

same scores on each of the three readability tests.

The second hypothesis was that for all books the FOG Index scores would be at least two grade levels above the Fry Readability Graph scores and three grade levels above the Flesch Readability Test scores, must be rejected by this researcher.

Table 2

Comparisons Between FOG and Fry and FOG and Flesch Readability Levels for all Books

Readability Tests	Number of Books
FOG = Fry + at least two grade levels	142
FOG = Fry + less than two grade levels	34
FOG = Fry	1
FOG = Flesch + at least three grade levels	83
FOG = Flesch + less than three grade levels	93
FOG = Flesch	1

Of the one hundred seventy-seven (177) titles, 142 had FOG Index scores of at least two grade levels above the Fry Readability Graph grade levels and 35 had less than a two grade level difference. In fact, there was one title in which the Fry Readability Graph grade level was higher than the FOG Index grade level.

Of the one hundred seventy-seven (177) titles, 83 had FOG Index scores of at least three grade levels above the Flesch Readability Test grade levels and 94 had less than a three grade level difference. In fact, there were five titles in which the Flesch Readability Test grade levels were higher than the FOG Index grade levels.

The third hypothesis was that there would be a difference for all books among the means, medians, and modes of the three readability tests, and that these differences would be the same as in hypothesis two, that is, the FOG Index means, median, and mode would be at least two grade levels above the Fry Readability Graph means, median, and mode, and three grade levels above the Flesch Readability Test means, median, and mode. This hypothesis was rejected.

Table 3

Average Grade Level Means, Medians and Modes for all Books for the Three Readability Tests

	FOG	Fry	+/-	Flesch	+/-
Means	10.75	7.15	3.6	7.47	3.28
Median	9.8-9.9	7	2.8-2.9	7	2.8-2.9
Mode	9.1	7	2.1	7	2.1

Part one of the third hypothesis had to be rejected, because the average means, medians, and modes were not always different. The Fry Readability Graph median and mode were the same as the Flesch Readability Test median and Mode.

Part two of the third hypothesis could be accepted, since all the FOG averages were at least two grade levels above the Fry averages. The FOG averages ranged from 2.1 to 3.6 grade levels above the Fry averages.

Part three of the third hypothesis had to be rejected, because the FOG median and mode were not three grade levels above the Flesch median and mode. In fact, only the FOG means was three grade levels above the Flesch means.

Chapter 5

Conclusions

All three readability tests are quality tests and easily used. Out of the one hundred and seventy-seven (177) scores, the Fry Readability Graph and the Flesch Readability Test gave one hundred and eight (108) grade level scores that were the same, fifty (50) scores that were one grade level apart, fourteen (14) scores that were two grade levels apart, four (4) scores that were three grade levels apart, and only one that was four grade levels apart. The FOG Index gave scores ranging from less than the Fry Readability Graph and the Flesch Readability Test scores to seventeen point three (17.3) grade levels above them. This leads this researcher to conclude that when testing fiction books, one should use either the Fry Readability Graph or the Flesch Readability Test because they gave similar scores for all books in this test.

Since the means, medians, and modes for the Fry Readability Graph and the Flesch Readability Test were seventh grade, one must conclude that most of the Riceville Community High School students prefer their pleasure reading materials (fiction) to be below their actual grade level, or were unable, using mainly paperbacks from the Riceville Community High School Library collection, to find material

at a higher grade level.

Recommendations

If this research were to be done again, this author would use a computer for the calculations. This would save time and be more consistent. The researcher would collect more data, possibly by working with instructors who might make book report assignments. This way, it might be possible to gather a greater amount of data and the reading should be on a higher grade level, since the students know they are being graded on it. One other change that would be made would be that all books checked out would be tested. This way, readability tests could be compared on their calculations for biographies and nonfiction as well as fiction.

This researcher would recommend that all libraries try to use readability tests. For high school libraries, this researcher would recommend they use the Fry Readability Graph and/or the Flesch Readability Test, because they are quick, easy to use, and gave consistent results in this study.

By using readability tests, librarians will learn more about their libraries: on what grade levels most of the books are written; authors and titles the students enjoy; what to consider when ordering new materials; and more about their students and partons; who uses the library the most. The patrons are why libraries exist, so the more the librarian can learn about them, the better qualified he/she will be for their job.

APPENDIXES

APPENDIX A.

FRY READABILITY TEST DIRECTIONS[29]

1. Randomly select three (3) sample passages and count out exactly 100 words each, beginning with the beginning of a sentence. Do count proper nouns, initializations, and numerals.

2. Count the number of sentences in the hundred words, estimating length of the fraction of the last sentence to the nearest one-tenth.

3. Count the total number of syllables in the 100-word passage. If you don't have a hand counter available, an easy way is to simply put a mark above every syllable over one in each word, then when you get to the end of the passage, count the number of marks and add 100. Small calculators can also be used as counters by pushing numeral 1, then push the + sign for each word or syllable when counting.

4. Enter graph with <u>average</u> sentence length and <u>average</u> number of syllables; plot dot where the two lines intersect. Area where dot is plotted will give you approximate grade level.

5. If a great deal of variability is found in syllable count or sentence count, putting more samples into the

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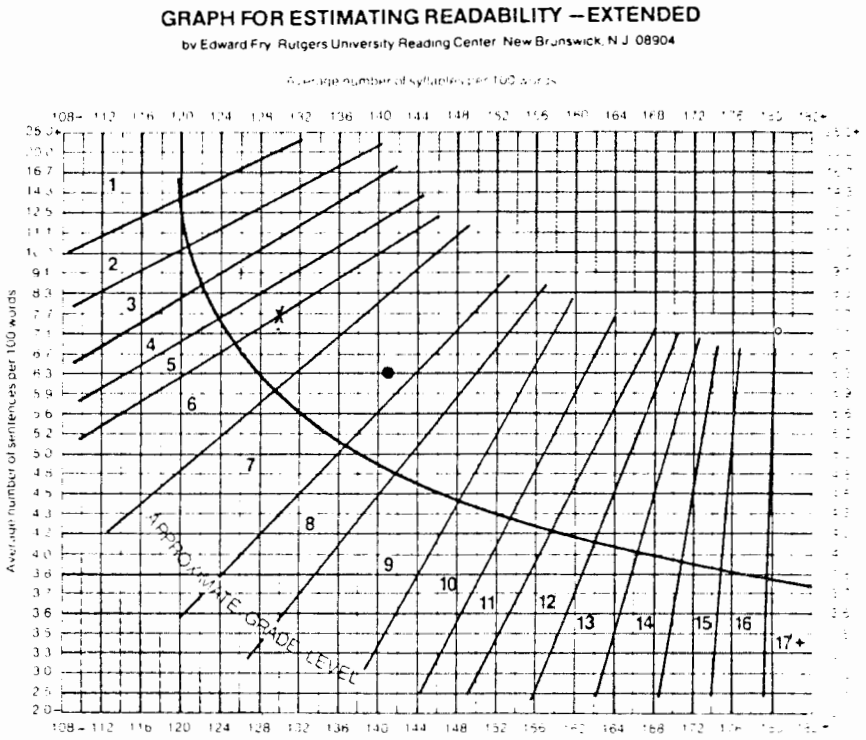
[29]Edward Fry, "Fry's Readability Graph: Clarifications, Validity, and Extension to Level 17," <u>Journal of Reading</u>, 21:242-251, December, 1977.

average is desirable.

6. A word is defined as a group of symbols with a space on either side; thus Joe, IRA, 1945, and & are each a word.

7. A syllable is defined as a phonetic syllable. Generally, there are as many syllables as vowel sounds. For example, stopped is one syllable and wanted is two syllables. When counting syllables for numerals and initialization, count one syllable for each symbol. For example, 1945 is four syllables, IRA is three syllables, and & is one syllable.



APPENDIX B.

FOG INDEX DIRECTIONS[30]

1. Select a sample of 100 words.

2. Find the average sentence length.

3. Count the number of words three syllables or over. If a word is repeated, count each repetition.

4. Add the average sentence length to the number of "difficult" words.

5. Multiply the sum by .4. This gives the "FOG" index.

Please Remember .....

1. Do at least two or three samples per selection.

2. Use the results as a guide or indication only; it is not always highly reliable.

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[30]Grace Leinen, "FOG Index - Oklahoma" (Cedar Falls, Iowa, Reading Consultant, 1977). (Mimeographed.)

APPENDIX C

FLESCH READABILITY TEST DIRECTIONS[31]

1. If you are using a sample, rather than the complete writing, take each sample and count each word in it up to 100.

Count as a word all letters, numbers, or symbols, or groups of letters, numbers, or symbols, that are surrounded by white space. Count contractions and hyphenated words as one word.

2. Figure the average number of words in your sentences. If you are using samples, count the number of sentences in each sample; then add the number of sentences in all samples and divide the number of words in all samples by the total number of sentences.

In a 100 word sample, the 100 word mark will usually fall in the middle of a sentence. Count such a sentence as one of those in your sample if the 100 word mark falls after more than half of the words in it; otherwise disregard it.

In counting sentences, count as a sentence each unit of thought that is grammatically independent of another sentence or clause, if its end is marked by a period, question mark, exclamation point, semicolon or colon.

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[31]Rudolf Flesch, How to Test Readability (New York: Harper & Brothers, 1951), pp. 2-6.

In dialogue, count the words he said or other speech tags as part of the quoted sentence to which they are attached.

3. Figure the average word length in syllables. If you use 100 word samples, count the total number of syllables in all your samples and divide by the number of samples.

Count syllables the way you pronounce the word. If in doubt about syllabication rules, use any good dictionary.

4. To find your Reading Ease Score, after you have found the average sentence length in words and the number of syllables per 100 words, use the following formula:

Multiply the average sentence length by 1.015 _____

Multiply the number of syllables per 100 words by .846 _____

Add _____

Subtract this sum from 206.835

Your Reading Ease Score is _____

5. To interpret your Reading Ease Score, use the following table.

Meaning of Reading Ease Scores

Reading Ease Scores	Description of style	Typical Magazine	Syllables per 100 words	Average sentence length
90-100	Very easy	Comics	123	8
80-90	Easy	Pulp fiction	131	11
70-80	Fairly easy	Slick fiction	139	14
60-70	Standard	Digest, Time mass non-fiction	147	17
50-60	Fairly difficult	Atlantic Harper's	155	21
30-50	Difficult	Academic, Scholarly	167	25
0-30	Very difficult	Scientific, Professional	192	29

6. To translate the Reading Ease Scores to grade levels, use the following table.

Grades for Reading Ease Scores[32]

Score	Grade levels
90-100	5th grade
80-90	6th grade
70-80	7th grade
60-70	8th and 9th grade
50-60	10th - 12th grade (high school)
30-50	13th - 16th grade (college)
0-30	College graduate

[32]Flesch, pp. 43-44.

7. These figures should be used only as general guides for estimating the grade levels of materials for school children. It is well known that the reading ability of children of the same age varies widely.

APPENDIX D.

AUTHOR CARD

DATA GATHERING INSTRUMENT

Author's Name last, first					
FOG	Fry	±	Flesch	±	Title of fiction book

APPENDIX E.

CALCULATED GRADE LEVELS FOR EACH FICTION TITLE INCLUDING DIFFERENCES FROM THE FOG LEVELS

Author	Title	FOG	Fry	+/-	Flesch	+/-
Aiken, Joan						
	Silence of Herondale	12.2	7	5.2	7	5.2
Allen, M. C.						
	Shock	9.6	7	2.6	7	2.6
Andrews, Mary Raymond Shipman						
	Perfect Tribute	17	9	8	10	7
Arundel, Honor						
	The Terrible Temptation	14.8	10	4.8	10	4.8
Asimov, Isaac						
	Fantastic Voyage	5.3	6	.7	7	1.7
	Lucky Starr and the Pirates of the Asteroids	10.5	7	3.5	8	2.5
	David Starr, Space Ranger	8.5	7	1.5	7	1.5
	Lucky Starr and the Big Sun Mercury	9.5	7	2.5	7	2.5
	Lucky Starr and the Rings of Saturn	11.6	9	2.6	8	3.6
Bach, Richard						
	Jonathan Livingston Seagull	10.3	8	2.3	7	3.3
Beckwith, Lillian						
	The Spuddy	15.6	8	7.6	8	7.6
Bell, Margaret						
	Watch for a Tall White Sail	9.4	7	2.4	7	2.4
Binder, Eando						
	The Impossible World	9.7	7	2.7	7	2.7
Bjorn, Thyra Ferre						
	Papa's Wife	8.7	7	1.7	7	1.7
	Papa's Daughter	8.5	6	2.5	6	2.5
Blume, Judy						
	Then Again, Maybe I Won't	5.7	4	1.7	6	.3
Bonham, Frank						
	Mystery of the Fat Cat	8	6	2	6	2
	Durango Street	6.9	6	.9	6	.9
Boulle, Pierre						
	Bridge Over the River Kwai	14.3	9	5.3	11	3.3
Bova, Ben						
	Exiled From Earth	9.1	6	3.1	6	3.1

Boyd, John					
Last Starship From Earth	10.7	7	3.7	7	3.7
Bradbury, Ray					
Halloween Tree	8.8	7	1.8	6	2.8
Martian Cronicles	8.9	7	1.9	7	1.9
Golden Apples of the Sun	16.4	9	7.4	8	8.4
Braden, Tom					
8 is Enough	12.3	7	5.3	7	5.3
Breck, Vivian					
Maggie	7.9	7	.9	7	.9
Brinkley, William					
Don't Go Near the Water	16.3	10	6.3	12	4.3
Bronte, Charlotte					
Jane Eyre	12.4	8	4.4	7	5.4
Bronte, Emily					
Wuthering Heights	16.9	9	7.9	10	6.9
Bryant, Chester					
Lost Kingdom	10.3	8	2.3	8	2.3
Buchan, John					
39 Steps	9.7	7	2.7	7	2.7
Burnford, Sheila					
Incredible Journey	21.6	10	11.6	13	8.6
Butler, Beverly					
Gift of Gold	12.1	8	4.1	7	5.1
Butterworth, W. E.					
Road Racer	15.9	10	5.9	12	3.9
Byars, Betsy					
The Summer of the Swan	7.3	6	1.3	6	1.3
Cameron, Eleanor					
A Spell is Cast	10.5	7	3.5	7	3.5
Caniff, Milton					
Steve Canyon: Operation Snowflower	9.6	7	2.6	7	2.6
Caras, Roger					
Sarang	12	9	3	9	3
Cartland, Barbara					
The Dream Within	15.2	9	6.2	8	7.2
Cassiday, Bruce					
The Wild One	4.1	2	2.1	5	.9
Cavanna, Betty					
Going on Sixteen	8.6	7	1.6	7	1.6
Chilton, I. M.					
Nightmare	8.1	7	1.1	6	2.1
Clark, Arthur					
The City and the Stars	14.3	9	5.3	9	5.3
Cornett, Nina					
Alaskan Summer	13.3	8	5.3	8	5.3
Cox, William					
Playoff	7.5	5	2.5	6	1.5
Crawford, Charles					
Three-Legged Race	5.9	4	1.9	5	.9

Crichton, Robert					
The Secret of Santa Vittoria	14.4	8	6.4	8	6.4
Crume, Vic					
Herbie Goes to Monte Carlo	8	7	1	7	1
Daily, Maureen					
Seventeenth Summer	12	7	5	7	5
Danziger, Paula					
The Cat Ate My Gymsuit	8.4	6	2.4	6	2.4
Dean, Nell A.					
A Business in Pets	9.9	7	2.9	7	2.9
Dickinson, Peter					
Emma Tupper's Diary	10.8	8	2.8	7	3.8
Donovan, John					
Wild in the World	9.1	6	3.1	6	3.1
DuJardin, Rosamond					
Double Feature	10.4	7	3.4	7	3.4
Showboat Summer	8.8	7	1.8	7	1.8
Dumas, Alexandre					
The Man in the Iron Mask	16.9	9	7.9	9	7.9
Eliot, George					
Silas Marner	29.3	12	17.3	15	14.3
Farre, Rowena					
Seal Morning	14.7	9	5.7	9	5.7
Fast, Howard					
The Hessian	15.1	9	6.1	9	6.1
April Morning	16.1	9	7.1	9	7.1
Fitzgerald, Scott					
Great Gatsby	14.4	10	4.4	10	4.4
Forester, C. S.					
Ship of the Line	12.4	9	3.4	8	4.4
Forsyth, Frederick					
Day of the Jackal	16.5	10	6.5	10	6.5
Frank, Pat					
Alas, Babylon	13.1	8	5.1	8	5.1
Fuller, Iola					
Loon Feather	7.9	6	1.9	6	1.9
Gault, William Campbell					
Drag Strip	12.2	7	5.2	7	5.2
Two-Wheeled Thunder	8.9	7	1.9	7	1.9
Gessner, Lynne					
Navajo Slave	13.2	9	4.2	9	4.2
Gordon, Mildred					
Night Before the Wedding	9.1	7	2.1	7	2.1
Green, Graham					
The Quiet American	19.2	9	10.2	9	10.2
Hale, Arlene					
Season of Love	7.1	5	2.1	6	1.1
Hall, Lynn					
The Siege of Silent Henry	7.7	6	1.7	6	1.7
Hamill, Ethel					
The Tower in the Forest	10.3	7	3.3	7	3.3

Hawthorne, Nathaniel					
House of the Seven Gables	17.7	13	4.7	14	3.7
Heide, Florence Parry					
When the Sad One Comes to Stay	8.5	6	2.5	6	2.5
Heinlein, Robert A.					
Assignment in Eternity	10.4	7	3.4	7	3.4
The Star Beast	10.5	8	2.5	7	3.5
Hemingway, Ernest					
Men Without Women	6.2	4	2.2	6	.2
The Old Man and the Sea	9.9	7	2.9	6	3.9
The Sun Also Rises	9.2	7	2.2	7	2.2
Henry, Will					
The Gates of the Mountains	12	7	5	7	5
Herzog, Arthur					
The Swarm	11.3	8	3.3	8	3.3
Hillerman, Tony					
The Blessing Way	13.5	10	3.5	10	3.5
Hinton, S. E.					
The Outsiders	8.5	6	2.5	6	2.5
Holt, Victoria					
Legend of the Seventh Virgin	10.9	7	3.9	7	3.9
The Shivering Sands	9.7	7	2.7	7	2.7
Hyne, C. J. Cutliffe					
The Lost Continent - the Story of Atlantis	15.7	9	6.7	9	6.7
Jacobs, Helen Hull					
The Tennis Machine	11.1	8	3.1	7	4.1
Jeffries, Roderic					
Against Time	13.7	9	4.7	9	4.7
Johnston, William					
Echoes of a Summer	8.1	5	3.1	6	2.1
Max Smart and the Ghastly Ghost Affair	9.5	7	2.5	7	2.5
Kafka, Franz					
Metamorphosis	20.5	9	11.9	9	11.5
Kapp, Colin					
Transfinite Man	13.2	8	5.2	8	5.2
Kenny, Kathryn					
Trixie Belden and the Mystery of the Uninvited Guest	8.1	6	2.1	7	1.1
Kerr, M. E.					
Love is a Missing Person	9.9	7	2.9	7	2.9
Kincaid, Stephanie					
The Heart Has Reason	8.7	7	1.7	7	1.7
Kjelgaard, James Arthur					
Big Red	8.3	7	1.3	7	1.3
Klein, Norma					
Hiding	7.5	4	3.5	6	1.5

Lambert, Janet					
Star Spangled Summer	10.9	8	2.9	8	2.9
First of All	10.8	8	2.8	8	2.8
L'Amour Louis					
Treasure Mountain	10.4	7	3.4	7	3.4
Lee, Harper					
To Kill a Mockingbird	10.3	7	3.3	7	3.3
Lee, Mildred					
Skating Rink	8.3	6	2.3	6	2.3
Leinster, Murray					
Land of the Giants	7.5	6	1.5	7	.5
Leslie, Robert					
In the Shadow of a Rainbow	10.8	9	1.8	9	1.8
Levin, Ira					
Boys From Brazil	11.6	7	4.6	7	4.6
Lipsyte, Robert					
The Contender	7.5	4	3.5	6	1.5
One Fat Summer	5.5	3	2.5	5	.5
Lofts, Norah					
Hester Roon	12.9	9	3.9	9	3.9
London, Jack					
Call of the Wild	12.3	8	4.3	9	3.3
MacCullers, Carson					
Members of the Wedding	11.7	7	4.7	7	4.7
MacLean, Alistair					
Guns of the Navaron	16.7	10	6.7	12	4.7
Matheson, Richard					
Shock	9.3	7	2.3	7	2.3
McCaffrey, Anne					
Dragonflight	12.1	8	4.1	7	5.1
McKay, Robert					
Dave's Song	9.1	6	3.1	6	3.1
Milne, A.					
The House at Pooh Corner	14.7	9	5.7	8	6.7
Winnie-the-Pooh	9.3	7	2.3	7	2.3
Milton, Hilary					
Emergency! 10-33 on Channel 11	10.8	6	4.8	7	3.8
Montagu, Ewen					
The Man Who Never Was	16.1	9	7.1	10	6.1
Montgomary, Rutherford					
Golden Stallion to the Rescue	7.7	5	2.7	6	1.7
Anne's House of Dreams	11.2	7	4.2	7	4.2
Mott, Michael					
Master Entrick	11.2	7	4.2	7	4.2
Neufield, John					
Lisa, Bright and Dark	8.7	6	2.7	7	1.7
Twink	8.8	7	1.8	7	1.8
O'Hara, Mary					
Green Grass of Wyoming	7.8	5	2.8	6	1.8

Oppenheimer, Joan L.					
No Laughing Matter	8.9	7	1.9	7	1.9
One Step Apart	9.6	7	2.6	7	2.6
Orwell, George					
Animal Farm	11.7	8	3.7	7	4.7
Palmer, Bernard					
Jon and the Break-in Mystery	10.1	7	3.1	7	3.1
Pasternak, Boris					
Doctor Zhivago	16.1	9	7.1	10	6.1
Pearson, Drew					
The President	10.9	7	3.9	8	2.9
Peck, Richard					
Through a Brief Darkness	6.3	5	1.3	6	.3
Dreamland Lake	8.7	6	2.7	6	2.7
Peyton, K. M.					
So Once Was I	8.1	6	2.1	6	2.1
Pomeroy, Pete					
Wipe Out	8.9	7	1.9	7	1.9
Remarque, Erich Maria					
All Quiet on the Western Front	10.7	7	3.7	7	3.7
Rendina, Laura Cooper					
Destination Capri	7.8	6	1.8	7	.8
Reynolds, Pamela					
Will the Real Monday Please Stand Up	8.1	6	2.1	6	2.1
Richter, Conrad					
Light in the Forest	10.9	7	3.9	7	3.9
Savitz, Harriet May					
The Lionhearted	7.5	5	2.5	6	1.5
Schoen, Barbara					
A Time and a Place	8.3	6	2.3	7	1.3
Shelley, Mary					
Frankenstein	14.1	11	3.1	12	2.1
Sinclair, Upton					
The Jungle	11	7	4	7	4
Oil	11.9	7	4.9	7	4.9
Sleator, William					
Run	10.7	7	3.7	7	3.7
Snyder, Anne					
First Step	4.3	2	2.3	5	.7
St. John, Wylly Fold					
The Mystery of the Other Girl	10.7	8	2.7	7	3.7
Steinbeck, John					
The Red Pony	9.3	7	2.3	7	2.3
Grapes of Wrath	6	3	3	5	1
The Pearl	7.6	6	1.6	6	1.6
Moon is Down	8.7	7	1.7	7	1.7
Stevenson, Robert L.					
Treasure Island	9.1	7	2.1	7	2.1
Kidnapped	12.3	7	5.3	7	5.3
Dr. Jekyll and Mr. Hyde	20	10	10	12	8

Stolz, Mary					
To Tell Your Love	7.9	6	1.9	6	1.9
Suhl, Yuri					
On the Other Side of the Gate	8	6	2	7	1
Tolstoy, Leo					
Anna Karenina	22.4	11	11.4	15	7.4
Townsend, John Rowe					
The Intruder	8	8	0	7	1
Trumbo, Dalton					
Johnny Got His Gun	11.3	7	4.3	7	4.3
Turngen					
Mystery Walks the Campus	9.1	6	3.1	7	2.1
Twain, Mark					
Roughing It	12.5	8	4.5	8	4.5
Van Tuyl, Barbara					
The Betrayal of Bonnie	16.7	9	7.7	10	6.7
Walsh, Jill					
Fireweed	8.5	6	2.5	6	2.5
Wambaugh, Joseph					
Blue Knight	11.9	9	2.9	8	3.9
Wells, Helen					
The Case of the Dangerous Remedy	9.8	7	2.8	7	2.8
Werba, Barbara					
Run Softly, Go Fast	6.5	4	2.5	6	.5
Weverka, Robert					
Search	9.1	7	2.1	7	2.1
Whitney, Phillis					
The Vanishing Scarecrow	9.1	7	2.1	7	2.1
Creole Holiday	8.5	6	2.5	7	1.5
Listen for the Whisperer	7.9	6	1.9	7	.9
Step to the Music	8.9	7	1.9	7	1.9
The Fire and the Gold	8.9	6	2.9	7	1.9
Williams, Lynn					
Rendezvous With Danger	6.3	4	2.3	6	.3
Wood, Phyllis Anderson					
Win Me and You Lose	8.6	6	2.6	7	1.6
Your Bird is Here, Tom Thompson	5.9	4	1.9	6	.1
Young, Bob					
Where Tomorrow	7	6	1	7	0
Zindel, Paul					
Pardon Me, You're Stepping on My Eyeball	7.7	6	1.7	6	1.7

APPENDIX F.

DISTRIBUTION OF MEANS, MEDIANS, AND MODES

	FOG	Fry	Flesch		FOG	Fry	Flesch
1.	4.1	2	5	46.	8.5	6	7
2.	4.3	2	5	47.	85.	6	7
3.	5.3	3	5	48.	8.5	6	7
4.	5.5	3	5	49.	8.5	6	7
5.	5.7	4	5	50.	8.5	6	7
6.	5.9	4	6	51.	8.6	6	7
7.	5.9	4	6	52.	8.6	6	7
8.	6.0	4	6	53.	8.7	6	7
9.	6.2	4	6	54.	8.7	7	7
10.	6.3	4	6	55.	8.7	7	7
11.	6.3	4	6	56.	8.7	7	7
12.	6.5	4	6	57.	8.7	7	7
13.	6.9	5	6	58.	8.8	7	7
14.	7.0	5	6	59.	8.8	7	7
15.	7.1	5	6	60.	8.8	7	7
16.	7.3	5	6	61.	8.9	7	7
17.	7.5	5	6	62.	8.9	7	7
18.	7.5	5	6	63.	8.9	7	7
19.	7.5	5	6	64.	8.9	7	7
20.	7.5	6	6	65.	8.9	7	7
21.	7.5	6	6	66.	8.9	7	7
22.	7.6	6	6	67.	9.1	7	7
23.	7.7	6	6	68.	9.1	7	7
24.	7.7	6	6	69.	9.1	7	7
25.	7.7	6	6	70.	9.1	7	7
26.	7.8	6	6	71.	9.1	7	7
27.	7.8	6	6	72.	9.1	7	7
28.	7.9	6	6	73.	9.1	7	7
29.	7.9	6	6	74.	9.1	7	7
30.	7.9	6	6	75.	9.2	7	7
31.	7.9	6	6	76.	9.3	7	7
32.	8.0	6	6	77.	9.3	7	7
33.	8.0	6	6	78.	9.3	7	7
34.	8.0	6	6	79.	9.4	7	7
35.	8.0	6	6	80.	9.5	7	7
36.	8.1	6	6	81.	9.5	7	7
37.	8.1	6	6	82.	9.6	7	7
38.	8.1	6	6	83.	9.6	7	7
39.	8.1	6	6	84.	9.6	7	7
40.	8.1	6	6	85.	9.7	7	7
41.	8.3	6	6	86.	9.7	7	7
42.	8.3	6	6	87.	9.7	7	7
43.	8.3	6	7	88.	9.8	7	7
44.	8.4	6	7	89.	9.9	7	7
45.	8.5	6	7	90.	9.9	7	7

91.	9.9	7	7
92.	10.1	7	7
93.	10.3	7	7
94.	10.3	7	7
95.	10.3	7	7
96.	10.3	7	7
97.	10.4	7	7
98.	10.4	7	7
99.	10.4	7	7
100.	10.5	7	7
101.	10.5	7	7
102.	10.5	7	7
103.	10.7	7	7
104.	10.7	7	7
105.	10.7	7	7
106.	10.7	7	7
107.	10.8	7	7
108.	10.8	7	7
109.	10.8	7	7
110.	10.8	7	7
111.	10.9	7	7
112.	10.9	7	7
113.	10.9	7	7
114.	10.9	7	7
115.	11.0	7	7
116.	11.1	7	7
117.	11.2	7	7
118.	11.2	7	7
119.	11.3	8	7
120.	11.3	8	7
121.	11.6	8	7
122.	11.6	8	7
123.	11.7	8	7
124.	11.7	8	7
125.	11.9	8	7
126.	11.9	8	7
127.	12.0	8	8
128.	12.0	8	8
129.	12.0	8	8
130.	12.1	8	8
131.	12.1	8	8
132.	12.2	8	8
133.	12.2	8	8
134.	12.3	8	8
135.	12.3	8	8
136.	12.3	8	8
137.	12.4	8	8
138.	12.4	8	8
139.	12.5	8	8
140.	12.9	9	8
141.	13.1	9	8
142.	13.3	9	8
143.	13.2	9	8
144.	13.3	9	8
145.	13.5	9	9
146.	13.7	9	9
147.	14.1	9	9
148.	14.3	9	9
149.	14.3	9	9
150.	14.4	9	9
151.	14.4	9	9
152.	14.7	9	9
153.	14.7	9	9
154.	14.8	9	9
155.	15.1	9	9
156.	15.2	9	9
157.	15.6	9	9
158.	15.7	9	9
159.	15.9	9	10
160.	16.1	9	10
161.	16.1	9	10
162.	16.1	9	10
163.	16.3	9	10
164.	16.4	9	10
165.	16.5	10	10
166.	16.7	10	10
167.	16.7	10	10
168.	16.9	10	11
169.	16.9	10	12
170.	17.0	10	12
171.	17.7	10	12
172.	19.2	10	12
173.	20.0	10	12
174.	20.5	11	13
175.	21.6	11	14
176.	22.4	12	15
177.	29.3	13	15

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