

THE DETERMINATION OF CRITERIA OF READABILITY

by

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CHAPTER I

THE PROBLEM

Introduction

Research in the field of reading has two main but related facets: (1) reading ability of individuals and (2) readability of the materials. Studies of the former first attracted investigators over a hundred years ago (15:2); they number in the thousands, embracing aspects of intelligence, education, environment, and interest and purpose in reading (28) as well as reading habits. In contrast are studies of readability which number about a hundred and have been made chiefly in the last thirty years.

The meaning of "readability" may seem so obvious as to require no definition; nevertheless, it needs some consideration. At the Readability Laboratory at Teachers' College, Bryson reports that to obtain a sketchy notion of the readability of a piece of prose for the average person, it was examined for "lucidity," "comprehensibility," and "appeal" (3). Such a definition is, of course, not helpful in an empirical or experimental investigation because each of these terms is as difficult of definition as is readability. Flesch deals with the subject by posing a question and answering it as follows: "What is reading comprehension? At the strictly operational level, the answer is: Reading comprehension is the capacity to answer correctly the questions in a reading comprehension test. 'Readable,' from this point of view, is a text that will evoke a large number of correct comprehension

test responses, if read by a given group of readers" (12:9). He further indicates that "this concept of readability ... depends upon the nature and composition of the reading comprehension tests used." Here Flesch does not offer a definition in consonance with his main interest, i.e., readability at the general adult level -- rather, his words are more appropriate to the classroom situation. To large one criterion of readability is comprehensibility, or, negatively, difficulty on a scale of comprehension (27). From this writer's point of view this definition is lacking mainly in operational specificity. In a later chapter an operational definition of readability will be set forth. Gray and Leary comment upon the variety of meanings attached to the term "readable," saying that some of these meanings are based on opinion, others on observation and experience, and others on experimentation (16:25). From polling librarians, readers' advisers, publishers, and other persons interested in adult education, these authors compiled a list of 289 factors believed to contribute to readability for adults of limited education; these were classified as they pertained to (1) format or mechanical features, (2) general features of organization, (3) style of expression and presentation, and (4) content.

Research on format and mechanical features is found in the work of Tinker and Paterson on size and style of type; it is not to be considered here. Also the present investigation does not introduce aspects of organization and content though the method presented most certainly permits it. In actual practice the term readability has come to be customarily associated with aspects of style and expression because they have been the primary focal points of most of the work done. The specific concern of this study is with a method for developing

adequate criteria of readability primarily as they may be used for assessing aspects of style and expression.

Summary of Related Investigations

The importance of readability problems, as reflected in the number and kinds of studies devoted to them, evinces several almost distinct and gradually expanding stages. Initially the interest was in more accurate methods of grade placement of children's textbooks. Next came studies devoted to the selection and development of materials more suitable to individuals pursuing adult education. The current stage is characterized by the application of readability techniques which has become of concern to newspapers, press services, magazines, advertising agencies, book publishers, and industrial, governmental and other organizations. The investigators of the past few years do not seem to have been motivated by an interest in new techniques. Selected and pertinent investigations in each of these stages will be considered.

It is understandable that in the study of children's textbooks readability investigators first turned to vocabulary for a solution to their problem. An early comprehensive attack upon this was Thorndike's Teacher's Word Book, (41) and following its publication in 1921 studies of readability began to appear. Principally they presented ways of grading children's textbooks. The initial Thorndike list of 10,000 words was based on a count of about four and a half million running words from 41 different sources. Following each word in the list is a credit number indicative, according to Thorndike, of its importance - the credit number reflects the range of sources in which the word was found and its frequency of appearance. There were, of course, other word lists and

variations existed from one list to another. To compensate for these variations, composite lists were derived (7).

In the use of any word list, the typical procedure of the investigator was to count, list, and tabulate the frequency of each word, in the material or sample he wished to assess, in accordance with its appearance or absence from a given list or parts of that list. The investigator might choose to determine the number of words in his material that were in the first two thousand in a given list or perhaps the number not included in the first two thousand. If a one hundred word sample was used this figure could automatically be interpreted as a percentage. A weighted median index of Thorndike's credit numbers was used by Lively and Pressey to rate the difficulty of school textbooks (26). Words in the second 5,000 of The Teacher's Word Book plus ratings of omitted words were used by Keboch to analyze five 7th grade history texts (24). He first omitted Thorndike's most common 135 words from his analysis, but later as a result of Thorndike's opinion that practically all words in the first 5,000 were known by 7th graders, Keboch omitted these too. Dolch, using reading texts, illustrated five methods of analyzing vocabulary burden and pointed out weaknesses of the different methods in reflecting the influence of word repetition and relative difficulty of different words (8). Since an analysis of difficulty by word count may assume a close correlation between frequency and difficulty, Dolch attempted to control this dependency in developing his Combined Word Study List (7).

In 1939, Horn, commenting upon the tremendous amount of word counting being done, stated that "Even if one considered only the more extensive studies for which frequencies have been kept, the total running

words is well over 20 million" (20). Horn attributed this activity not only to the importance of the problem but to its high objectivity and to the fact that it is based upon counting -- the simplest form of quantitative investigation. He concluded that "we have accumulated very dependable data on the four or five thousand words most permanently, most frequently, and most universally used by adults." Also in 1939, Lorge said, "Vocabulary meanings are most symptomatic of reading difficulty in the sense of reading comprehension" (27). It should be recognized that analysis of difficulty by word count against a given list is undoubtedly of value; however, due to the absence of a measurable criterion against which many lists were originally developed, its exact validity is often unknown.

In 1928, Vogel and Washburne reported the results of a significant investigation of readability predictors (44). One hundred and fifty-two books from their Hinnetka Graded Book List were examined for three vocabulary elements, four elements of sentence structure, occurrence of parts of speech, paragraph construction, and physical make-up. For each book, the elements were tabulated and graphed to see if a significant fall or rise occurred from grade to grade. Elements showing greatest variability from grade to grade were further studied. The authors reported a multiple R of .845 between median score on the Standard Achievement Paragraph Meaning Test and the following predictors: number of different words in a sampling of 1,000 words, number of prepositions, including duplicates, in a 1,000 word sampling, number of different words including duplicates not found in Thorndike's list, and the number of simple sentences in 75. In 1936, the same authors reported "a more useful formula and an easier technique for applying it" (45). A multiple

R of .86 was developed between the same criterion and (a) the number of different words in a 1,000 word systematic sampling, (b) the number of the former not in the commonest 1,500 words in the English language, and (c) the number of sentences neither complex nor compound in a systematic sampling of 75 sentences. Whereas, the original formula was for grades III to IX, the latter included grades I and II. Previously mentioned studies have dealt with children's material; studies relating to adults or adult materials will now be considered.

In 1934, Dale and Tyler, hoping to minimize the effect of interest upon readability by using health materials, had adult Negroes of limited reading ability read such materials and gave them a comprehension test (6). They reported a multiple R of .51 between comprehension test scores and number of different technical words, number of different hard words not technical, and the number of indeterminate clauses.

Also in 1934, Ojemann reported a study which assessed the reading ability of parents and the difficulty of parent-education materials (35). Using scores upon a reading comprehension test which he developed as a criterion, Ojemann found the average difficulty of different words, the number of prepositions, the number of simple sentences, and the proportion of dependent clauses to be indicative of readability difficulty.

In 1935, Gray and Leary reported relationships between 44 possible predictors and comprehension test scores made by adults of limited reading ability who read forty-eight 100 word selections (16). Multiple R's of the order of .63 to .64 were obtained from eight predictors used in different combinations of four. They were as follows: number of different hard words, number of easy words, percentage of monosyllables, number of personal pronouns, average sentence length in words, percentage

of different words, number of prepositional phrases, and number of simple sentences. This study investigated a greater number of possible predictors than any that preceded or has followed it.

In 1939, Lorge reported the use of the McCall-Crabbs Standard Test Lessons in Reading, which are designed for children, as a criterion for studying five of the Gray-Leary predictors (27). His published multiple R of .76 with number of hard words, number of prepositional phrases and average sentence length against this criterion was later corrected to .67 as a result of errors in the Lorge data discovered by Dale and Chall (5).

Currently, concern with readability at the general adult level is chiefly associated with the work of Rudolf Flesch, a student of Lorge's. Readability studies of the past half dozen years, in the main, have used Flesch's techniques. In addition to publications in scientific journals, Flesch has written successfully for popular consumption and has become known as a readability consultant. His initial publication reviewed the literature and pointed out that previous formulae, developed upon children's material and on adults of limited reading ability, failed to predict adequately readability at the general adult level. Flesch drew three hundred and seventy-five 100 word reading samples from a hierarchy of 21 different magazines which "appeared to be typical of five clearly distinguishable levels of difficulty" (12:26). He then attempted to differentiate between these levels, using the previously mentioned Lorge predictors plus the number of affixes and number of abstract words. Upon the basis of this analysis, Flesch concluded that "When reading matter for adults was tested, frequency of uncommon words proved to decrease in its readability prediction value with mounting

difficulty of the text; whereas sentence length, number of abstract words, and number of affixed morphemes showed their value as indices of readability even for highly difficult material" (12:31). Having provided data showing the unsuitability of techniques developed from children and adults of limited reading ability, for application to general adult material, Flesch turned to the McCall-Crabbs material for the criterion against which his initially published formula was developed, thus leaving himself open to a possible charge of inconsistency.

Flesch obtained a multiple R of .73 using average sentence length in words, number of affixes, and number of personal references as independent variables.(12:34). Later he provided two additional formulae (13): (1) an index of reading ease using average sentence length in words and average word length in syllables, and (2) an index of human interest which employed the average percentage of "personal words" and average percentage of "personal sentences." The McCall-Crabbs passages remained the criterion. Recently, Flesch has introduced other formulae requiring cumbersome procedures - seven possible steps, one of which has sixteen separate substeps (14). One purports to include a measure of abstraction whereas the other is a different measure of reading ease; both are again based on relationships with McCall-Crabbs material.

Because of the unreliability of Flesch's affix count, Dale & Chall (5), again using the McCall-Crabbs material, developed a simpler formula. This uses the relative number of words not included in a specified list of 3,000 words known to 80 per cent of fourth graders and average sentence length; it is reported as giving a multiple R of .70.

Little doubt exists that a certain practical validity inheres in the Flesch and similar formulae. The increasing amount of literature

appearing on readability can be noticed by even the casual observer. Murphy reports a controlled investigation to show that such techniques increase readership (34) and Lestutter attests to their effect on comprehensibility (30). Others have reported on a variety of aspects concerned with the application of readability techniques (2,9,10,23,30,31,32,36,37,40).¹ The fact is, however, that inconsistent findings occur: different methods give varying difficulty positions to the material analyzed² and Koffka rates as easier than William James (39). Many of the formulae yield approximately the same multiple R's regardless of the various predictor combinations used; it appears that some sort of prediction ceiling exists for the approaches used and a plateau as far as the readability problem itself is concerned.

The Winnetka, Gray-Leary, and Dale and Tyler studies were the principal ones to employ a criterion and to use real live subjects. Lorge tried out Gray-Leary predictors with a criterion not before used while Flesch used Lorge's criterion but tried out some new predictors. The relationship obtained by Dale and Tyler failed to achieve as high a level as some other studies. Although Leverenz found that the frequency of words beginning with w, h, and b was greater in easy material and that in the same material comparatively few began with e and i, the Gray-Leary study did not offer much support to these findings (25). McCluskey had subjects read a total of six passages from a fiction book and five college texts and reported his analysis against a criterion

¹For additional references to the readability literature see: Flesch Readability Reading List by Sanford N. Hotchkiss and Donald G. Paterson in Personnel Psychology, 1950, 30, 327-344. This is an annotated bibliography.

²See: A Critical Analysis of the Objective Method of Measuring Reading Difficulty by C.J. Elliott, Pittsburgh Schools, 1941, 15, 201-209.

of the number of words read per second. His results are inconclusive since only 30 subjects completed the whole series (33).

Other readability investigators have principally been engaged in making comparative analyses using predictors found promising by others or ones which, a priori, appeared as promising.

At the present time, the presumed validity of readability predictors for materials at the general adult level has a very uncertain foundation. The major readability studies in the literature report use of one or more of the following: children or adults of limited reading ability as subjects, children's reading materials, and children's tests as criteria.³ In truth, progress in the field of adult readability has appeared to be handicapped. Despite apparent recognition of the goal, applicable methods do not seem to have been employed.

It is difficult to understand why readability investigators have not attended more to the criterion problem. In part the answer appears to be a zeal for immediate practical results - to grade textbooks, to make adult education more effective, and the like. Gray and Leary devote one paragraph to the discussion of the criterion and that purely on a descriptive level (16:96). A relevant quotation from Lorge already has been made on page 2; in the same article he points out criteria used by other investigators. Again, in another publication dealing with the same study, Lorge states "The literature of readability is concerned with the criterion for readability as well as with predictors

³Ojemann's study is an exception to this statement. He reports high criterion reliabilities, but since he did not use multiple regression a comparison of the predictive efficiency of his results with others is not readily possible.

of readability" (28). In 1943, Flesch stated, "For lack of anything better, like an extensive collection of reading tests of an adult population - nothing even approaching such a criterion is available at present - the writer decided to use a scale of widely read magazines a more reliable criterion on the adult level was not available" (12:25,32); again in 1948, he states "But such (criterion) data were not available at the time the first formula was developed and they are still unavailable today" (13).

One might say that the criterion problem has received lip service and not too much of that.

Criterion Aspects Related to Readability

In 1941, Bellows, in an article stressing the deceptive nature of criteria, stated that "efforts designed to evaluate predictive instruments have generally neglected the fact that basic criteria are fallible... Indices of reliability of criterion data seem as important as reliability of test data, yet few investigators appear to have made use of this as a possible basis for criterion evaluation."⁴ (1). Though it seems as if Bellows were directing his words to readability investigators, he was, in fact, writing about vocational criteria. Four of the six checks cited by Bellows upon the merit of the criterion are particularly pertinent to studying readability, namely (1) statistical reliability, (2) correlation with other criteria (3) predictability, and (4) production of a practical change in the situation by use of the derived instrument.

⁴Among other publications which emphasize the criterion problem are the following: Occupational Counseling Techniques by Stead, Shartle & Associates, New York: American Book Co., 1940.; Validity for What by John G. Jenkins, J. Con. Psychol., 1946, 10, 93-98.; The Prediction of Personal Adjustment by Paul Horst, New York: Social Science Research Council, Bulletin #48, 1941.

The ensuing discussion will consider these checks in relation to some of the readability studies previously mentioned.

In the development of personnel selection procedures, investigators frequently first make a detailed search for a number of criteria; next these are examined to determine if among the possible criteria one or more exist which are sufficiently reliable to warrant a testing program to uncover promising predictors.⁵ Bellows tells of the abandonment of an investigation which was not able to uncover reliable criterion data (1). No instances have been found where readability investigators have engaged in comparable procedures - indeed, the problem is virtually ignored. Since the reliability coefficient of the criterion establishes the ceiling of the relationship of any of the predictors with the criterion (i.e., the validity), this check would seem more important than others not only from a practical point of view, but from a scientific standpoint as well. If the tentative criterion does not possess sufficient reliability, the investigator's task, before searching for predictors, is to improve the reliability of his measure by such means as lengthening his test or isolating and eliminating the sources of unreliability.

The extent to which criteria were considered in the Winnetka study is unstated. Whether fortuitously or by design, the criterion used had a high reported reliability.⁶ Hence, it hardly seems fortuitous

⁵This and the ensuing discussion assume equal pertinency of various criteria to the purpose of the investigation.

⁶Reliability for ages 8-14 inc. range from .90 to .95; see Manual of Directions, Stanford Achievement Test, World Book Co., Chicago. Copyright 1922, 1925.

that the multiple R's (.845 and .86) obtained have exceeded considerably the correlations reported in other investigations. Gray and Leary report twelve reliability coefficients for the different groups upon whom their Adult Reading Test served as the criterion. These range from .48 to .78; the writer found them to average .64. Actually these coefficients are not reliability coefficients in the ordinary sense of the term, because they express the relationships between Form 1 which was a fiction test and Form 2, a non-fiction test. These coefficients come from the actual test population rather than having been determined in advance of final testing when they might have proved invaluable. No data have yet been uncovered on the reliability of the McCall-Crabbs Standard Test Lessons in Reading. They have been reported as normed from the Thorndike-McCall Reading Scale⁷ (27).

Along with criterion determination upon the basis of reliability, determination upon the basis of correlation with other criteria may be effected prior to the introduction of a testing program - an economical step, if reliabilities are adequate but their comparison does not indicate a clear choice among available criteria. The Gray-Leary investigation is the only one found in which the criterion was correlated with another possible one, the Monroe Standardized Silent Reading Test. However, instead of being administered to gather criterion data, the latter was administered to ascertain "within certain limitations, first, what is the general grade level of adult reading ability; and

⁷Estimated reliabilities for the Thorndike-McCall Reading Scale are provided in the Predictions of Vocational Success by E. L. Thorndike, New York: The Commonwealth Fund, 1934. This information was obtained through the courtesy of Professor Robert L. Thorndike and Professor Irving Lorge.

second, whether ability is markedly different among different classes of adult readers" (16:74). Correlations are reported again for separate groups as were the reliability figures; for Form 1 with the Monroe their average is .43 and for Form 2, .38; both the foregoing averages were calculated by the writer. One can speculate that securing these data prior to final testing might have saved a considerable amount of test administration or resulted in the use of the Monroe or some other test as the criterion rather than the so-called Adult Reading Test.

Production of a practical change in the situation by use of a derived instrument has less merit methodologically than any of the former checks. Reliabilities and validities of predictors are unknown and the investigator has little to guide him but shrewd guesses in the improvement of his instrument. Nonetheless, controlled follow-up procedures frequently may establish that a certain validity does exist. And so it has been with readability. Despite the few criteria used, and their manifest low or unknown reliability at the general adult level, certain predictors are used and to a degree apparently are effective.

The Purpose of This Investigation

It is hoped the foregoing pages indicate the manifest need of an attack upon the readability criterion problem. It is believed that two pertinent needs may be fulfilled if an adequate methodology can be devised and demonstrated as feasible; the first of these needs involves a long-range research program, the second pertains to immediately practical problems which beckon for solution.

The long-range research program contemplates an initial determination of parameters of readability or more probably parameters of readability of different kinds of reading material, say, fiction and non-fiction or perhaps of philosophy, literature, and newspaper content and as they interact with individual differences in reading ability, habits and interests. However, before this can be done, a criterion must be established against which different predictors can be examined.

Pending findings which would definitively determine readability parameters, book, newspaper, and magazine publishers, advertising agencies, schools, personnel training, and other communications departments of industrial, business, governmental and other organizations have pressing readability problems. An adequate methodology should contribute now to improved solutions for these problems. Such a method is described in Chapter II.

CHAPTER II

THE METHOD

Originally, a practical problem, namely, that of pre-testing idea producing advertisements, was the stimulus for this investigation. Previous techniques were deemed inadequate to solve that particular problem, and although the problem itself was abandoned, a solution at a higher level of generality was undertaken with this study.

This investigation used a modification of the method of paired-comparisons. The basic data produced by the method were judgments by interviewees of the relative difficulty between paired passages of reading materials plus the relative length of time required to read one passage against that with which it was paired. The procedure used will be described in the following order: (1) the selection and pairing of reading materials, (2) the sampling plan, (3) the determination of reading time, (4) the interview procedure, (5) the collection of data, and (6) comments on method.

Selection and Pairing of Reading Materials

The first step was to gather a fairly extensive collection of sample reading materials. No idea was entertained that this would be either a representative or a random sample of the universe of English reading materials. Standards for the selection of reading passages were but three: (1) passages should be understandable independently from the context from which they were drawn, (2) passages should

be limited in length to one side of a double-spaced typed page, i.e., approximately 325-400 words, (3) passages should be selected from all parts of the articles sampled. Following the above rules 200 sample passages which satisfied the above standards were selected, typed, and proof-read.¹ Minor alterations were necessary in only a few passages; as an example in passage "a" the word "Rossellini's" was substituted once at the beginning for the pronoun referring to him.

In order to determine if these passages were spread out on a rough difficulty continuum, two raters, one an M.A. in Psychology who had taught adult reading courses, the other a B.S. in Zoology with some graduate work, ranked them on a 7-category equal-appearing-interval scale. The relationship between these sets of rankings was represented by a contingency coefficient of .73. This was obtained from a 5 x 5 table after the two extreme categories had been combined. Raters were also requested to indicate samples which did not conform to the first standard above. Next, all sample passages were carefully re-examined by the investigator and an adviser for content which, it was believed,

¹Passages were selected from the following: American Magazine; American Scholar; Annals of the American Academy of Political and Social Science; Atlantic Monthly; Blue Book; Collier's; Cosmopolitan; Esquire; Exciting Sports; Foreign Affairs; Fortune; Good Housekeeping; Harper's; How to Think in War and Peace by Mortimer Adler, New York, Simon & Schuster, 1944; Ladies' Home Journal; Liberty; The Mature Mind by H. A. Overstreet, New York, W.W. Norton & Co., 1947; McCall's; New Love; New Yorker; New York Times; Official Detective Stories; The Principles of Psychology, Vol II, by William James, New York, Henry Holt & Co., 1890; Productive Thinking by Max Wertheimer, New York, Harper Bros., 1945; Ranch Romances; Readers' Digest; Redbook; Saturday Evening Post; Saturday Review of Literature; Scientific Monthly; Time and Tide; True Confessions; True Detective; Virginia Quarterly Review; Washington Post; Woman's Home Companion; Yale Review.

might offend members of particular religious, racial, political or socio-economic groups. These passages in addition to those identified by raters as not satisfying the first standard were discarded, as also were fiction passages and biographical passages that appeared to represent a different kind of writing from that which this investigation was concerned. In the foregoing manner about 53 passages were eliminated.

Five key samples (A, B, C, D, and E) on which the two raters were in complete agreement were then selected from equally spaced intervals on the scale of difficulty. Thirty two more samples were randomly selected one at a time from each cell in the residual contingency table until all possible cells had been drawn from.² These 32 samples were divided into two groups of 16 each, and each sample in each group was paired with every other sample in its group and with each of the five key samples. This arrangement gave rise to two separate groups of sample passages each with 210 pairings and each with the same 5 key passages in common.³ Since, from pretesting,⁴ it had been determined that four passages, i.e., two pairs, could be administered to a single interviewee, sets of 4 samples were constructed so that each pair within each group was randomly paired with another in the same group and no set of two pairs contained the same sample twice.

²The 37 reading samples identified, and their sources, comprise Appendix I. In the study proper, no identifying marks whatsoever exclusive of the text, appeared upon the face page of the passage.

³The sample pairings are shown in the first four columns of Appendix III.

⁴A description of the exploratory work which preceded the determination of the procedures used is presented in Appendix II.

In carrying out the pairing procedure each sample passage was placed so that it would be administered an equal number of times in the 1st, 2nd, 3rd, and 4th positions. "Caps" (A through U) were assigned to the passages in one group and small letters "f" through "u" to the remaining passages in the second group. The key samples A, B, C, D, and E were common to both groups. Sample passages will be identified accordingly throughout this study. In total there were, of course, 420 double pairings - the total number of complete interviews required.

Hectographed copies of the selected reading passages were prepared. The order of presentation was copied from the master-list of pairings to each interview form, and the appropriate hectographed samples were clipped to the form. Interviewers used samples from each of the two main groups on alternate interviews.

Sampling Plan

No attempt was made to secure a random sample of interviewees. An official city block was the actual sampling unit. A large map of the District of Columbia was obtained upon which each block was numbered. By the use of a table of random numbers, blocks were selected, listed serially, and a colored pin was placed in the map of the selected blocks.⁵ Through this procedure it was hoped that sampling bias could be reduced and a variety of interviewees could be obtained. The individual interviewees within the block were selected by the interviewers; this is explained in the section on "Interview Procedure."

⁵A photograph identifying the blocks used appears in Appendix II.

The Determination of Reading Time

Prior to its solution, one of the most baffling problems in this study was finding an acceptable method of determining reading time without the subjects' awareness. It was assumed that such a procedure would contribute to the maximization of time variance - a desirable goal in this study. Precise methods of timing reading are, of course, available when the subject is placed in a test situation; however, they were of no assistance here because, first, the subject generally knows he is being timed or at least suspicious of it, and second, such methods generally require subjects to be tested at a single place. Since individuals from a general population were desired the timing device had to be portable. Furthermore, because of limited funds, the device had to be inexpensive.

From pre-testing, it was evident that an unusual or apparent manipulation was quite likely to arouse suspicion. Such methods as having stopwatches in the interviewers' pockets or attempting to observe a wristwatch without being detected were clearly unacceptable. It was also believed that they would introduce considerable absolute as well as variable timing error due to the interviewer's attempts to keep the timing as well as the recording unobserved. The task, then, was to evolve a method of securing a separate unobserved timing for each of four different reading passages and to do this with fair accuracy and inexpensively.

The possible solutions to this problem that were considered were many. Their recapitulation is probably a matter for the trained

introspectionist. Eventually the problem was solved by constructing a box with a hinged clipboard top; four stopwatches were concealed within the box where room also existed for interviewing forms and reading samples.⁶ This was called a silent recorder and it met all the criteria stated above. A total of three were constructed.

The reader who has used a clipboard in interviewing will appreciate that a natural posture is assumed by holding the left edge of the clipboard with the left hand while writing with the right hand. In effect this study merely used a thick clipboard. The tips of the fingers of the left hand normally rested against the underside of the box where notches provided easy access to the stopwatch slides. It had been assumed in designing the equipment that interviewees would regard this as a natural posture and that it would arouse no suspicion. Such proved to be the case. Although several interviewees did ask if they were to be timed prior to beginning the interviewing procedure, in no instance did any interviewer feel that the subject knew or suspected that he was being timed. The spring clip on the top was used to hold the interview form and reading passages in use at the time. At the suggestion of one of the interviewers, a newspaper was carried against the bottom of the silent recorder in order to conceal the stopwatch slides from view.

⁶ A detailed description of the silent recorder is found in Appendix II.

Interview Procedure

The reader can best understand the interviewing procedure from a copy of the instructions issued to each interviewer:

When to Interview.

4 to 4 1/2 hours in morning or afternoon

2 1/2 to 3 hours in evening and/or Saturday?

Whom to Interview.

Adults only who can give the tasks their full attention. Record all calls where someone answers the door. Select every sixth dwelling unit on four sides of the block to call on. If no one is home go to the next dwelling unit and then to the sixth beyond that. If interviewers have not been obtained from one sixth of the dwelling units by the time the four sides of the block are covered, start again and call upon units not previously visited.⁸

Approach.

Be neatly dressed. Do not ring bell furiously but sufficiently to be heard. Use following approach.

"Good morning (evening) Madame (Sir). I am from the University of Maryland. We are making a study of how readable different articles are. Would you be kind enough to read four very short passages that

⁷In order to insure representation of an employed population, night as well as day interviews were required.

⁸This standard proved impractical - requiring too much time. As revised, it required interviews from approximately 1/6 of the dwelling units in a block.

have been taken from current newspapers, magazines, and books and give us your opinion of them?"⁹

At this point you may have to assure interviewees that you are not selling anything, or taking orders for any type of merchandise or service. If necessary, show your letter of identification. You should attempt to enlist interviewee's cooperation but without exerting undue pressure. Under no circumstances tell the interviewee that "It will only require a couple of minutes."

After thanking interviewee for assenting and gaining admittance say "Now if you don't mind, we'll need to do this in a room where you will not be interrupted." (If interviewee indicates this not possible, ask if you can wait or return at a time when interruptions will not be made. If you receive another appointment, be sure to keep it.)

Next try asking interviewee "Which chair do you generally sit in to read?" Then place a chair for yourself so that your right side is nearer to interviewee¹⁰ but if possible to his side so that you are not directly facing him, and, it is hoped, in a manner that will permit him to feel he is not under surveillance. Busying yourself with the forms, while interviewee is reading, should help.

Presentation of Samples.

As you present the first sample, say "Please read this completely through in the same way you usually read." Start timing as soon as

⁹No insistence was placed upon the use of these exact words. Much insistence was placed upon observance of the intent of the instructions, especially in not exerting pressure to secure an interview. To secure interviews in some of the upper economic groups a slight variant of the above approach was used by telephone.

¹⁰The purpose of this was to have the hand that controlled the stopwatches away from the interviewee.

you notice first eye movement. Stop as interviewee looks up or starts to tender you the sample. Then say, "Now this is the second; just read it completely through as you did the first" (providing he has performed procedure correctly the first time).

Following the completion of the second sample, say, "Now, would you tell me which one of these was the harder or more difficult for you to read?" (Be sure to force a choice and encircle the harder). Then pause a moment and say, "Can you tell me why you think _____ was harder for you?" After recording the response opposite the appropriate sample, say, "Is there any other reason?" Continue this procedure until interviewee has named all reasons for his choice, and then say "That's fine!"

Next say: "Now could you please give me a one sentence summary having the opposite meaning of the first passage which you read?" Give examples, if necessary - which, of course, do not pertain to sample read. If interviewee cannot reverse meaning ask for a straight summary. If he cannot do this, ask him if he'd like to look at the sample again and note additional time required from your own watch. Record it unobtrusively while the re-reading occurs, and then get his summary. Then repeat the foregoing process for the second passage. During the whole procedure it is vital not to allow the interviewee to be embarrassed or feel he is being made a fool of. If he cannot perform the tasks required, he should be given to understand that samples have been selected because of their obscurity, difficulty, or confused expression - i.e., his trouble is perfectly normal.

The complete procedure should then be repeated for the second pair. Be sure to express appreciation; let interviewee know he is

being a big help and try to have him appreciate that you feel this is quite important. In this way it should be possible to maintain motivation during the last two samples. After getting summaries for the last two samples, make your exit quickly and gracefully. Do not, however, fail to satisfy any queries interviewees may have (except, of course, the timing). Return then to your car, record times, reset watches, and at this time be sure your interview form is completed in every respect. If an interview has been spoiled through some interruption (other than a short question, in which case take time out) of any duration, complete it but record the reason for its invalidity, select a blank interview form, copy down the same pairings and use it at the next interview.

Collection of Data

Prior to the collection of the final data each interviewer worked several days in a non-sample area obtaining practice interviews until he was thoroughly familiar with the interview technique and felt at ease in the interview situation. If a prospective interviewer did not satisfy the foregoing criteria, he was not employed to collect data from the sample proper; such proved to be the case in one instance.

The data were collected between the dates of August 8 and November 5, 1951, within the District of Columbia by six interviewers.¹¹

¹¹These data are found in the first twelve columns of Appendix III.

A total of 63 blocks was worked in the approximate order in which they had been randomly selected. In possibly a half dozen cases, interviews came from outside the designated blocks because of errors in locating the blocks from the telephone cross-cross book and the like; these interviews were not discarded, if, in the opinion of the interviewer, they came from economic areas comparable to the designated block.¹² About one in every twelve interviews had to be repeated for one or more of the following reasons: (a) failure of interviewee to follow instructions, (b) refusal of interviewee to continue the interview, (c) unavoidable interruptions at official times such as, doorbells, telephone, children, cooking food, etc., (d) error upon the part of the interviewer. In a few instances, interviewees were unable to make a difficult choice and these were decided by coin toss at a later time.

Comments on Method

Two lines of evidence had indicated that the approach employed in this investigation might be promising. The first is methodological in character and concerns the advantages and potentials of the method of paired comparisons while the second derives from reading investigations.

Gulliksen has remarked upon the "great flexibility and generality"

¹²Interviewers were paid on an hourly basis from the time they left the University of Maryland until they returned and therefore had nothing monetarily to gain by representing interviews as acceptable when the contrary might be true.

of the method of paired comparisons; also he has offered a "broader definition of measurement than that given by other writers" and attempted to show that scales constructed by the method of paired comparisons will satisfy this broader definition of measurement (18). Although the purpose of this investigation was not to develop a reading scale, it would be desirable to indicate this to be feasible.

Application of the method of paired comparisons to passages of prose is not new, having been made years ago by Hillegas (17:224). It has the advantage of permitting a simple understandable request to be made of the subject, regardless of the number or magnitude of the bases which may underlie the judgment requested. Likewise, the minimal response by the subject can be made in simple terms; he determines the criteria for his response explicitly or unknowingly. Such a method is especially valuable when confronting individuals varying widely in education and intelligence with a problem of the kind used in this study.

From the field of reading, promising indicators of the value of reading time as a criterion are abundant. It has been reported that recognition span is reduced as difficulty of reading material increases; that fixations per line increase with increased difficulty of material; that regressive eye-movements increase with increased difficulty; and that average fixation time is longer as difficulty increases (4). Everyday observations of these phenomena may, of course, be made by an interested observer. Finally, there has been confirmation in the choice of a similar criterion by another readability investigator, McCluskey (23), a fact unnoticed prior to the time this study was designed.

CHAPTER III

RESULTS AND DISCUSSION

The results of this study and their interpretation will be presented in the following sections: (1) selection of criterion reading passages, (2) analysis of reading passages, (3) predictor differentiation between "Hard" and "Easy" passages, and (4) general discussion.

Selection of Criterion Reading Passages

The reader will recall that two kinds of criterion data were to be studied: (1) the readers' judgments of the relative reading difficulty in each of two pairs of passages, and (2) the relative time required to read the same passages. The development of useable data from the foregoing required several steps to determine the comparability of the data between the first and second pairs of passages presented to each subject.

It has been the custom in readability studies to use the number of words (frequently one hundred) as a base denoting the size of the sample or passage being analysed. This seems somewhat analogous to using an elastic yardstick inasmuch as passages with an equal number of words may vary considerably in length. Mere custom in such matters is hardly a sufficient reason for continuing to use samples of variable length because they count up to 100 words. A more invariable base of the length of the passages, 2,000 type spaces,

was used in this study; this was calculated by counting the spaces taken up by each single line and adding the line totals, thus omitting spaces between the last word in one line and the first of another. This practice has certain precedents in advertising and newspaper work. Accordingly, constants were calculated for each of the passages in order that subsequent analyses might proceed upon the assumption that the reading passages were of equivalent length.¹ The first step was to convert all actual reading times to a base of reading time per 2,000 spaces.²

It was then feasible to determine the number of times a passage required longer to read than others within each main group for each of the two pairs administered. These data are presented in Tables I and II. The frequencies for passages requiring a longer reading time reflect the converted reading time plus the added converted time. As a matter of fact, the inclusion of the added converted times makes little difference in the results. Upon logical grounds, however, it has the advantage of including all the time necessary to elicit a response from an interviewee. In order to determine if combining data for the first and second pairs of the two groups was permissible, chi square was calculated between each judgment and each relative time pair in each group and the decision was made to combine. The chi square values are found in Table III.

¹The constants used are presented at the beginning of Appendix III.

²Actual and converted reading times in seconds are shown in columns 5-8 and in columns 13-16 respectively in Appendix III; columns 9-12 and 17-20 show the added times and the converted added times.

Table I

**Judged Difficulty and Relative
Time Frequencies by Pairs for
"Caps" Group.**

Frequencies with which passages were judged more difficult when administered as a member of the 1st and 2nd Pair			Frequencies with which passages required a longer time to read when administered as a member of the 1st and 2nd Pair			
<u>1st Pair</u>	<u>2nd Pair</u>	<u>Total</u>	<u>1st Pair</u>	<u>2nd Pair</u>	<u>Total</u>	
A	16	20	36	13	17	30
B	11	16	27	13	13	26
C	13	12	25	9	9	18
D	3	2	5	9	4	13
E	2	2	4	5	7	12
F	11	6	17	4	4	8
G	7	9	16	11	14	25
H	11	13	24	9	11	20
I	14	15	29	14	15	29
J	6	6	12	5	5	10
K	2	2	4	3	2	5
L	13	14	27	11	14	25
M	7	3	10	9	8	17
N	4	3	7	10	8	18
O	14	11	25	14	13	27
P	9	10	19	9	14	23
Q	11	15	26	8	4	12
R	16	14	30	14	15	29
S	14	12	26	10	10	20
T	18	18	36	18	14	32
U	8	7	15	12	9	21
		<u>420</u>			<u>420</u>	

Table II

Judged Difficulty and Relative
Time Frequencies by Pairs for
"Lower Case" Group.

Frequencies with which passages were judged more difficult when administered as a member of the 1st and 2nd Pair			Frequencies with which passages required a longer time to read when administered as a member of the 1st and 2nd Pair		
<u>1st Pair</u>	<u>2nd Pair</u>	<u>Total</u>	<u>1st Pair</u>	<u>2nd Pair</u>	<u>Total</u>
A 16	18	34	16	16	32
B 8	8	16	14	16	30
C 10	11	21	13	7	20
D 7	9	16	8	5	13
E 3	4	7	2	6	8
F 13	14	27	9	12	21
G 6	6	12	10	8	18
H 8	8	16	6	11	17
I 4	2	6	6	6	12
J 6	6	12	12	11	23
K 11	9	20	16	14	30
L 14	12	26	12	14	26
M 6	7	13	5	5	10
N 7	7	14	8	7	15
O 8	9	17	10	8	18
P 11	9	20	12	9	21
Q 8	10	18	4	10	14
R 15	14	29	13	8	21
S 18	14	32	13	14	27
T 15	14	29	11	13	24
U 16	19	35	10	10	20
		<u>420</u>			<u>420</u>

TABLE III

Chi Square and P Values between 1st and 2nd Pair Judgments and between 1st and 2nd Pair Relative Time Frequencies for "Caps" and "Lower Case" Groups

	Caps		Lower	
	χ^2	P	χ^2	P
Judged Difficulty	6.68	>.99	3.08	>.99
Relative Time	7.64	>.99	11.80	<.95>.90

Although the decision was made to combine judgments and relative time frequencies, the reader should not assume that there were no differences between passages administered as members of the first and second pairs. In terms of actual reading time required, when converted to 2,000 spaces, $\frac{1}{2}$ values for the differences between the means of passages for both the "Caps" and "Lower Case" groups were significant at less than the one per cent level. This, in conjunction with the relative time chi square values, indicates that while a knowledge of the task influenced the absolute reading time, proof is not available that the relative time relationships were significantly affected. Table IV presents the means of the initial reading times for each passage. Readers interested in this aspect of this study will probably find a more accurate reflection of the reading speed of a sample of a general population in the median initial reading times which are shown in Table V. When considering these data, it is well to remember that, although all individuals who read the first pair in the "Caps" and "Lower Case" Groups read the second pairs too, this

Table IV

Mean Reading Time in Seconds by Pairs
Converted to 2,000 type spaces

"Caps"		"Lower Case"	
<u>1st Pair</u>	<u>2nd Pair</u>	<u>1st Pair</u>	<u>2nd Pair</u>
A	118	A	107
B	110	B	108
C	109	C	95
D	99	D	88
E	85	E	83
F	92	f	95
G	96	g	116
H	103	h	91
I	120	i	92
J	88	j	108
K	80	k	105
L	121	l	99
M	100	m	93
N	97	n	96
O	113	o	108
P	97	p	98
Q	94	q	89
R	126	r	118
S	104	s	103
T	119	t	121
U	92	u	92
			138
			137
			107
			91
			95
			123
			129
			101
			84
			111
			134
			135
			95
			96
			110
			120
			115
			125
			110
			101
			115

Table V

Median Reading Time in Seconds
Converted to 2,000 type spaces

"Caps"		"Lower Case"	
<u>1st Pair</u>	<u>2nd Pair</u>	<u>1st Pair</u>	<u>2nd Pair</u>
A	108.5	A	104.5
B	88.	B	101.
C	94.	C	86.5
D	97.	D	80.0
E	74.	E	83.5
F	98.	F	91.
G	93.5	G	116.5
H	91.5	H	85.
I	112.5	I	82.5
J	87.5	J	93.
K	78.	K	100.
L	112.5	L	96.
M	96.	M	94.
N	86.5	N	92.5
O	90.5	O	96.
P	75.	P	92.
Q	86.5	Q	81.5
R	114.5	R	119.5
S	92.5	S	103.
T	111.	T	102.5
U	88.5	U	93.
			115.5

statement holds only for each group as a whole - the individuals who read given passages as a member of the first pair were not the same individuals who read that passage as a member of the second pair.

In the "Caps" group, the mean converted reading time per 2,000 spaces is 103 seconds for the first pair, while the median of the medians is 91.5; the range of converted times for this pair is from 35 to 365 seconds. For the 2nd pair of the "Caps" group, mean reading time is 118 seconds, while median of the medians is 106.5; the range for the 2nd pair is 35 to 728. For the 1st pair of the "Lower Case" group, the mean reading time is 100 seconds while the median of the medians is 93; the range for the 1st pair of the "Lower Case" group is 30 to 328. For the 2nd pair of the "Lower Case" group, the mean reading time is 113 seconds, while the median of the medians is 101. The range for the 2nd pair of the "Lower Case" group is 30 to 453. Since reading time is generally quoted in words per minute, the average number of words per 2,000 spaces for all the passages was computed.³ This is 341 words. The times for the 1st pairs probably approximate normal reading speed more closely than do those for the 2nd pair; it is evident that the population sampled read the 1st pair of the "Caps" group at 199 words per minute and the 1st pair of the "Lower Case" group at 205 words per minute. This may be compared with 250 words

³In view of the actual type space variation for passages having the same number of words, it appears just as fallacious to quote reading speed in terms of the number of words per minute as it does to compute readability indices for a base of 100 words.

per minute which approximates figures quoted as an average of entering college freshmen.⁴

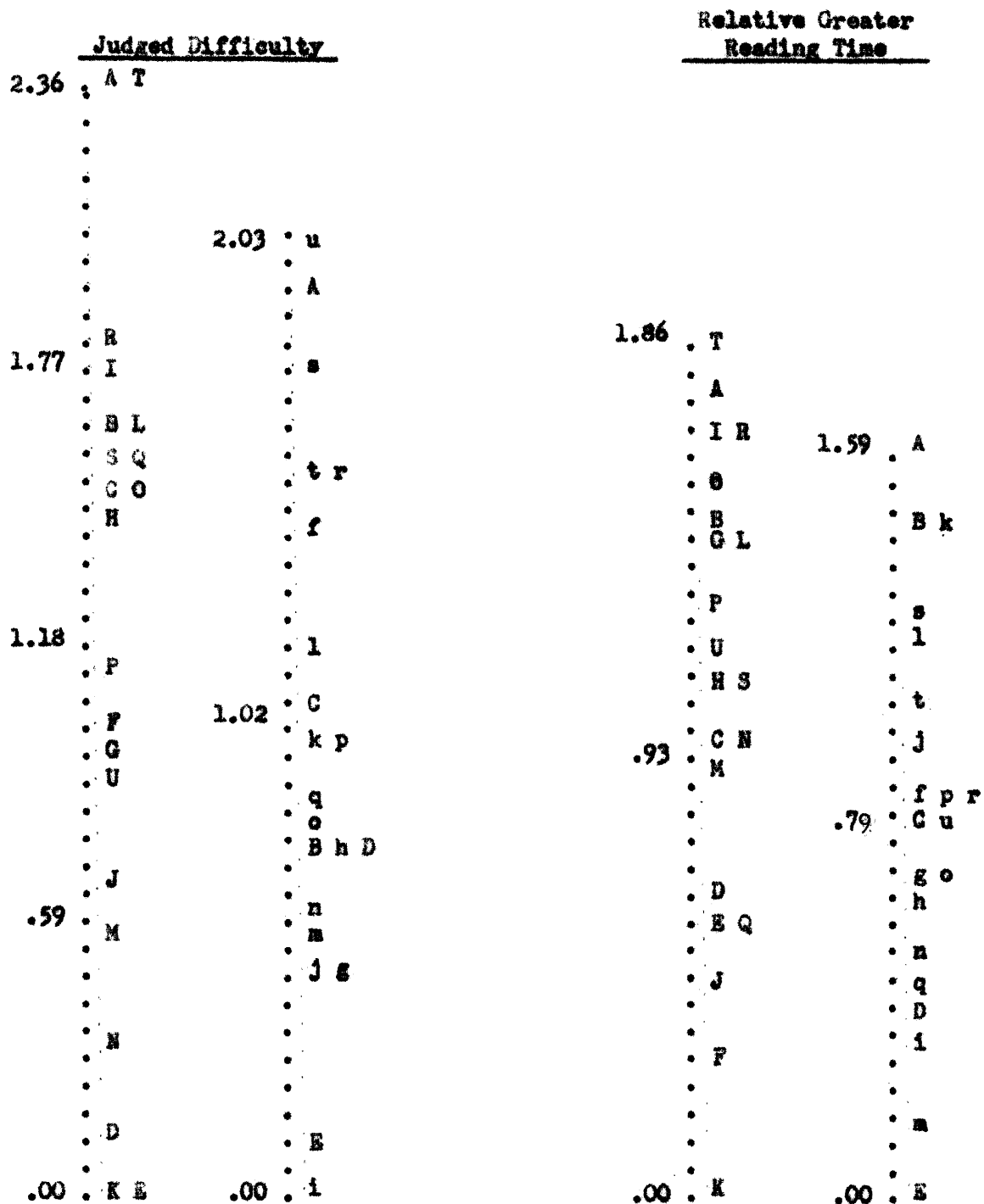
In Appendix II the reader will find a general distribution of the converted initial reading times for all the passages.

The next step consisted in scaling the values presented in Tables I and II. The results of this operation appear in Figure 1.

Figure 1 highlights certain facts which may escape one's attention when looking at Table I and others which should be considered in relation to it. It is apparent that the method employed has discriminated among the passages for both criteria. On the four scales in Figure 1, single passages appear at different scale positions 46 times; on 16 occasions different passages fall at the same point; and upon 2 occasions, three passages appear together. To put it another way, 84 passage scalings occupy 64 different scale points. The crude method of depicting these scalings in Figure 1 tends to make differences at the "difficult" end of the scales appear greater than they actually are, while at the same time failing to reflect differences at the "easy" end of the scales. If the mean scale values were placed opposite one another the reader would get a truer picture of differences at the ends of the continua. Accordingly, it should be noted that the difficulty judgments for the scale at the left were only numerically greater by 4 than were the number of times taken longer to read for the scale at the right. Because of combining the

⁴See Problems in the Improvement of Reading in High School and College. Lancaster, Pa; The Science Press Printing Co., 1936. It is, of course, misleading to quote averages of college reading rates because the data are more characterized by variability than uniformity.

Figure I
Scale Values³



³ The above are not presented as reading scales. Values were derived by converting frequencies in Tables I and II to percentages and the latter to normal curve deviates in a manner similar but not identical with Guilford (19236). When plotted it appears that these data may be linear but were not so tested because of the small N's.

data for the first and second pairs, forty was the greatest number by which a passage could be chosen as more difficult or could require longer to read within a given scale; thus a given passage could potentially occupy 41 scaled positions.

The reading passages as depicted in Figure 1 can be identified in three ways;

1. Those showing reasonable consistency in their positions for both judgment and relative time criteria and identifiable as extremes.
2. Those showing reasonable consistency in their positions about the centers of the scales, and
3. Those passages whose positions on the judgment and relative time criteria are inconsistent.

Passages A, T, R, I, O, L, f, l, s, t, and r were selected from the difficult ends of the judgment and relative time continua and will henceforth be called "Hard." Passages E, K, D, J, M, N, h, i, m, n, and q were selected from the opposite end and henceforth will be designated as "Easy."

These two groups of passages constitute the two criterion groups - furthermore, the manner of their selection constitutes the operational definition of readability promised in Chapter I; more specifically, passages actually judged as more difficult and passages taking a relatively greater time to read than those with which they were paired are operationally less readable.

Passages B, F, G, C, g, j, k, u, constitute a group for which the technique employed in this investigation may not be appropriate. On the other hand, it may be that merely a larger reader N is required to establish agreement between the two criteria employed. Either criterion, of course, could be used alone depending upon its pertinancy

to the situation at hand, there being nothing sacred about combining them.

Passages C, H, P, S, U, o, and p constitute the "centers" of the difficulty continua and were not retained in the criterion groups.

Analysis of Reading Passages

From Chapter I some notion may have been gained of the kinds and number of variables for which reading passages have been analyzed. Although the focal point of this investigation was to develop a method for the determination of readability criteria and not to determine readability parameters, we shall proceed with a limited analysis of the passages employed despite the small N for both passages and readers.

Because of the considerable experience of Lorge and Flesch with variables used by others, the original decision was to use variables indicated by them as predictive. The comparatively recent report of Dale & Chall (5) dictated that a count of words not included in Dale's 3,000 word list should be made rather than that based upon his 769 word list used by Lorge. The decision was also made to use prefixes alone and the calculation procedure made it a simple matter to include the number of words and sentences per 2,000 type spaces. Variables are identified as follows:⁵

⁵The data for these variables are presented in Appendix IV. The words "number of..." are implied after the dash as prefacing each line except for X_3 and X_{11} . Different "Hard" words (X_1) mean different words not included in Dale's 3,000 word list exclusive of names of persons or places; see Edgar Dale and Jeanne Chall, A Formula for Predicting Readability: Instructions, Educ. Res. Bull., Ohio State University, 1948, 27, 37-54; these authors include duplicates. Prepositional phrases were counted after the instructions of Lorge (28). An attempt was made to follow Flesch's instructions for the following variables: X_3 , X_4 , X_7 , X_{11} , (13); X_6 (12); and X_{10} (14). Others doubtless may quibble with these counts; it is believed reasonable accuracy was attained but not micrometric accuracy. Undoubtedly significance levels of less than .0001 can be attained if a sufficient number of counting rules be stipulated. Readability formula instructions are currently surpassing a point of practicability with their myriads of "count," "but don't count" and other exceptions.

- X_1 - Different "Hard" words per 2,000 type spaces
- X_2 - Prefixes per 2,000 type spaces
- X_3 - Average Sentence Length in Words
- X_4 - "Personal" words per 2,000 type spaces
- X_5 - Sentences per 2,000 type spaces
- X_6 - Affixes per 2,000 type spaces
- X_7 - "Personal" Sentences per 2,000 type spaces
- X_8 - Words per 2,000 type spaces
- X_9 - Prepositional Phrases per 2,000 type spaces
- X_{10} - "Definite" Words per 2,000 type spaces
- X_{11} - Average Word Length in Syllables

Table VI presents the mean, t , and P values for the "Hard" and "Easy" criterion groups for each variable.

Table VI

Mean, t , and P values for Hard and Easy
Criterion Passages for each
Predictor Variable

	Means		t^*	P
	Hard	Easy		
X_1	67.64	48.64	3.384	<.01>.001
X_2	52.27	42.09	2.696	<.05>.02
X_3	27.24	20.54	2.223	.05
X_4	14.36	27.00	1.823	<.10>.05
X_5	13.70	18.41	1.891	<.10>.05
X_6	154.45	131.27	2.671	<.05>.02
X_7	1.64	4.00	1.388	<.20>.10
X_8	337.82	349.27	1.365	<.20>.10
X_9	42.45	38.91	1.301	<.30>.20
X_{10}	74.09	95.37	1.753	<.20>.10
X_{11}	1.621	1.554	1.219	<.30>.20

*df = 10, which does not assume equal variances (22:75).

It may be observed that hard words, prefixes, average sentence length, and affixes are significant at the 5 per cent level or below and that "hard" words is significant at below the 1 per cent level. This latter significance appears the more remarkable because a count of duplicate words was not included, a procedure contrary to Dale and Chall's instructions (see footnote 5). It should be noted that there is a difference of over 12 words per 2,000 spaces between the "Hard" and "Easy" passages. This suggests the dubious merit of using the number of words as a base value to compute readability indices but the argument may be strengthened when the range of differences per 2,000 spaces is considered. Among the "Hard" passages there was a difference of 59 words per 2,000 spaces between passage "I" and passage "f"; among the "Easy" passages the difference was 71 between passage "J" and passage "i" (see Appendix IV). Frequently readability investigators have been careful to point out limitations of their formulas as guides for writing. Nonetheless, with the increasing general applications of these formulae under the impact of the increasing popular testimony to their effectiveness, writers gifted with the ability to say things succinctly may well be penalized under a word-base system. Correlative to this problem is that of equating for content in terms of the ideas and information conveyed. At what point is it justifiable for a writer to alter his style in terms of sentence construction, vocabulary, and other factors for the sake of readability? These are matters for experimental determination through a design sufficiently ingenious to tap such complex interactions.

Table VII presents the inter-correlations between the first ten of the predictor variables; because of error in the computation of the original t values, which had indicated an even less significant value, average word length in syllables was dropped. Though the merit of including values at this level of significance is doubtful, it would have been included had the error not been made. In the interpretation of this table the reader should be guided by the fact that with 20 degrees of freedom, a correlation of .54 is significantly greater than zero at the 1 per cent level while one of .42 is significant at the 5 per cent level. If one chooses the former level, 22 of the 45 correlations may be depended upon as indicative of some relationship; if the latter, 37 of the 45 are indicative.

Table VII

Zero-order Correlations
between Predictor Variables⁶

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀
X ₁		.51	.41	-.68	-.60	.62	-.46	-.80	.44	-.75
X ₂			.47	-.24	-.50	.82	-.54	-.63	.09	-.42
X ₃				-.48	-.86	.39	-.49	-.56	.47	-.60
X ₄					.60	-.31	.33	.70	-.47	.90
X ₅						-.46	.63	.75	-.44	.66
X ₆							-.62	-.67	.27	-.55
X ₇								.51	-.60	.43
X ₈									-.33	.82
X ₉										-.46

⁶Correlations are presented here with the sign they would have had if computed from the raw data (see footnote 3). For the convenience of the reader, the identification of the variables is repeated here:

X ₁ -Different "Hard" Words per 2,000 type spaces	X ₆ -Affixes per 2,000 type spaces
X ₂ -Prefixes per 2,000 type spaces	X ₇ -"Personal" Sentences per 2,000 type spaces
X ₃ -Average Sentence Length in Words	X ₈ -Words per 2,000 type spaces
X ₄ -"Personal" Words per 2,000 type spaces	X ₉ -Prepositional Phrases per 2,000 type spaces
X ₅ -Sentences per 2,000 type spaces	X ₁₀ -"Definite" Words per 2,000 type spaces

Predictor Differentiation between "Hard" and "Easy" Passages

In order to determine the significance of the combination of predictor variables employed to the groups of "Hard" and "Easy" criterion passages, a discriminant function was calculated with the first nine variables. Variable X_{10} , definite words,⁷ was dropped from this calculation because of its high correlation (.90) with personal words and with mere words per 2,000 spaces (.82).

The discriminant function, developed by L. A. Fisher, provides a solution, similar to multiple regression, for situations in which the dependent or criterion variable is dichotomized. "The principle upon which the discriminant function rests is that the linear functions of the measurements will maximize the ratio of the difference between the specific means to the standard deviations within the classes" (22:344). The computational scheme set forth by Palmer C. Johnson was employed (22:347-352). This treatment resulted in the following prediction equation:⁸

$$X_t = .010361X_1 + .005159X_2 + .007646X_3 + .002113X_4 + .000280X_5 \\ + .001767X_6 - .004487X_7 - .008809X_8 - .003291X_9$$

⁷The merit of this measure has already been questioned in the literature by Jenkins and Jones (21).

⁸It should be noted that in Table VI variables X_4 , X_5 , X_7 , and X_8 possess larger means for the "Easy" passages whereas the reverse situation obtains for the other variables. Since the computational scheme employed required uni-directional mean values, the raw data values for the foregoing variables were coded as follows: $X_4' = 65 - X_4$; $X_5' = 100 - X_5$; $X_7' = 15 - (X_7 + 1)$; $X_8' = 400 - X_8$.

When this equation was applied to the raw data for the nine variables used, a t value between the means of the predicted values for the "Hard" and "Easy" passages of 5.191 ($P < .001$) resulted. The biserial correlation coefficient based on these predicted values is .95. Predicted values were also calculated for passages showing inconsistencies between the judged difficulty and relative time criteria and for passages which fall near the centers of the criteria distributions. Table VIII presents the predicted values for all the reading samples used in this study while Figures 2, 3, and 4 depict their distributions.

Table VIII

Predicted Values for All Reading Passages

"Hard"		"Easy"		"Inconsistent"		"Centers"	
A	.926	E	.408	B	.818	C	.690
T	1.056	K	.506	F	.671	H	.436
R	.909	D	.608	G	.623	P	.654
I	.943	J	.559	Q	.856	S	.803
O	.924	M	.622	g	.672	U	.740
L	.800	N	.605	J	.755	o	.808
f	.657	h	.725	k	.523	p	.664
l	.817	i	.594	u	.628		
r	.593	m	.587				
s	.782	n	.633				
t	.770	q	.630				

Passage "r" in the "Hard" group has a predicted value almost as low as the mean of the "Easy" group while passage "h" in the "Easy" group has a predicted value which overlaps "f" in the "Hard" group but does not so closely approach the mean of the "Hard" group as does "r" with the "Easy" group. With the exception of these two passages there is no overlap between the predicted values for the two criterion groups. The lack of spread on the whole for the "inconsistent"

Figure 2

Distribution of Predicted Values
for Criterion Passages

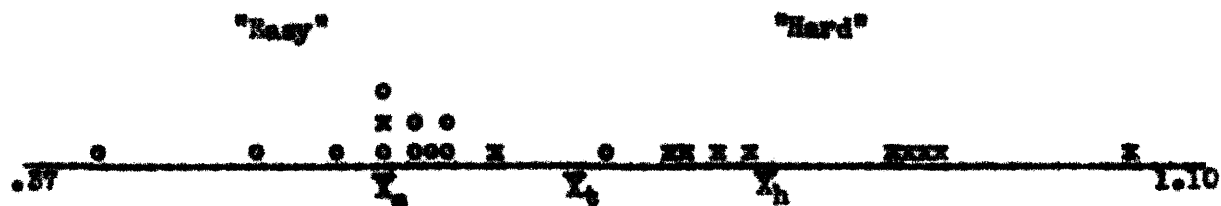


Figure 3

Distribution of Predicted Values
for Passages Showing Criteria
"Inconsistency"



Figure 4

Distribution of Predicted Values
for Passages in the "Centers"
of the Criteria Continua



group and the group from the "centers" of the criteria continua are readily observable; however, each of these groups contains a passage deviating markedly from the others, and indicating, as in the instances of "r" and "h", either criterion weakness or an insufficiency of predictors.

General Discussion

The reader is asked to recall Bellows' checks of the merit of criteria so that this investigation may now be discussed in those terms.

Reliability.

The procedure used in this study does not lend itself to the conventional measures of reliability estimation. However, the general method might be evaluated by Kendall's coefficient of agreement (22:177) if used with a smaller group of reading samples with several subjects each making judgments of every possible combination. With such a procedure, though, there might be dangers of two kinds: (1) with repeated administrations to the same subject, subjects might well suspicion they are being times, a matter that could vitiate the entire results, and (2) the effect of making repeated judgments may introduce differential intra-individual bias in the judgment process. The fact that 29 of the 37 (i.e., "Hard," "Easy," and "Centers") reading passages maintained relatively consistent positions on the judgment and relative time criteria is evidence to the credit of the general method rather than evidence of reliability. In this connection, it may be pointed out, that, even in the so-called "inconsistent" group of passages, three, F, g, and u, did not occupy positions across the mid-points of the different scales.

More pertinent, though, to reliability, are the relative positions of the five key passages, which were common to both groups, upon the two judged difficulty scales and upon the two relative time scales. The idea

of using samples in this way came from Uhrbrock and Richardson's report which described the rating of supervisors (43). Passage A is highly consistent upon the two judgment and two relative time scales. Passage B shows relative consistency on the time scales at the difficult ends of the continua but on one of the judgment scales places on the easy end of the continuum. Passage C places quite consistently around the center of the continua, never being separated from the mid-points of the different scales by more than one scale position. Passage D, while not showing the consistency of C is always at the easy end of the scales, its positions upon relative time being in closer agreement than upon the judgment ones. Passage E shows high consistency on the judgment scales but only fair consistency on the relative time ones. If a qualitative judgment regarding reliability is permissible, these data may be said to evince reliability. In only one instance does one of the key samples give a value at an opposite end of the scale from other values for the same passage.

For quantitative indications of reliability, the reader should refer to the chi square values in Table III (p. 32). These data are certainly indicative of the method's reliability, and may be so interpreted.

Finally, there is the significance level between the means of the predicted values. It is highly unlikely that unreliable criteria could be predicted in the manner in which these criteria have. The high biserial r obtained with the predicted criterion values suggests that we are dealing with data of high reliability.

Correlation with other criteria.

It would, of course, be desirable if many readability criteria were available in order that the two criteria proposed in this study might be evaluated against them. Were such the case this study most probably would not have been made. Scale values between judged difficulty and relative time for each group of passages were, however, correlated with each other. For the "Cape" group an r of .76 was obtained while for the "Lower Case" group the r was .63. These correlations support the use of reading passages selected on the basis of both criteria. If the correlations were extremely high, both criteria would be measuring the same thing, hence, either one would suffice.

Predictability.

This particular check upon the merit of a criterion was not given special attention in Chapter I because of the little notice given by readability investigators to criterion aspects. Similarly, in this section we shall not be concerned with the fourth check, prediction of a practical change in the situation by use of a derived instrument, because as yet there has been no opportunity to put these results to such an independent use.

As a criterion of criteria, predictability is a sine qua non in any quantitative study which is concerned with forecasting. One may have a reliable criterion, one may have a criterion which correlates with other criteria; the criterion may be acceptable to the sponsor but unless it is predictable it can hardly be acceptable to the investigator. In this particular study the level of significance between the means of the predicted values of the criterion "Hard"

and "Easy" passages stands as the evidence of the predictability of the criteria employed.

No claim is made that the criteria presented in this study are the criteria of readability, or that the predictors used are the predictors. The behavior of passages r, h, and H with the application of the prediction equation indicates that other criteria as well as other predictors might profitably be investigated.

This investigation has reaffirmed the importance of attention to criteria. Over the years readability investigators have devoted an almost spartan search for predictors when it has been almost impossible for them to determine the degree to which their predictors were of merit for the general adult population. Paterson and Jenkins (37) in discussing communication between management and workers, have called attention to evidences of "cultural lag" in the application to personnel work of what has long been known in the field of advertising and in the writing of children's textbooks. In turn, it must be pointed out here that readability investigation has been the victim of a "cultural lag" from personnel selection procedures; as has been indicated previously, personnel selection investigators have been cognizant of the futility of attempting to predict without a predictable criterion.

Implications for Future Research

Since the method presented gives evidence of discriminating upon both criterion as well as predicted scales, there is reason to believe that (1) readability parameters may be determined by this technique, (2) adult reading scales can be developed by this method,

and (3) specific readability problems concerned with advertising, training, adult education, and most any form of written communication can be solved in terms of the problems at hand without resort to predictors until the generality of predictor application is more firmly established. Actually the flexibility of this method lends itself particularly well to the solution of the highly specific problems routinely encountered by the practical researcher in these areas. In addition, the method frees adult readability investigation from its dependence upon a criterion of children's materials while at the same time providing criteria more appropriate to the adult reading situation.

CHAPTER IV

SUMMARY AND CONCLUSIONS

This study was designed to investigate readers' judgments of difficulty and relative reading time as applicable criteria of readability.

Thirty seven reading passages were organized in two main groups, each with 210 double pairings with five key passages common to both groups. Three silent timing recorders were devised and constructed. Passages were presented to 420 adult residents of the District of Columbia, each of whom read, judged, and summarized four passages. Reading time for each passage was secured, though this was unknown to the subjects. Criterion passages were selected upon the basis of judged difficulty and relative reading time; a discriminant function was calculated using nine predictor variables and a prediction equation was obtained. In conclusion it may be stated that:

1. A practical technique for obtaining uncontaminated reading times was developed and uncontaminated reading time data have been presented.
2. A basis for the analysis of readability data and the reporting of reading time which is not subject to the variability of the number of words has been used and proposed for future investigations.
3. An operational definition of readability was given in terms of two readability criteria, judged difficulty and relative reading time consumed.

4. The application of these criteria discriminated among most of the reading passages employed in this study.

5. A prediction equation was developed which when applied to criterion passages yielded a t value at a high level of significance between the predicted mean values of "Hard" and "Easy" passages; predicted values between the "Hard" and "Easy" passages correlated .95 by the biserial method. The variables used in this equation were: (1) number of different words not included in Dale's 3,000 list, (2) number of prefixes, (3) average sentence length, (4) number of "personal words," (5) number of sentences, (6) number of affixes, (7) number of "personal sentences," (8) number of words, and (9) number of prepositional phrases. All variables except (3) were adjusted to a 2,000 type space base.

6. Implications were given for the determination of readability parameters, the development of reading scales, and the solution of specific readability problems in the fields of business and industry, government, and education.

7. This investigation has reaffirmed the importance of attention to criteria problems; it has reaffirmed Lorge's statement in 1939 (27) that "vocabulary meanings are most symptomatic of reading difficulty.."; though Lorge concludes "in the sense of reading comprehension," it is here concluded in terms of judged difficulty and relative reading time required.

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APPENDIX I

Reading Passages, Identified, and Their Sources*

Reading Passages

***Page references are for the
passage used, not the complete
article.**

A	Goethe: Science and Poetry	Lange, Victor	Yale Review	6/49	638
B	Bourgeois Genetics & Party-Line Darwinism	Plough, Harold H.	American Scholar	9um/49	293-4
C	Elisir of the Grape	Lucie, Salvatore P.	Atlantic Monthly	12/49	107
D	Is This At Last, Good-Bye to the Common Cold	deKruif, Paul	Readers' Digest	12/49	16
E	Making Marriage Work	Adams, Clifford R.	Ladies Home Jour.	12/49	26
F	Education and the Present World Order	Zook, George F.	The Annals of the Amer. Acad. of Pol. & Soc. Sci.	9/49	8-9
G	The Novel of Contemporary History	Hershey, John	Atlantic Monthly	11/49	82
H	Potential Development	White, Lyman G.	The Annals.....	7/49	91
I	The Involuntary Good Samaritan	Pound, Roscoe	Fortune	11/49	171
J	California Overrun (Editorial)		Washington Post	12/1/49	
K	If You Want to Be A Model	Winslow, Thyra	True Confessions	1/50	35
L	France and the Future German State	Struss-Rapo, Robt.	Yale Review	Win/49	308-9
M	Santa Claus Lane	Jenkins, Ben	Esquire	1/50	45
N	What is Your Family Worth	Porter, Sylvia F.	McCall's	12/49	8
O	Notes on the Way	Berlin, Isiah	Time & Tide	11/26/49	1187
P	Time-Frightened Playwrights	Kennedy, George R.	Amer. Scholar	Aut/49	446
Q	World Organization Premature	Elliot, Rundle	The Annals.....	7/49	32
R	Some Developments of Materialism	Santayana, George	Amer. Scholar	9um/49	278-9
S	The British Crisis	Williams, John	Foreign Affairs	10/49	3-4
T	The Methods of Science	Nagel, Ernest	Scientific Mon.	1/50	22
U	The Mature Mind	Overstreet, H. A.	Morton & Co., N.Y.	1949	57-58
F	Productive Thinking	Herbstman, Max	Harper Bros., N.Y.	1945	161-2
G	Don't Blame The Range	Staff	Goodhousekeeping	12/49	124
h	What Should College Teach Women	Konarovsky, Mirra	Harper's	11/49	35-6
I	I Made My Own Heaven On Earth	Smith, Joan	True Confessions	10/49	16
J	Dangerous Myths About China	Buck, Pearl S.	Reader's Digest	1/50	69-70
k	Blits of the Beetles	Punk, Ben	Reader's Digest	1/50	100-1
l	The Exceptional Man	Russel, Bertreid	Atlantic Monthly	11/49	52
m	Keeping Fit Before and After Forty	Staff	Esquire	2/50	68
n	In Defense of Speeding	Loas, William	Esquire	1/50	63

o Science on the March	Hookings, M. T. & Payne, A. H.	The Scientific Mon. 11/49	336
p The Greatest Opportunity on Earth	Davenport, R. W.	Fortune	69
q Nickel Candy Bars	Simon, Betsey	Cosmopolitan	53
r What <u>Can</u> We Do Under Point Four	Perkins, Mlle	Harper's	52-3
s After Hours (Hosellink Film Four)	"Mr. Harper"	Harper's	100-1
t A New World Takes Shape	Butler, Sir Howard	Foreign Affairs	610-11
u Atomic Hydrogen as an Aid to Industrial Research	Langmuir, Irving	The Scientific Mon. 1/50	6-7

A

"Faust" is the fullest accretion of Goethe's thinking, and its stratified meanings has never ceased to challenge its interpreters. Whether the two parts can be brought into a single line of argument, whether Faust as we see him advance, affirms or denies the chance of human salvation, whether his striving, his inarticulate but fervent groping for the inexpressible truth, is his triumph or his folly -- these are the alternatives between which a philosophical decision will not be easily reached. But whatever the possible unity of action and character, the two parts of the tragedy belong unmistakably to distinct orders of poetic achievement. The first part with its impulsive language, its picturesque imagination, and its celebration of feeling has the expansiveness of the earlier Goethe. It is a work of striking though uncertain qualities that has always received the warmest praise from those who prefer even in art the free energies of natural growth. The second part, clearly more involved than the first, and far more demanding upon the reader, attains at times the deliberate perfection of the highest poetry. The lines of its design are clear and impressive even though it remained fragmentary. Its central purpose is no longer the spiritual biography of Faust. The chain of disaster and guilt in which he has become involved seems to have reduced him to a mere function in the grand spectacle of life. But his perception of the core of meaning has given him the strength to preserve, against the demonic temper, his character as a human being. And this, we must remember, is the essence of Goethe's faith. What follows, in the superb closing scenes of the poem, is not the bestowing of a deserved reward but the metamorphosis of Faust's entelechy: he becomes a participant in the eventual resolution of all discrepancies in love and grace. That this should be possible is a paradox of the highest order; and what is, in fact, indescribable is here, in a poetic event, miraculously achieved.

B

Genetics is one of the newest fields in biology to be delimited, and for forty years it has been one of the most active. It has given a precise meaning to heredity by showing the mechanisms by which characters are transmitted from parents to offspring. It has distinguished between heritable variations and those non-hereditary individual differences induced by the environment which were the stumbling blocks in Darwin's Origin of Species. The proofs of Darwinian evolution by natural selection may now be said to have been made available by genetic studies. Finally, in the practical fields of agriculture, applied genetics has furnished a theoretical basis for improvements in crop plants and farm animals by cross breeding and selection, of which the most striking recent development is the utilization of the increased yield of hybrid corn and garden vegetables.

Modern genetics began with the rediscovery of Mendel's long neglected work on heredity in 1900. Almost contemporaneously with Darwin, Gregor Mendel had shown in his garden peas that each inherited character is determined by two interacting units, later called genes, and that every individual receives one of these from each parent. There are many such gene pairs, and one or the other member of each pair is passed into every male or female germ cell formed. Then, when fertilization occurs, the resulting individual is a new combination of the many segregating genes. Since in the duplex condition one gene may be dominant and the other recessive, it is evident that offspring may receive two recessive members of any one pair and so inherit qualities unlike either of their parents.

In 1947-1948 California produced 95,222,000 gallons of wine, of which 77,006,000 gallons were of the dessert varieties. Officially wines are classified according to their content of alcohol, those containing less than 14 percent being the table wines, and those containing more than 14 per cent the dessert wines. Oddly the apéritif or appetizer wines are included among dessert wines, for no other reason than a legal definition.

The dessert wines are in reality elixirs of the grape, and perhaps the alcohol which is added to them is for the purpose of preserving their characteristic flavor and sweetness. In Great Britain the term "fortified wine" is still used officially; but it has been dropped in the United States because the word fortification connotes intent to increase intoxicating power.

Setting a legal line of demarcation between table and dessert wine does not indicate the differences between sweet and dry wine; nor does it set the limits of sweetness or natural fermentation. Some wines are naturally sweet although they contain less than 14 per cent alcohol, and many are dry although they contain more than 14 per cent alcohol; others may acquire a natural alcoholic content greater than 14 per cent without the addition of distilled spirit.

Some confusion results from the nomenclature of California dessert wines because foreign type-names are used to designate wines which, though pleasing in themselves, rarely resemble their European prototypes. The need for distinctive California names is imperative. As a prelude Angelica, Palomino Beige, and varietal grape names such as Muscat de Frontignan have appeared on California dessert wines. The American public eagerly awaits a name for the California product labeled Sherry, which neither in method of production nor in taste resembles the Spanish product.

The grapes which are to be used for dessert wines must contain an abundance of sugar in order that an adequate amount of alcohol may be produced and still leave enough sweetness; and those for the better sweet wines must have character and reasonable amounts of "varietal aroma" and fruit acids, so that quality may be rendered to the wine.

November 15, 1949, marked the beginning of a great step ahead in the comfort of mankind. On that date occurred the scientific publication--in the New York State Journal of Medicine--of a powerful and practical preventive and cure for the common cold.

The new cold-killer is no tantalizing laboratory curiosity; it's available to everybody. It is safe, and it is not limited to expensive prescriptions; the federal government permits its direct sale to the public in drug-stores.

Until four years ago just about all that anyone knew about colds was that they were catching and were caused by a virus. Cures? Here was the gloomy advice of Dr. Perrin H. Long, famed therapist of Johns Hopkins: "The only rational treatment . . . is to be put to bed at the onset and remain there for two or three days." But in 1945--with no fanfare whatever--came the hint of a clue for a cure.

Dr. Elizabeth Troescher-Elam and co-workers in San Francisco proved that the sneezes and sniffles of hay fever were scientifically identical to the sniffles and sneezes of acute cold in the head. The culprit in both troubles was a chemical, histamine, released by the human body in all its allergic explosions. As The Journal of the American Medical Association put it in an editorial comment last September 10, "the common cold is an allergic response in susceptible persons."

Physicians in 1945 were getting their hands on a battery of new antidotes for allergies--chemicals called antihistamines. Dr. John M. Brewster of the U. S. Navy Medical Corps dosed more than 100 victims of the common cold with Benadryl. Ninety-five percent of the sick sailors got marked relief and had much shorter colds than usual. Ten percent, treated very early, had their colds quickly cured, aborted, an event truly unique.

But there was a catch. Benadryl made many of the sailors very sleepy.

E

Recently an attractive woman of 28 came to us for advice on finding a husband. She had been teaching in a large city where marriageable women far outnumbered men; since she took little part in community life, her chances for getting acquainted were few. Further, despite her attractive personality and appearance, she was handicapped by shyness.

The mere fact of discussing her situation, and of accepting the initiative in changing it, gave her new confidence. She took a position in a small city of 18,000, where she joined the Y.W.C.A., attended church regularly, and worked in all kinds of volunteer activities. She accepted some dates that were not particularly interesting, simply to meet other men. In a few months' time she had a wide acquaintance, and at a Christmas party she met a young business-man who really interested her, as she did him.... This Christmas they will be married, with every prospect of happiness.

Obviously, it doesn't follow that any girl can find a husband simply by moving from one city to another. But it does follow that if your present situation isn't satisfactory, you can do something to change it. Perhaps you'd best begin by changing yourself.

Every girl (and every woman, single or married) should do her utmost to be attractive, in both personality and appearance. Not every woman can be beautiful, but every woman can look her best-- and the knowledge that she does enhances her personality.

But even an attractive girl can't get dates unless she is where men are. Once you've finished school or college, most of your opportunities to meet people of either sex will arise from your job, from participation in activities, and from the social life you share with your friends.

If you work in a field monopolized by women, you'll need outside opportunities to meet men-- or a different job. Hostess jobs, service jobs in fields where men patrons are in the majority, and jobs in business or industry employing more men than women are excellent opportunities.

Of all the instruments for the development of international friendship and good will, the exchange of students and teachers has usually been given priority. I have no reason to question this assumption, particularly when the number of students and teachers who, by reason of the increase in rapid transportation facilities, go abroad from year to year seems bound to multiply. In this country, for example, there are now three times as many foreign students as there were only a few years ago, and the Fulbright Law has greatly facilitated study by Americans in a number of foreign countries.

Yet it seems certain that the present system of exchange as it applies to students leaves much to be desired. Students from the well-developed countries go infrequently to the universities in the less-developed countries. Students from the latter enrolled at well-known centers of learning often confine themselves to technical studies and thus get a very partial and even biased appreciation of the social life about them. Indeed, there are persons who feel that there is so little evidence of the friendly effect of the student exchange program as to raise honest questions as to how the whole process can be improved. Well, in the first place, as was pointed out in the recent conference held at Estes Park, Colorado, institutions of higher education should do more in the way of organizing well-rounded programs for foreign students, and they should take more advantage of the opportunities which the presence of foreign students affords to enable other students and the surrounding community to learn about life in the countries from which these students come. In other words, there are mutually educative possibilities in the student exchange situations which to date have not been fully utilized.

Finally, the technical assistance program should be broadened to include a great variety of technical and professional workers, as is now being done through the Economic Cooperation Administration and in the American zone of Germany. Such persons return to their respective countries after having extensive opportunities to view not only educational but social life as a whole, in this and, to some extent, in other countries. This program may in the end prove to be as important as, if not more important than, the exchange program at the student level.

G

What should be the aims of a writer who undertakes a novel of contemporary history? What are valid standards for this genre?

Above all, this kind of novel should make anyone who reads it better able to meet life in his generation - whenever that generation may be. This is the highest aim of any piece of fiction; in only one respect is this aim especially pertinent to the novel of contemporary history: the presently living generations have been more confused and harassed than most others have been by the history in which they have participated. In this very fact lies fiction's main chance. Fiction is not afraid of complexity, as journalism is. Fiction can deal with confusion. A journalist is not allowed to be confused; he must know. But it is not necessarily a disadvantage for a novelist to be confused as a citizen and a human being - provided he has discipline as a writer. Indeed, the novelist's confusion may be a virtue, for it may allow him to come into harmony with his readers, who are very likely confused themselves.

The task of this kind of novel, however, is not to illuminate events: it is to illuminate the human beings who are caught up in the events. Character is the proper focus of novels of any genre. Again, here is a special strength that novelists always have at hand and that journalists rarely have: it is possible in fiction to make a reader identify himself with the human beings in the story - to make a reader feel that he himself took part in the great or despicable events of the story. The image of a single protagonist, in which the reader may see his own image - this is far more moving, more persuasive, and more memorable than the most raucous headlines and the most horrible statistics and the most authoritative editorials that could possibly be published in a newspaper. Journalism allows its readers to witness history; fiction gives its readers an opportunity to live it.

H

A few words on the future of international nongovernmental organizations may be appropriate at this point.

If we assume the continued existence of our civilization, we may also assume that international nongovernmental organizations will continue to develop; for they arise out of that civilization and meet needs created by it. To enlarge upon this idea, let us say that the industrial revolution and the advance of science have destroyed the isolation of peoples and have provided the means by which they can work together in dealing with common interests. One aspect of this has been increasing specialization in knowledge and the resulting dependence of scientists and scholars on the thought of those of other lands. Scientists clearly realize that cutting off the international exchange of information greatly reduces the progress of both the physical and the social sciences. This exchange of information is often most effectively carried on through international nongovernmental organizations. When social workers, chemists, or other specialists of different nations come together in conferences, they find the meetings stimulating and helpful; they are also greatly helped by the publications of these organizations, which bring to their attention the latest developments in many countries.

Another aspect of our civilization is democracy, and the future of international nongovernmental organization is intimately connected with democracy. It is an expression of democracy when groups from various nations work together in solving their common problems; this is particularly true when they try to influence intergovernmental organizations. They are then acting as national groups act within a democratic state.

Certain things are reasonably or customarily expected by those who live in a civilized society. We call them the jural postulates of the civilization of the time and place. That is, people take them for granted in their everyday life and so the law seeks to give effect to them as presuppositions of the legal order. Three such postulates were recognized in the last century as behind the law of liability for damage to others. They were: (1) in civilized society men must be able to assume that others will commit no intentional aggressions upon them; (2) men must be able to assume that others will act reasonably and prudently so as not by want of due care under the circumstances to cast upon them an unreasonable risk of injury; (3) men must be able to assume that others who maintain things or employ agencies harmless in the sphere of their use but harmful in their normal action elsewhere, and having a natural tendency to cross the boundaries of their proper use, will restrain them or keep them within their proper bounds. Hence we considered that one is liable in damages for (1) intentional aggression upon the personality or substance of another unless he can establish justification or privilege; (2) negligent interference with person or property--i.e., failure to come up to the legal standard of care whereby injury is caused to the person or property of another; and (3) unintended, non-negligent interference with the person or property of another through failing to restrain or prevent the escape of some thing or agency which one maintains or employs that has a tendency to get out of bounds and do harm.

But as the common law had been, there could be no recovery of damages if the injury was caused in whole or in part by the injured person's own fault, or if it was due to no one's fault.

J

Governor Warren of California has called a conference to discuss plans for solving the State's unemployment problem. At present, seasonal demands for agricultural workers have reduced the numbers of unemployed to 318,000, but the State employment director forecasts a rise to 600,000 by next March, the peak unemployment month, as compared with 531,000 last March.

California's trouble is not due to an absolute shortage of jobs; it is rather a result of a war-stimulated expansion of the working population that is being constantly augmented by westward migration. Governor Warren says that during the last year or so the number of people entering the State just about equals the increase in the number of the unemployed. In other words, California has reached the limit of its capacity to create jobs for newcomers. A major purpose of the coming conference is to devise plans for the development of local industries that will create more jobs and permit the State to grow and prosper at the same time.

California's population has increased nearly 54 percent since 1940, while the increase for the country as a whole has been only 12.4 percent. The variations in the rate of growth by States and regions during the past decade are, indeed, startling. Most of the Middle Western and Southern States show limited population gains far below the national average. The New England States (with the exception of Connecticut), New York and Pennsylvania, have also had a less-than-average increase, while Mississippi, Oklahoma, Nebraska, North Dakota and Montana actually have fewer residents now than in 1940. On the other hand, the population gains of Ohio, Indiana and Michigan range from more than 15 to 20 percent. If these figures were broken down, they would present an even more chaotic picture of population changes.

This uneven growth, largely due to mass migration of workers during the war years, has given rise to problems that can no longer be ignored. States in the position of California, confronted by the menace of chronic unemployment, are beginning to realize that they must either take aggressive steps to adjust their economies to the changed demands of the postwar era or else discourage inward migration of job-seekers.

Start training for your career as soon as ^Kyou've decided what you want to do. And realize this: There isn't a single glamor career that isn't helped along by a good basic formal education. So stay at school as long as you can, you youngsters who are just starting out. But bear this in mind, too--every career is helped by the pre-career courses that you can take--the things you do and think and read before you start your career. Whether you want to be a doctor, a nurse, a scientist, an actor, a publicity girl, a reporter, a private secretary, a night club entertainer or a hostess--or any of the other glamor careerists, you can't begin training too early. Find out what you want to be. Then find out what you'll have to learn. Then slant your studies and your actions in that direction. You'll find, when you go into actual training, that you're way ahead--and very apt to succeed brilliantly.

Thousands of girls want to be models. You can't blame them. It is not only one of the newest but one of the most exciting professions for women. For modeling, as a profession, is under twenty-five years old. And only the last ten years has it become recognized at its true worth.

Because it is such a glamorous profession, more things have been written about modeling lately than about all other professions and careers put together. And not all of them have been correct. They've pictured models as spending all of their time in night clubs and meeting millionaires, or spending hours under hot, gruelling lights clad in hot furs. The truth is far from either condition. Modeling is a career open to girls who are suited for it. It offers interesting work and it pays well. The star models make as much as \$25,000 a year. There are only a few of the girls who reach the top, but the average successful model makes from \$75 to \$150 a week over a period of many years.

If you want to be a model you must first realize one thing: You will be paid not because you are beautiful--but as a clothes horse--an animated mannequin who will sell merchandise--whether the merchandise is lipstick, hair tonic or gowns. No matter what branch of modeling you take up you are, first of all, a salesman. This may give you a different slant on the profession. It isn't just a job for strutting around and looking beautiful.

France, though not a party to the Potsdam agreements, accepted the Big Three decision to de-militarize Germany by removal of industrial equipment deemed to constitute capacity in excess of German peace-time requirements. In spite of urgent American representations on behalf of the European Recovery Plan, the French government was reluctant to halt dismantling of those plants which the Inter-Allied Reparations Committee had previously scheduled for delivery to France. In that respect, the position of France was not far from that of Britain or, for that matter, from the position of the United States before the evolution of American policy for the execution of the Marshall Plan had led to the far-reaching revision of Allied policy for the limitation of German productivity, which latter policy the United States itself had been foremost in helping to inaugurate. If France was slow in following the United States onto new ground, this was hardly because the French public was unmindful of the co-operative nature of the Marshall Plan or unduly exercised over the residual military potential of German industry. Not a few French newspapers criticised severely the haste and thoroughness with which French authorities removed some industrial installations in the French zone of occupation. The Socialist "Combat" characterized this procedure, particularly the removal of certain highly specialized plants of Wuerttemberg's metal and watch industry, as a policy of "cutting off one's nose to spite one's face." But the heavy war damage to many French towns and the deterioration of French industrial equipment commandeered by the Nazis are facts which speak to most Frenchmen louder than the economic and social dislocations Germany suffers as a result of massive plant removals.

Los Angeles is innocent enough in its outward aspects, unusual though they may be. Encompassing 453.3 square miles, it is (except for greater London) the largest continuous area on the face of the earth. It is possible to drive forty-four miles in a straight line without leaving its jurisdiction. But while, for instance, San Francisco, limited by geography, can expand only upward in the form of skyscrapers, Los Angeles hugs the ground like a great white pancake and is constantly oozing its way to the outer reaches of nowhere, limited only on its west flank by the Pacific Ocean. It is a "hull down" city. The city fathers of 1906, with one eye on future earth-shaking and the other on the sunless canyons of New York, decreed that none except the tallest buildings should soar more than thirteen stories, or 150 feet. As a result, the Federal Building and the City Hall rise above the city's skyline. The Los Angeles City Hall stands twenty-eight stories and is topped by a forty-two foot eleven-story tower.

Having thus guaranteed its citizens full access to the rays of the California sun, the city promptly invited every industrial Tom, Dick, and Harry in the country to "come on out and see us." Everybody came and everybody stayed. The result today is a huge, eye-smarting umbrella known as "smog"--a combination of smoke, fumes, and dust which, to the incoming air traveler, looks for all the world like a great yellow puff dropped into the valley by some Bunyanesque woman from another world. The fate of its removal is in the hands of the Air Pollution Control District, organized in 1947 as a smog-fighting bureau.

Creeping out from under the edges of the smog, Los Angeles real-estate entrepreneurs have thrown up an ever-widening circle of one-story bungalows, stores, filling stations, real-estate offices, and brilliantly disguised hamburger stands, which give the casual passer-by the impression of having been built last Monday with the expectation of being torn down a week from next Thursday. With nothing to hold back such expansion but the availability of water, it is perfectly conceivable to every Angeleno that this city will, in the inevitable future, be synonymous with Los Angeles County, a geographical entity covering roughly 4000 square miles--approximately twice the area of the sovereign State of Delaware.

N

He knows where you keep the jewelry he has given you through the years. But I'll wager he doesn't know where you've stored your marriage certificate--which is not only a symbol but a proof of your union that both of you will badly need in time to come.

You know where he stores his hunting things. But I'll wager you don't know where he keeps his Social Security card--an essential proof of his working career that will be worth dollars and cents to both of you in future years.

How inconsistent we married folk are! We fret for months over the pros and cons of buying a new car, but we shrink from spending a few minutes once in a lifetime to talk about writing wills for each other and to go about writing them. In time the car will wear out, but the will decides forever what is to happen to the assets you have collected before and after your marriage.

Superstition, suspicion, sensitivity--these three little devils are working day and night to undermine our common sense, to keep us from telling each other and doing for each other the things we should. They have jammed the courts in every city and town with families ripped apart by bickering, misunderstanding, confusion. They've packed the relief rolls with women forced into poverty and dependence by their husbands' thoughtlessness, laziness or ignorance. They've swelled the treasuries of every state in the nation with millions of dollars left unclaimed in bank accounts.

My husband and I have had a talk about the things we own alone and together. And we've found that adding up what we have--instead of concentrating on what we don't have--gives us a feeling of richness we didn't anticipate. What have we found out? Things that are a lot more important to our peace of mind than which of us is more grumpy on a dreary morning.

O

In the past, the primary aim of education was so to train people that they were able to solve the problems considered to be important more successfully than if they were left to their own devices. Opinions, doubtless, differed at various times and in different cultures as to what these problems were. And they differed, of course, about the best techniques for their solution. The history of these differences is a familiar and at times tragic story: while some looked for the answer in sacred books and others to the inspired teachings of priests or divinely-appointed leaders, still others insisted that observation of natural phenomena, or scientific experiment, or the inner light, or metaphysical speculation, or what one's nurse used to say, were the sole sources of reliable truth. So crucially important were these differences of method felt to be that, ostensibly at least, wars were fought and blood was shed over little else during long periods of human history.

But while these disagreements about the proper way to the discovery of the truth were wide and often sharp and irreconcilable, there was a considerable degree of general agreement, at any rate in the Western world, about what were the great problems to the solution of any one of which a man might worthily devote his whole life. Such questions as the nature of laws governing the external world, its origins, its history, its purpose, and the more alarming question whether it could be said to have a purpose at all; the proper ends of human life; the existence and attributes of God, and again whether anything at all is meant by even asserting His existence, and if so what; the best ways of making or judging beautiful or remarkable objects; the laws which govern the mental life of individuals or of societies and the ways in which they should govern themselves or one another, and the reasons for it; all these were regarded as issues worthy of the most serious and sustained effort which could be applied to their study.

P

The Man of today cannot rejoice in his day. He cannot cast off a recurring nightmare of time. He goes to the theater to forget the past, but the latest playwrights are even more obsessed by time than he. "A Street-car Named Desire," "The Mad-woman of Chaillot," and "Death of a Salesman" all show him a vision of the twentieth century heading straight for destruction, insanity and suicide. The more he consumes the endless newspapers, "Time" magazines, radio newscasts, private dope sheets, books and columns of inside stories, in an ever-losing race to keep up with the minute, the more he finds himself involved in time. Then he rushes out to buy Spengler, or Toynbee, or anyone who promises to tell him what time and history mean.

Time has ceased to be a mere setting for human history; it is an active force, a force of evil. It seems to be going faster and faster, always bearing man nearer some frightful finish. Caught in the vortex, he looks back with anguished nostalgia to some blissful age of confidence and leisure--before the atom, before the war, before the depression, before the twentieth century. Fifty years ago he wanted to cut himself free from all bonds of the past and walk boldly into the modern age. But now he no longer walks. He is being taken on a machine ride faster and faster. Somehow he must get a firmer footing in time.

Even the psychological plays like "Dear Brutus," "The Star Wagon," and "Lady in the Dark," which juggle with time in order to explore individual personality problems, imply a century where it is all too easy to take the wrong turn. The more important plays of time diagnose the century itself, finding now complete destruction and now a little hope, and sometimes suggesting a whole new view of history. The most terrifying plays show man in the twentieth century caught in a speeding whirl of time.

Today, for the second time in our generation, mankind is engaged in a great twar quest for some kind of international World community. Eventually it must e. In some limited technical matters, universal communities of interest already exist, and have provided sound foundations for workable, world-wide associations (such as the Universal Postal Union) which are doing a good and necessary job in their own functional fields. But in the vital matters of national security and political independence, this advanced global stage of community development is just starting to take place. If we try at one fell swoop to establish a world-wide agency for the compulsory, universal application of sanctions and enforcement of peace, we shall overreach the bounds of real community and cause the new world peace organization to collapse of its own weight.

This type of overambition, in my opinion, was a major defect of the great League of Nations experiment. During the past ten years we have heard a great deal of disparagement of the League of Nations and its attempts toward world government. Much of this disparagement, of course, is justified. After all, the League did fail in its primary responsibility of preventing another world war. But we still have much to learn from that experiment, and I think it is in order for us now to draw from the League's experience some pertinent lessons that are equally applicable under the United Nations. For again today, as in 1920, hope for peace and security has been entrusted to the mechanistic devices of a world-wide international organization.

One of the vital problems in instituting any form of international government is to strike a balance between the innate idealism of statesmen and the realities of the situation at hand. The statesman is prone to peer into the future to set up, before its time, the system that might evolve in the course of normal experience if free evolution were permitted. The philosophers of international organization, with remarkably few exceptions, have always looked toward a universal basis for any peace system that might be established; and in 1919 the founders of the League of Nations were strongly influenced by the same ideal of one peace for the entire world.

R

Would a materialism free from all admixture of idealism or militancy involve any particular code of politics or morals? Essentially and directly, it certainly would not. Materialism intends to be scientific, and science is a description of nature as it is and as it functions, not an ideology or a collection of precepts. Moreover, materialism traces, and traces sympathetically, the whole generative movement of nature; it feels the equal right of every animal to strive to live, and in that sense its sympathies might be called democratic. A moral ideal in this system must be omnimodal or, if you prefer, non-existent. But at the same time materialism records, at every step, the ruin of every thing that is inopportune, the agony of crime, the ignominy of vice, the madness of passion. Thus the picture it paints of existence is full of silent warnings and monitions, yet also full of glorious and lovely models. In this sense the tragic but stimulating lesson that materialism teaches is aristocratic, severe, hard-hearted, yet always leaving a tempting vista open to the bold, to the artist, and to the thinker. It invites all nations and all arts to try their luck: but it discloses a past covered with ruins, and a future in which little that we can care for or understand may be expected to last.

More subtly rendered, with no alloy of illusion, the personal morals and politics inspired by materialism may be found in the best known of Epicurean poets - I mean, Lucretius and in Horace. They are diverse in dignity, as nature is; and each touches different notes of the moral gamut, as nature touches them in the unintimidated human heart.

After the first war, Britain's policy was dominated by the fear of loss reserves. The gold standard which she had restored in 1924, following the period of currency disorder and inflation which had engulfed Europe, broke down in 1931; and ever since it has been referred to as a "strait jacket" to which she would never return. The devaluation of 1931, which she did her utmost to avoid, turned out beneficially. Quite the contrary to orthodox theory, it was followed by a fall of prices elsewhere rather than by a rise in British prices. This favorable turn in the terms of trade improved Britain's trade position and undoubtedly played a large role in the rise in productivity as well as output which she experienced in the thirties.

The external strains of the twenties, the ensuing great depression, and the release from both through the devaluation made a deep mark on British economic thinking. With the development of Keynesian "closed economy" economics, primary emphasis was increasingly placed on internal full-employment policy, which was to be kept free from external interference by the use of exchange-rate adjustments. But the gains proved short-lived. The sterling devaluation was part of a chain reaction that included devaluation of the dollar in 1933-34 and did not end until there had been further devaluations of the French and Belgian francs (the process in the case of those two countries had begun a decade earlier). Indeed, there is no evidence that the vicious circle would have ended before the war and the direct controls, both external and internal, that came with it. Meanwhile Britain and many other countries had in the later thirties turned increasingly toward bilateral trade and exchange controls as the effective methods of relieving external strains. Despite all her efforts, Britain was in 1938 compelled to liquidate a small portion of her overseas assets to bring her international account into balance.

T

The history of science makes amply evident that data of observation do not in general uniquely determine the form in which so-called laws of nature may be stated, nor the schema of explanation that may be provided for them. It seems clear, therefore, that principles of selection and rejection must be operative, which in favorable cases are at least practically decisive. In this connection the student should come to realize not only the suggestive value of observation and experiment for instituting new functional dependencies, but also their function in eliminating tentatively assumed connections. Again, the precisions with which experimental data are in agreement with assumptions made, as well as the congruence between theory and observation when undertaken by different inquirers and in a large variety of heterogeneous domains, are other objective factors that control the acceptance of proposed solutions to scientific problems; and I have no doubt that even elementary considerations on the nature of reliable sampling and statistical procedures help to clarify these matters. Moreover, as already indicated, an important function of comprehensive theories in science consists in their making it possible to use evidence that initially appears to confirm isolated propositions, as additional support for quite different propositions that are systematically related to the first. Indeed, in science as in daily life, the best accredited beliefs are not those which hang from but a single thread of evidence; they are those for which cumulative lines of argument are available. And methodological study can contribute to a more adequate understanding of the nature of science by showing how more responsibly held beliefs can be secured through the achievement of systematic coherence.

U

When we begin to understand the role that speech plays in life, we cannot discuss the prevalent immaturity of speech. Speech is that through which we most constantly influence one another. From the words of a mother to her child to the words one diplomat to another, speech is a maker of psychological universes. Speech, in, is that through which we most commonly seek to escape our skin-enclosed isolation and to enter into a community of experience. Again, it is that through which we clarify our ideas and beliefs: putting these out into the public medium of language, we discover whether or not they make sense. Furthermore, it is that through which we transmit knowledge and experience: acting out our human role as builders of tradition. Finally, speech is man's most ready emotional safety valve. Tests attentive to the joys, fears, and angers of different age groups have established the fact, for example, that whereas children of the eight- and nine-year-old group tend to express strong emotion through physical action, adolescents and adults tend to express it through words. For the most part, however, the type of release they are able to enjoy is woefully inadequate, because they have grown to the age of verbal release of tension without growing verbally mature. They are unable to do more than bluster with emotion; or brood themselves into explosive anger. They are bound, likewise, by the sheer paucity of the words at their command; they can do nothing more than repeat the expletives, clichés, and slang phrases that have already been rendered meaningless with use, so that they never have a chance, through words, to express the strong uniqueness of their own human experience.

We may, then, set this down as another basic fact about ourselves: our lives are in good order only if the communicative linkages between us and our world are relatively mature and becoming more so.

1. If you hold a stone in your hand and let it go, it will fall down. Heavy bodies

The old physics said: "Heavy bodies tend toward their home, the earth."

2. If I give a push to a body, say a carriage, or if I roll a ball straight ahead on horizontal plane, it will move, will continue moving for a while, will then come to rest-- or if I push it gently, somewhat later if I push it hard.

This is the simplest meaning of the old vis impressa. "The moving body sooner or later to a standstill if the force which is pushing it no longer acts."

Isn't that true? It is obvious.

3. And there are, of course, several additional factors to be considered in connection questions of movement: e.g., the size of the object, its form, the surface along which body is moved, the presence or absence of obstacles, etc.

So we know a great many facts about movement. They are familiar to us. Do we understand them? It appears so. Do we really know how movement comes about? Do we see the principles at work?

Galileo was not satisfied with this knowledge. He asked himself: "Do we know how such events really proceed?" Driven by a desire to get at an understanding of the fundamentals, but at the inner laws involved, Galileo said to himself: "We know that a heavy body falls, how does it fall? In falling it acquires speed. The speed is greater if the distance it is greater. What happens to the speed as the body is falling?"

Common experience gives only a vague picture. Galileo started to make observations and experiments in the hope of finding out what happens to the speed, and whether it is governed by principles we can understand. His experimental setups were very crude compared with that physicists developed later, but in making these observations and experiments he had to form and to test an hypothesis. First he made a wrong guess, then he found the law for the acceleration of a falling body. Since the speed of falling is so great that values are not easy to determine, Galileo, desirous of studying the question more thoroughly, had taken counsel with himself: "Could I not study this in a more convenient way? Spheres roll down an inclined surface. I shall study them. Isn't free falling simply a special case, the case of falling at an incline of 90° instead of a lesser angle?"

Are you disappointed in the way your cakes bake? The sensitivity of cakes makes them reveal errors or omissions more readily than other foods.

First, be sure of your recipe and your method of mixing the cake. Over-mixing is a common failure, most likely to occur when the flour and other dry ingredients are being added. An overmixed cake may appear quite normal when taken from the oven; but as it cools, it shrinks away from the sides of the pan and loses volume. It's up to you to correct your method by gentle, not vigorous, mixing or blending as you add the dry ingredients. If you use an electric mixer in making cakes, be sure it is on low speed at this final cake-making stage. Insufficient batter can produce a cake lacking in volume; too much batter may over-flow, spoil the appearance of the cake, and give you a job of cleaning charred bits of batter from racks and oven. To help you use the right-size pan, Good Housekeeping Institute recipes specify pan sizes for specific purposes -- a definite help in overcoming this problem.

A misshapen cake can be caused by a warped or bent pan. Not only is the appearance spoiled, but the quality usually is poor because thin sections of the cake become overbaked before thick sections are done.

Remember that differences in color and material of cake pans affect bottom browning. The darker the pan, the browner the bottom crust will be. A bright, shiny pan, on the other hand, gives a light-colored crust on bottom and sides. These differences are likely to occur in tin cake pans, which are shiny when new and become dull or darkened with long use. Aluminum and glass cake pans give a medium-brown shade similar to the normal color of the top crust.

If your layers are lopsided, better check to make sure your range is level. Test this by placing a layer-cake pan half-full of water on the oven rack. The water level will show you whether or not your range is level. Warped oven racks cause similar difficulty. Repair or replace them.

Every member of the family suffers when education for family living is limited to women alone. A child needs two understanding parents; a father should be something more in the family than the person who pays the bills, and a mother should not be expected to take all the responsibility for family relationships. If she is - as a distinguished sociologist, the late Willard W. Waller, once pointed out - she will be the one to make all the adjustments, often at the cost of her own personality. Attuned to the personalities of her husband and children, she alone will have to forego the luxury of spontaneity, of being angry or tired, loving or resentful, sociable or withdrawn, when her own needs dictate it. If education can provide any answers to the problems of marriage and parenthood, we had better let the men in on it, too!

What about the other arguments for special education for women? Is it true that liberal-arts studies "are even more important for a woman than for a man?" Not necessarily. It can just as easily be argued that it is the future career-driven, middle-class male who most needs to acquire a broad cultural background in college; the women will have more leisure in adult life to pursue such studies. Actually, both men and women need the humanities - as the growing pleas of the legal, medical, and engineering professions for a more liberal and less specialized education in the pre-professional college years are making more and more clear. And equally, both sexes require as much vocational counseling and preparation for life as a liberal arts college can give.

Higher education of women does present more complex problems than higher education of men because women's status in modern society is still full of inconsistencies. Any girl graduate's future is uncertain and may follow not only different but contradictory patterns which will require conflicting skills and attitudes of mind. No one can be sure during her college years of just what a girl's life path will be: whether she will marry or remain single; whether it is worth while to invest time and money for her professional training.

1

Several years ago a doctor told me that I had something seriously wrong with me that would eventually be cause for major surgery. Frightened, I concluded that there were too many odds against me. I probably wouldn't make it.

So I got busy. I started working my way into heaven. I mean that literally.

If one thinks her life is measured by days, or a few weeks, a year or so at the most, one can get in a rush.

I got in a hurry. I had a lot of unfinished business to attend to. I needed to start putting marks for good behavior on the right side of Saint Peter's big book. You'd be surprised if you actually felt that your days had number tags on them and that at a difference it would make.

I didn't miss a day--not even one hour. I'd take time to hug my husband, I'd stop in the middle of my work and kiss my children, and I'd sing and smile and bake chocolate cakes that would melt in one's mouth.

I did everything as well as it could be done so my husband could remember me with love. I reasoned with the children instead of scolding. I practically never spanked any one. I looked my very best all the time. I stayed in a good humor. I wouldn't be drawn into a quarrel. If I had a headache or a pain I never mentioned it. I turned anything slightly amusing into an hilarious story. I never let any one know I was scared green.

I almost never said no to any one about any thing. Yes, I would be glad to have a talk about preschool physical checkups for children; yes, I would chaperone a party; yes, you may borrow my red satin slippers; yes, I'll be glad to keep my children for a day. I said yes, yes, yes, or, "Let me do it." I never refused to do anyone a favor. I was very busy doing right, doing good--working my way into heaven.

J

In considering our American policy toward China it may be wise to do some preparatory attic-cleaning in our own minds, for there is an amazing amount of trash in our mental attics when it comes to the Chinese. Age old fragments of misinformation still clutter our thinking, and there is a new accumulation ladled out by persons who have been in China very recently and very briefly. It will not be possible soon to clear our attics entirely of the residues of a century or so, but certain large and cumbersome myths might be thrown out for good and all.

First of all, I would reject the myth that China's basic problem is hunger. It will be a myth difficult to relinquish, for it is an easy explanation of China's troubles.

Anyone who lived in China before the last war knows that in spite of the overthrow of one government and the setting up of a new military government under Generalissimo Chiang Kai-shek, and in spite of continued regional civil war, the Chinese fed themselves heartily and well, as they have done for a long time. True, there were occasional famines, of which Americans heard much. But these famines were not caused by basic food shortage but by flood or drought. Flood and drought are not always preventable but they are always local.

China's vast territory, much larger than ours, can easily remedy any local famine, given roads enough. Lack of communications has long been a basic problem in China. In my own experience it was often cheaper and easier in some famines to ship wheat from the United States and Canada than it was to bring it 300 miles over a Chinese country road on donkey- and man-back.

A Dark Brown Destroyer has gone on a gnawing rampage through the forests of Colorado. The villain is the Engelmann spruce bark beetle, a cylindrical, hard-shelled insect no bigger than a grain of rice.

Since 1942, when he first began running amok, he has killed 16 times more trees in Colorado alone than all the forest fires in a generation have laid waste throughout the entire Rocky Mountain region. He has already destroyed four billion board feet of timber -- enough to build 400,000 five-room houses. No practical method of stopping the hungry gangster has yet been discovered.

Engelmann spruce represents more than three fifths of the standing timber resources of Colorado. Nearly a third of this is dead or doomed. All of it may be dead in a few more years. Growing seasons are short in the frosty altitudes of the Rockies, and even when forests are kept thinned out to permit maximum growth it takes an Englemann spruce a century and a half to reach saw-log size.

Having blanketed the western slope of Colorado, the beetle hordes are preparing to cross over the Continental Divide and complete their sweep through the state.

In the past the Engelmann beetle attacked only weak trees. Healthy trees browned him in a flood of pitch as soon as he bored through the outer bark. The damage done was so unimportant that entomologists never bothered to investigate his habits.

That lack of a criminal record saved him when his big chance came. On June 15, 1939, the western slope of Colorado was raked by winds of cyclonic force, and hundreds of thousands of trees fell. Many were still rooted to the ground, alive but too weak to resist the beetles.

1

There are many ways in which an individual may differ from most of the other members of his herd. He may be exceptionally anarchic or criminal; he may have great artistic talent; he may have what comes in time to be recognized as a new freedom in matters of religion and morals, and he may have exceptional intellectual powers. It would seem that from a very early period in human history there must have been some differentiation of function. The pictures in the caves in the Pyrenees which were made by Paleolithic men have a very high degree of artistic merit, and one can hardly suppose that all the men of that time were capable of such admirable work. It seems far more probable that those who were found to have artistic talent were sometimes allowed to stay at home making pictures while the rest of the tribe hunted. The chief and the priest must have begun from a very early time to be chosen for real or supposed peculiar excellences: medicine men could work magic, and the tribal spirit was in some sense incarnate in the chief.

But from the earliest time there has been a tendency for every activity of this kind to become institutionalized. The chieftain became hereditary, the medicine men became a separate caste, and recognized bards became the prototypes of poets laureate. It has always been difficult for communities to recognize what is necessary for individuals who are going to make the kind of exceptional contribution that I have in mind: namely, elements of wildness, of separateness from the herd, domination by rare impulses of which the utility was not always obvious to everybody.

III

It may come as a surprise to many that the principal benefits of sports are other than exercise. It's true enough that when schools and colleges made such individual sports as golf, tennis and squash a required part of the curriculum, athletics greatly affected the physical well-being of American men. It is equally undeniable that when a man runs the 440 in 48 seconds or swims it in five minutes flat, he's "in the pink." But most of us give up training-table athletics about the time we cast our first vote and, as has been pointed out on a previous page, it takes a whale of a lot of weekend golf or tennis to keep strong the musculature necessary if we are to keep really physically fit.

Therefore, for most of us, the principal benefits of sports are recreational. They divert us from the business of daily living with its attendant worries and tensions. Their competition, good-humored gregariousness and frequent festivity are an integral part of American life. Tournament golf or tennis, a winter weekend of skiing, summertime sailing or horseback rides on brisk fall days are tonics--not muscle builders. Or at any rate, they should be. Unfortunately, many men who continue athletics into adult life transfer all the anxieties and tensions of the working world to the golf course, tennis court or bowling alley. They no longer play the game--they fight it.

Take the sad case of Mr. A.--one Friday afternoon he lost out on a contract to Mr. B., his country club crony. Saturday morning he tried to skunk him on a round of golf. When a tree got in the way of what he thought was a perfect drive from the seventh tee, he was ready to wrap his club around the tree or Mr. B.--he didn't care which. When he stepped into the shower after the 18th, he was an emotional wreck, determined to take B.'s shirt in a poker game that night. On Sunday the molehill grew into a mountain, and on Monday morning Mr. A. was set to bait B. to a bigger and fatter contract. Two weeks later, the papers carried the story of his sudden death on the golf course and none of his friends could understand.

My position, gentlemen, is that a fifteen-mile-an-hour driver is a reckless driver. High speed is the traditional highway bugaboo, dating back to the time when roads were for horses, and motorcars were upstart interlopers. In the national folklore, recklessness goes with speed as cozily as Tom goes with Jerry. Our laws are written accordingly--but the whole idea is pure hogwash.

Today, not fast driving but bad driving is the highway killer, and most of the worst drivers are never guilty of speeding. It may surprise you to learn that one of the current problems of road engineering is the hazard created by the slow driver. Fortunately, the lawmakers are a bit slower on the uptake than the engineers; so, instead of improved traffic rules and principles, we are apt to see improved speed-checking--with radar. It's a complete waste of time.

Now don't get me wrong: I'm not saying speed is automatically safe and never reckless. Let there be no consolation here for show-offs. If, after reading this article, you feel impelled to roar down Main Street at seventy during the five-o'clock rush, my advice is to turn in your license and see a psychiatrist. No one should ever drive fast unless equipped with the skill, experience, physical powers, even temperament, and judgment, and sense of responsibility required to keep a high-powered vehicle under control. But don't fall into the easy error of resenting the driver who, possessing these qualities, habitually travels as fast as conditions warrant. Hold the school bus under thirty, if you like, but just hold her well over to the right. Let us pass the fast drivers by. If not for our speed, you might not be able to use your car at all.

The keyword in this question of highway speed is traffic. In this year of 1950, with 45,000,000 vehicles and 53,000,000 drivers registered in the United States, there is no such thing as an open road. All driving now is traffic driving, which determines the appropriate speed quite regardless of the driver's whim. The thicker the traffic, the more essential it is for individual vehicles to keep moving. That is the reason why skillful drivers make a habit of speed, depending upon their alertness and judgment to achieve maximum forward progress with maximum safety.

Malaria is the perpetual target of greatest interest in tropical medicine and has been the subject of more careful study and investigation than perhaps any other disease known to man. In spite of the vast amount of accumulated knowledge, however, it continues to head the list of causes of sickness and death throughout the world. The economic loss due to malaria is incalculable, and vast areas of fertile land remain idle because of it.

Malaria is a controllable disease, yet it is seldom controlled. The annual death rate in some sections exceeds two hundred per one hundred thousand population per year. Recent work on the Island of Cyprus demonstrates, however, that the disease can really be conquered when there is determination to do so. Here the approach has been to destroy the adult and the larval Anopheles mosquitoes by using the newer insecticides and larvicides--particularly DDT. The entire island has been divided into small areas of 3-8 square miles, and in each of these trained men hunt down the mosquitoes in their obscure and often almost inaccessible breeding places. Painsstaking diligence has paid dividends. In 1945 in Cyprus, 40 percent of all school children suffered from malaria; in 1948 the rate was only 1.3 percent. The entire campaign is expected to be completed this year at a total cost of little more than a million dollars.

In Holland, too, it has been reported that with the support of the International Health Division of the Rockefeller Foundation malaria control has made great advances. The residual effect of sprayed DDT was found to last for about five months in Holland. Therefore, spraying is done just before the malaria-transmission season begins and is sufficient to control the Anopheles mosquitoes for that year. In treated villages and towns, malaria was practically eliminated in 1948.

Americans have come to use the word "security" as more or less synonymous with what has here been called the Right to Life. It is a much misunderstood word. Indeed the worker's idea of security is far more dynamic than his critics like to pretend. He would not want "security" carried to such a point that freedom of choice and a chance for advancement would be eliminated; nor, on the other hand, does he expect something for nothing. What he means is, that he thinks he has a right, which ought to be just as good as the employer's right, to be able to live in the society, to participate in it, in a permanent and confident way. His right to live in it--his Right to Life--must not be taken away from him by circumstances, such as fluctuations in employment, over which he has no control; or by accident or the onset of old age.

Boiled down to its most practical terms, security for the worker means stable employment. Elmo Roper, summarizing the researches of many years, has stated that ten times as many workers would rather have steady employment than higher pay, and twenty-five times as many would rather have it than shorter hours. Yet steady employment is probably the hardest kind of security for the employer to provide. To most industrial workers the annual wage is the symbol of the ultimate to be achieved in this area, and a few companies such as Geo. A. Hormel, Procter & Gamble, and the Nunn-Bush Shoe Co. have successfully installed it. But most employers consider it virtually an impossibility.

Such experienced practitioners as Jay Hormel and Richard Deupree of Procter & Gamble, however, make a point of great significance for those companies that cannot see their way to an annual wage. The first step, they say, is not the proclamation of the guarantee but the stabilizing of employment to the highest possible degree within the circumstances prevailing in the particular company. The truth is, that an annual guarantee is impossible until this painful stabilizing process has been carried out.

There is a gentleman in New York City named Philip Spenadel who, as official 91
 ster for a large candy concern, tastes four hundred pieces of candy a day, five
 rs a week. He has been following this routine for thirty years and it is a plea-
 re to report that his middle is almost as concise as it was when he first embarked
 his career.

The purpose of introducing Mr. Spenadel is to relay to you his remarks concern-
 g the candy-bar cult, the membership of which corresponds roughly to that of the
 ulation of the United States. "Mark down 1949," Mr. Spenadel says, "as the year
 at the nickel candy bar returned and saved us from a revolution. Candy-bar lovers
 l taken just about all the indignities they could bear--six-cent signs posted on
 agstore candy counters, ten-cent minimums in movie lobbies--and what did you get
 r these outlandish prices? A midget candy bar, mounted on a huge piece of card-
 ard, and hidden in one of the folds of the paper wrapping. Thank goodness the
 ginal nickel candy bar is back again."

The nickel candy bar--like the five-cent cigar and the hot dog--is a peculiarly
 erican institution, which has become practically indispensable to the everyday
 ring of the citizens of this country. Every minute of the day and night, twenty-
 ur hours around the clock, 365 days a year, Americans drop 45,662 nickels on candy-
 r counters and in 300,000 vending machines, making a yearly total of \$1,200,000,000.
 st year vending machines alone dispensed 2,184,000,000 bars, and official surveys
 imate that if you divided the total population of the United States into the total
 nber of candy bars sold in a year, you would get 144 as the per capita consumption
 these nickel delectables.

There is seldom any rhyme and certainly little reason to the proud names candy
 rs bear. Milky Way, Baby Ruth, Old Nick, Butterfinger, Denver Sandwich, Ping Bar,
 ng, Whiz, Forever Yours--the names merrily run the gamut from words that are asso-
 ated with the dinner table (Chicken Dinner) to words that are associated with lover's
 ne (Love Nest). A few bars, like the Hershey, staidly bear the name of their owners,
 , for the most part, candy manufacturers follow a christening pattern roughly paral-
 ling that used by race-horse owners. A hunch, a superstition, a nickname currently
 vogue, all have often been hopefully employed by manufacturers who were launching
 ew bar.

Cutting through the infinite complexity of this postwar world, two economic facts stand out like lanterns in a dark night. The first is this: that with only 7 per cent of the world's population, the United States has roughly half of its manufacturing capacity and a highly mechanized agriculture. Our production is growing at a faster relative rate than that of any other country. In the early nineteen-forties we spent tens of billions of dollars on plant and equipment for wartime purposes. Most of these factories are now turning out goods for peacetime use.

As though this were not enough, we have invested another \$60 billion in plant and equipment since 1945--and are still going strong. I suggest, in all humility, that the "climate" within which an achievement of this sort is possible--by free men--is worth examination by all peoples who want to raise their own living standards. We have accomplished this by being ourselves--by counting primarily on competitive enterprise and by using the powers of government to buttress our economy rather than to control it.

The second key fact which stands out is this: that production in most other countries is wholly inadequate to meet the needs of the people who live in the rest of the world. The fundamental crisis in most nations today is a production crisis and not a fiscal crisis. The simple reason why some currencies are "soft" is that those currencies cannot be swapped for goods at competitive levels in the countries which issued them. Until production is raised and prices are reduced within those countries and until that production is merchandized aggressively among the peoples of all lands, there is no hope of solving the money problems of the world. Devaluation, by itself, offers no final answer.

The famous "dollar shortage" is a phony in terms of semantics. What people in other countries are really saying when they use the phrase is this: that they want more of the goods which can be bought in the United States than they can afford--more than their own production permits them to buy. Most of us have had a "dollar shortage" in our personal affairs many times in our lives. All it meant was that we were not earning enough to buy everything we really needed.

Rossellini's "Germany Year Zero" confronts the audience with a chain of hideous circumstances by which--so we are to believe--a boy of twelve is led to poison his mother and subsequently to commit suicide. Various symbolic figures, foremost among them the boy's Nazi schoolteacher, are unable to help him judge the morality of crime which, in the old Fatherland, would have been inconceivably shocking. So he wanders through the city, in the film's most successful sequence, expressing in a child's solitary hop-scotch games his grotesque, adult dilemma. This combination of simple story and stark detail produces a curiously vague result: many people who see "Germany Year Zero" are divided as to whether it is pro- or anti-German (in itself, a curious way to judge the film). Rossellini has said that he did not expect the Germans to like it, since it represented to him "the hopeless future of Germany" and feared that "the seed of evil propaganda which carried them to war and destruction still alive in the German people." He was right (they didn't like it), but I am sure that he was right about their reasons. A lady who directs documentary films for her own--"Why," she asked, as we were leaving the theater, "did they have to get to do that for them?"--was indignant not only because she thought the film was technically incompetent but also because she took it to be pro-German, or at least focused on the sufferings of that baffling and obsessive people as to sentimentalize their distress. It is strange enough that this should show through even the director's determination to say exactly the opposite, but stranger still that Rossellini should not realize how and where he lost control of his medium. "Like many of the Italians of the new film school," wrote Hans Habe for the New York Aufbau, "Rossellini puts realism on a par with pessimism. . . . The world may not be half so lovely as Hollywood would have it, but neither is it half so bad as Rossellini makes it." So it is not surprising that excess melodrama should be resented by the Germans themselves, to whom its substantiating details are the dreadful commonplaces of daily life. Do they have to see a screen littered with corpses before they get the idea that life in their fractured society is demoralizing? Do we?

It may be safely said that without the Marshall offer the unitary movement in Europe would not have been launched. Though Mr. Churchill had preached the gospel of unity at Zurich nearly two years ago, and though many people of Britain and the Continent were sure that it held out the only hope of real recovery, there was no cue which would set the official world in motion, no immediate objective which would justify it in summoning Europe together. Secretary Marshall's Harvard speech provided both the cue and the objective. But it also produced another effect which gave a far sharper spur to Western Europe than the prospect of further American aid or even of the resurrection of Europe. The Russians realized as soon as anybody that the new movement might mean rapid recovery in Western Europe and its emergence as a new Great Power closely linked with the United States and the British Commonwealth, which would block the advance of the Communist empire. In their determination to frustrate both of these aims the Kremlin staged a vigorous counter-movement. Communist power was quickly consolidated in Rumania, Hungary, Poland and finally in Czechoslovakia by the suppression of the liberal and peasant parties and the forcible absorption of the Socialists. All these four countries were dragged reluctantly back behind the Soviet fence and forbidden to take any part in European union or American assistance. The Cominform was created to prosecute relentless war against both projects and against all who supported them in Western Europe.

The effect of this Russian offensive was twofold. It not only stimulated the fear of Russian expansion in Western Europe, but it brought the old antagonism between the Communists and the Socialists--the Bolsheviks and the Mensheviks -- to breaking point. There could no longer be any tolerance or cooperation between them. Those who were for the Marshall Plan were against Communism. Those who condoned the totalitarian suppression of liberty throughout Eastern Europe were exposed as opponents of those human rights which Mr. Attlee, M. Blum and M. Spaak uphold as firmly as Mr. Churchill, M. Bidault or Count Sforza. The declaration of war by the Socialists against "Communist imperialism" was an essential factor in promoting European unity.

Early in 1911 William Stanley, one of the pioneers in the electrical industry, that our company should do more fundamental work in connection with heating devices. Since I had become interested in the theory of heat losses from filaments in gases, I was glad to work along these lines, so I undertook to direct a small laboratory at Pittsfield, Massachusetts, at which I spent about two days a week. Besides studying the heat losses from plane surfaces at various temperatures, I measured the heat losses from wires of various sizes in air at different temperatures, beginning at first with platinum wires, and was able to develop a theory of the heat losses which enabled me to calculate the loss from a wire of any size at any temperature in any gas, assuming, however, that the gas did not dissociate at high temperatures.

Having now a definite theoretical basis on which to calculate the normal loss by convection, I was able to prove that the abnormal rate of heat loss previously observed with tungsten filaments at high temperatures in hydrogen was due to actual dissociation; in fact, I was thus able to calculate the heat of dissociation and the degree of dissociation at different temperatures.

To make sure of these conclusions, however, I wished to make measurements of heat losses in gases which could not possibly dissociate, and therefore undertook experiments with heated tungsten wires in mercury vapor at atmospheric pressure. A little later I experimented with nitrogen to see if this gas dissociated at high temperatures, but found that it did not do so. In both these gases the filaments could be maintained at temperatures close to the melting point for a far longer time than if heated in vacuum at the same temperature. Thus the rate of evaporation was greatly decreased by the gas, many of the evaporating tungsten atoms being brought back to the filament after striking the gas molecules.

By this time I was familiar with all the harmful effects which gas can produce in contact with filaments and knew under what conditions these bad effects could be avoided. In particular, I realized the importance of avoiding even almost infinitesimal traces of water vapor. Thus, when I found a marked effect of mercury vapor and hydrogen in reducing the rate of evaporation, it occurred to me that it might be possible to operate a tungsten filament in gas at atmospheric pressure and obtain a long useful life.

APPENDIX II

Preliminary procedure

Description of Silent Recorder

photograph of Sample Blocks

Composite Distribution of Converted
Reading Time

Preliminary Procedure

The original plan of this study was to write a scrambled or changed version of each passage and to determine difficulty not only by judgment and time required to read but also in terms of the time required to detect the changes. After having numerous individuals write changed versions it became evident that there would be extreme difficulty in developing passages for which the changes were of comparable difficulty from one passage to another.

In order to test the procedure adopted in this study four passages, exclusive of the 37 used, were administered to 48 student subjects. Each permutation was administered to two different students, thereby achieving one complete block of data. When the data were scaled large discriminations were evident.

An analysis of variance of the equated reading times showed (1) significant differences between samples; (2) significant differences between individuals; (3) insignificant differences between order of presentation within or between pairs; and (4) insignificant interactions between samples and individuals.

That insignificant differences were gotten between pairs in the student sample, whereas the reverse obtained with the general population, may be accounted for by the fact that the psychology students were more test wise, hence were not as credulous of the purpose of the initially stated task. This pre-testing experience fully confirmed the belief that a timing method which was virtually fool-proof against detection was necessary for the successful completion of this study. It indicated that four passages could probably be administered to the general population. Use of the student group failed to

uncover procedural flaws in the order of questioning interviewees. These latter aspects, though, were further pre-tested in homes outside of the District of Columbia before beginning actual collection of data.

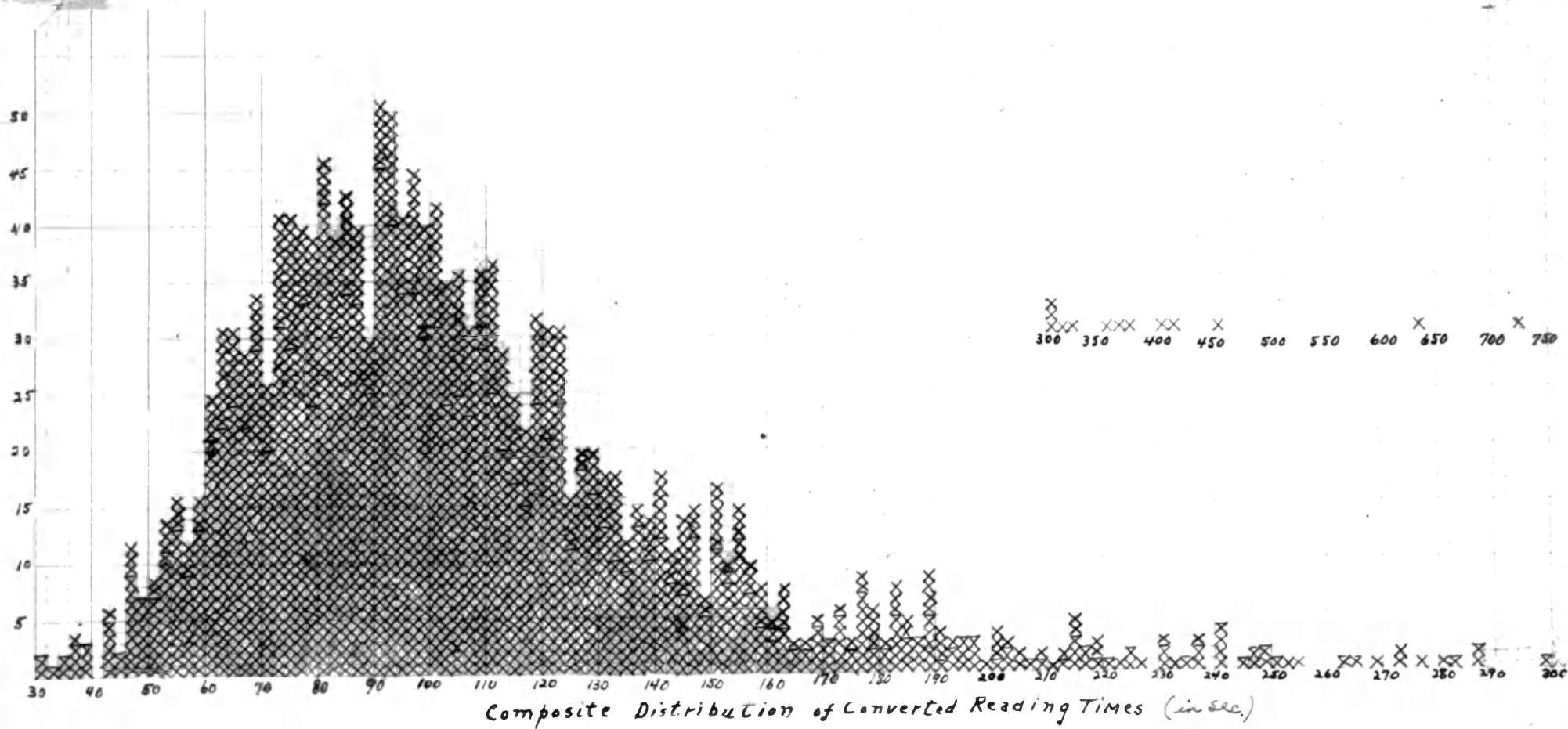
Description of Silent Recorder

Four $1/8$ " thick pieces of masonite, three small sizes of pine wood, two hinges, twenty-two screws, six small brass bolts, one small brass angle strip, a spring clip, and a friction latch were purchased. A masonite clipboard $10-3/8$ " x $15-1/2$ " was constructed which was to serve as a hinged cover of an open topped box which had outside dimensions of $13-3/4$ " x $10-7/16$ " x $2-3/4$ ". The sides of the box ($13-3/4$ " x $2-3/4$ ") were of masonite strips and were screwed into the ends of $1/2$ " pine pieces ($10-1/8$ " x $2-3/4$ ") which formed the ends of the box. The bottom of the box was a $10-1/4$ " x $13-3/4$ " piece masonite and was also fastened to the pine ends by screws and was over-lapped by the masonite side strips. Recesses for the hinges were cut in top edge of the pine end pieces, hinges were secured with screws into the pine and to the bottom side of the clipboard by small brass bolts which also held the spring-clip on the top of the board in place. The brass angle strip was bolted to the bottom and side pieces of masonite on the interior at the center of the right side of the box merely to give additional support. Prior to assembling, each pine piece had been mortised $3/16$ " deep and $3/4$ " wide across the $2-3/4$ " end. This latter dimension was the depth of the inside of the box. These mortised knotches faced each other on the inside of the box on the left side. Also prior to assembly four knotches $1-1/8$ " long and $3/4$ " deep had been cut at equidistant spaces in the left edge of the bottom piece of masonite. The friction latch pieces were attached to the end pine piece and the underside of the clipboard. Finally a piece of pine $12-9/16$ " x $2-7/16$ " x $13/16$ " was cut so that it fitted snugly inside the box against the left side of the box and was held in place by the mortised ends of the box. This piece was removable.

Recesses to hold stopwatches were then cut through this piece so that the slides, to start and stop watches, were accessible through the knitches in the bottom piece of masonite when the pine piece was in place. To insure that the watches would not be seen even though the interviewer found it necessary to open the box in the presence of the interviewee, the inner surface of the pine piece holding the stopwatches was covered with a piece of masonite facing. A remaining free space $9\text{-}1/8"$ x $12\text{-}1/4"$ x $2\text{-}1/2"$ except for the space occupied by the friction catch was available for the carrying of interviewing forms and sets of reading samples.







APPENDIX III

Constants Used to Equate Reading Times
and Predictor-Variables Data to
2,000 Type Spaces

Passage Pairings, Actual and Converted
Reading Times, Added and Converted
Reading Times*

*Columns 5, 9, 13, and 17 contain data pertaining to reading passages listed in column 1; columns 6, 10, 14, and 18 contain the data for passages in column 2; columns 7, 11, 15, and 19 contain the data for passages in column 3; and similarly columns 8, 12, 16, and 20 contain the data for passages listed in column 4.

Constants Used to Equate Reading
Times and Predictor-Variable Data
to 2,000 Type Spaces

<u>Passage</u>	<u>Constant</u>
A	1.0020
B	1.2114
C	.9251
D	1.0817
E	1.0065
F	.8536
G	1.0422
H	1.1669
I	1.1105
J	.8973
K	.8662
L	1.1299
M	.8540
N	1.1249
O	1.0035
P	1.0823
Q	.8897
R	1.2247
S	1.0315
T	1.1211
U	1.0521
V	.8442
W	1.0101
X	.9470
Y	1.1547
Z	1.2384
a	1.2195
b	1.2438
c	.9611
d	.8881
e	1.0911
f	.9940
g	.8299
h	.8969
i	.8707
j	.8787
k	.8264

"CAPS" Group

1st Pr.		2nd Pr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
H	C	F	R	226	193	320	246					264	179	273	277				
I	D	B	H	77	57	89	64					86	62	108	75				
L	T	A	O	55	85	92	99					62	95	92	88				
M	A	N	L	178	146	155	194					152	146	174	219				
A	T	J	E	247	211	229	187					247	237	230	227				
C	C	J	C	96	56	125	92	150				100	56	111	85	156			
R	P	T	J	99	98	118	99	125		150		121	84	132	104	153		168	
T	O	K	J	133	88	79	81					149	88	68	73				
B	E	D	K	100	94	90	115					121	95	97	100				
D	E	N	I	79	85	73	95					85	73	82	105				
C	H	K	J	118	95	91	69					123	81	79	84				
J	S	R	I	67	88	84	193			20	110	60	91	103	214			24	122
R	C	A	E	79	86	83	62					97	80	83	62				
C	A	F	S	77	70	60	61					71	62	65	63				
A	R	I	G	109	112	171	99					109	137	190	103				
N	E	C	B	74	124	95	98					83	109	96	119				
J	B	M	Q	69	58	73	69					62	70	62	61				
T	J	P	L	172	130	127	149	180				193	117	137	168	202			
K	A	S	J	49	87	79	47					42	87	81	42				
H	P	I	K	101	130	120	95					118	141	133	82				
D	P	O	T	69	56	91	80					75	61	91	90				
E	P	K	H	70	59	73	85					70	64	63	104				
N	R	F	H	157	85	128	114		85		80	134	104	109	133		104		93
L	C	B	P	323	193	145	118					365	179	176	128				
A	J	L	H	94	119	106	101					94	107	120	118				
M	I	S	C	149	125	173	140					127	139	178	130				
F	I	C	K	140	124	199	164		75		30	120	138	177	142		83		27
M	D	E	S	113	94	70	98					97	102	70	101				

"CAPS" Group

1st Fr.		2nd Fr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
T	N	C	R	68	73	84	103	65				76	82	78	126	73			
S	L	C	D	54	46	61	54	110	75			56	52	56	58	113	85		
N	S	J	P	94	92	67	57					106	95	60	62				
I	H	J	T	123	116	138	137					137	135	124	154				
C	A	R	D	196	217	208	151			50		181	217	255	163			61	
C	O	A	K	132	122	133	83					122	122	133	72				
G	O	H	A	52	50	40	76					54	50	47	76				
E	T	A	S	59	73	118	92		80			59	82	118	95		90		
K	E	C	H	140	118	158	124					121	119	146	145				
D	J	I	F	96	122	170	128					104	109	189	109				
B	S	E	U	73	65	65	72					88	67	65	76				
R	B	E	U	153	121	65	115					187	147	65	120				
S	P	U	O	95	68	64	72					98	74	67	72				
U	H	J	R	86	75	85	124					90	88	76	152				
M	K	O	G	99	86	149	88					111	74	150	92				
N	J	E	M	85	93	89	115					96	83	90	98				
M	B	M	K	171	194	196	138					192	235	167	120				
E	A	M	G	82	108	109	129		135			83	108	93	134		135		
F	O	L	S	196	282	644	619					167	283	728	638				
H	B	S	T	64	63	51	64					75	76	53	72				
S	I	U	P	184	222	225	233					190	247	237	199				
I	E	N	M	135	130	100	140					150	131	112	120				
F	O	U	B	63	74	82	80			40		54	66	86	97			42	
O	D	C	J	90	92	120	102					90	100	111	92				
C	H	F	R	127	110	136	123	30			55	113	128	116	151	27		67	
E	F	A	G	115	106	193	107					116	90	193	112				
D	R	P	U	171	123	134	151			10	10	185	151	145	159			11	11

"CAPS" Group

1st 2nd		Actual Time					Added Time				Converted Time				Converted added Time						
Fr.	Fr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
F S	O C	100	121	208	95									85	125	209	88				
K O	M U	69	77	76	58									60	77	65	61				
O S	A C	80	66	89	90									80	68	90	83				
G J	J E	100	90	82	106					50				104	97	74	107	52			
M T	H K	111	112	105	88									95	126	123	76				
S D	G U	74	73	88	106									76	79	78	110				
A M	O J	113	118	139	121									113	133	119	121				
L G	J D	107	74	143	114									121	77	128	123				
C M	D E	110	89	68	82									102	76	74	83				
A D	G L	125	118	183	109					20				125	128	191	123	20			
P F	C T	163	152	204	188									176	130	213	211				
T G	F J	105	97	129	82									118	90	110	74				
H Q	N E	43	77	70	78									50	80	79	79				
O K	N H	241	270	224	234									214	231	252	273				
L M	R H	167	141	129	199									189	122	158	232				
K Q	E F	63	73	54	62									71	65	61	62				
M R	E F	160	191	249	96						20		10	139	197	305	97		21		10
K O	E F	74	78	94	84									74	69	98	72				
O L	E F	107	109	184	128					35				121	118	190	111	38			
P U	S J	73	116	116	161									62	122	104	179				
H T	F H	98	170	116	94					20				114	208	99	102	23			
T F	H I	142	113	124	181									159	96	145	201				
A P	H S	116	122	174	82									116	104	203	85				
G R	U K	71	61	122	96					90	200			63	75	128	83	80	245		
S E	U K	94	55	85	98									97	55	103	111				
U K	L M	88	83	154	116									76	87	189	99				

" CAPS" Group

1st 2nd		Actual time				Added Time				Converted Time				Converted Added Time							
Pr.	Pr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
GK	EQ			39	59			62	115					93	51	62	102				
GE	HO			91	63			64	78					84	63	75	78				
EN	AI			125	63			104	73	20	20			153	71	104	81	24	22		
ED	CL			62	90			145	98					62	97	134	111				
UD	IS			119	111			100	140					125	120	111	144				
BI	KL			88	126			71	64					107	140	62	72				
BO	AG			95	110			349	175					115	115	350	162				
NO	UG			61	61			63	66					69	61	66	69				
TS	FA			97	119			222	78					109	123	189	78				
OL	UR			143	123			121	135					144	139	127	165				
RO	DM			116	195			97	240					142	196	105	205				
MP	CU			94	61			126	129					80	66	112	136				
TR	J			111	121			146	163					124	105	130	146				
SG	GH			179	206			257	157					185	183	268	183				
CI	HD			120	110			124	106					111	122	145	115				
UA	HA			58	76			61	75					61	76	71	67				
KH	HC			76	64			86	84		10			66	75	73	78		12		
SH	ON			89	104			76	92	30	40			92	121	76	103	31	47		
AP	TO			164	143			164	150	150				164	155	184	133	150			
HJ	BD			54	56			96	49			20		63	50	116	53			24	
PT	AO			70	72			122	92		60			76	81	122	92		67		
GE	GB			66	67			86	64	25				66	67	90	78	25			
OS	OP			89	75			107	98			40	20	79	75	107	106			40	22
KA	RL			97	66			121	97					83	66	148	110				
BR	GF			88	88			115	113					89	108	120	122				
BQ	TE			70	100			87	92			80		85	89	98	93			90	

"CAPS" Group

1st Pr.		2nd Pr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Q	A	U	J	108	99	90	111					96	99	95	100				
L	F	R	A	78	105	146	179					88	90	179	179				
B	K	F	E	53	40	152	144					64	35	130	145				
R	G	S	F	103	66	96	87					126	69	99	74				
H	L	I	C	69	61	120	80	12	5			81	69	133	74	14	6		
J	M	A	U	114	113	184	132	10	15			102	97	184	139	9	13		
M	H	D	O	130	117	95	124					111	137	103	124				
O	M	K	P	92	123	86	108					92	105	74	117				
K	D	J	H	92	77	102	83					80	83	92	97				
R	U	P	H	81	96	123	113					99	101	133	132				
I	R	P	A	69	81	113	107					77	99	122	107				
O	I	L	Q	91	68	178	130				60	91	76	201	116				53
U	E	C	B	50	73	86	87					53	73	77	105				
J	G	R	P	80	76	89	62					72	79	109	67				
I	L	R	Q	85	104	82	100	75	100	90	130	94	118	100	89	83	113	110	116
U	L	D	A	127	109	159	140	15			45	134	123	172	140	16			45
B	C	R	T	217	255	178	179					263	236	218	201				
U	F	B	N	68	54	116	102					72	58	141	115				
G	I	N	A	97	103	100	116		120			101	114	112	116		133		
I	F	K	G	123	118	129	156					137	128	112	163				
A	H	P	I	71	80	112	107		90			71	93	121	119		105		
J	F	P	Q	100	106	145	125					90	90	157	111				
D	T	Q	F	61	73	75	67					66	82	67	57				
P	O	U	C	122	202	195	160					132	203	205	148				
I	J	S	R	94	95	101	78					104	85	104	96				
D	H	I	Q	57	55	67	57					62	64	74	51				
C	U	H	M	69	58	183	85					64	61	214	73				
M	L	K	F	61	122	135	147					52	138	117	125				

"CAPS" Group

1st Pr.		2nd Pr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C	S	M	J	105	87	110	95					97	90	94	85				
K	M	J	A	43	68	75	80					37	58	67	80				
M	N	B	T	87	56	68	75					74	63	82	84				
S	M	C	F	81	113	130	120					84	97	120	102				
I	N	K	C	84	93	90	105					93	105	78	97				
L	J	E	O	140	155	149	157			50		158	139	150	158			50	
E	J	H	M	92	101	132	127					93	91	154	134				
P	C	T	M	49	50	77	68					53	46	86	58				
U	Q	I	O	61	89	91	76					64	79	101	76				
J	O	P	E	161	145	149	152					144	146	161	153				
N	G	C	I	69	96	122	117					78	100	113	131				
E	N	S	O	156	145	151	181					157	163	156	182				
P	G	O	F	86	86	106	95					93	90	106	81				
A	L	S	B	95	77	76	94					95	87	78	114				
G	Q	E	I	130	108	86	101					135	96	87	112				
H	F	D	G	64	75	43	55					75	64	47	57				
T	G	N	R	68	60	75	82					76	63	84	100				
J	K	B	A	70	69	94	92					63	60	114	92				
R	J	T	P	49	62	73	85					60	56	82	92				
G	S	M	B	122	91	110	116		60		60	127	94	94	141		62		73
T	R	D	S	84	65	64	71					94	80	69	73				
J	U	T	I	128	98	92	94					115	103	103	104				
O	A	T	H	119	99	124	105			55		119	99	139	123			62	
K	I	T	L	107	100	168	89					93	111	188	101				
Q	D	K	N	125	93	124	101					111	101	107	114				
D	N	L	I	175	114	275	252	45				189	128	311	280	49			

"CAPS" Group

1st Fr.		2nd Fr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C	G	J	L	75	79	79	74					69	82	71	84				
U	T	S	N	75	90	82	85					79	101	85	96				
O	L	K	T	79	94	84	114					85	106	73	128				
Q	T	P	M	94	112	93	93					84	126	101	79				
O	H	N	D	107	90	110	99					107	105	124	107				
E	H	B	J	118	92	150	134	10				119	107	182	120	10			
C	K	O	R	98	108	100	88					91	94	100	108				
O	U	E	S	90	93	111	86					90	98	95	89				
T	B	L	M	133	95	110	126					149	115	124	108				
F	G	L	O	77	90	89	95					66	94	101	95				
I	A	D	U	140	110	59	60					155	110	64	63				
L	R	P	D	105	74	68	61					119	91	74	66				
O	B	G	R	55	52	65	96					59	63	68	118				
P	K	Q	S	68	54	66	68					74	47	59	70				
B	O	T	A	73	90	78	97					88	90	87	97				
F	H	G	C	88	120	99	93					75	102	103	86				
R	K	F	D	140	132	107	150					171	114	91	162				
H	N	M	F	77	83	131	177					90	93	112	151				
L	N	D	I	95	58	46	77					107	65	50	86				
P	B	L	A	59	63	57	105					64	76	64	105				
E	L	J	N	58	72	72	66					58	81	65	74				
B	U	G	N	70	57	70	41					85	60	73	46				
J	C	H	E	41	60	47	54		25			37	56	55	54		23		
F	C	Q	N	104	130	147	160					89	120	131	180				
Q	P	N	T	57	68	99	32	35	20		100	51	74	111	36	31	22		112
U	I	F	T	71	65	96	62	145	40		55	75	72	82	70	153	44		62
F	K	C	N	105	101	123	83					90	87	114	93				

"CAPS" Group

1st Pr.		2nd Pr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
P	J	B	F	94	95	124	110					102	85	150	94				
B	M	D	Q	72	99	91	108					87	85	98	96				
S	U	F	L	90	88	92	105					93	93	79	119				
D	C	B	R	94	119	127	120					102	110	154	147				
Q	L	T	D	121	85	108	101					108	96	121	109				
F	B	L	U	113	95	124	94					96	115	140	99				
N	U	O	J	61	82	100	126					69	86	100	113				
P	R	E	K	142	184	141	167	85	15			154	225	142	145	92	18		
S	A	I	B	71	76	126	114					73	76	140	138				
L	B	C	P	77	64	92	73					87	78	85	79				
N	C	U	S	63	92	99	76					71	85	104	78				
K	Q	N	P	105	67	63	99		10			91	60	71	107		9		
G	U	O	K	142	161	159	162					148	169	160	140				
G	A	I	U	80	87	89	111					83	87	99	117				
P	N	S	G	65	80	53	51					70	90	55	53				
A	B	U	N	130	106	136	141					130	128	143	159				
I	T	G	J	95	101	144	97		105			105	113	150	87		118		
Q	I	C	B	108	99	149	92					96	110	138	111				
H	T	A	M	67	83	156	114					78	93	156	97				
U	M	L	D	95	62	102	81					100	53	115	88				
J	Q	I	M	105	110	92	80					94	98	102	68				
R	S	Q	Q	76	79	128	119	62				93	81	114	119	76			

"Lower Case" Group

1st Fr.		2nd Fr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B	g	A	C	107	125	92	125					130	126	92	116				
E	h	B	J	72	86	107	98					72	81	130	121				
i	D	B	h	59	84	104	115					68	91	126	109				
k	A	s	j	43	80	98	49					52	80	85	61				
A	t	o	B	123	118	147	142			55		123	104	160	172			60	
l	t	A	q	92	123	161	152	100				114	108	161	126	124			
f	s	o	C	93	116	94	107					79	101	103	99				
D	f	n	i	71	101	108	68					77	85	96	79				
B	E	D	k	45	47	82	60					55	47	89	73				
B	i	k	l	101	76	91	88			75		122	88	111	109			93	
r	f	t	u	149	108	135	139					134	91	119	115				
r	C	A	E	126	143	118	94					113	132	118	95				
C	q	p	s	64	39	58	82					59	32	58	71				
E	D	C	l	74	91	123	95					74	98	114	118				
E	f	A	g	55	80	150	82					55	68	150	83				
h	g	n	E	101	101	125	107	25				97	102	111	108	24			
r	o	D	m	138	91	141	76					124	99	153	73				
n	B	m	k	183	124	125	111		120			163	150	120	135		145		
D	p	e	t	53	63	60	77					57	63	65	68				
a	l	C	D	90	43	80	67					78	53	74	72				
E	p	k	r	55	77	77	112		20			55	77	94	100		20		
m	r	f	h	100	111	103	86		90	85		96	100	87	81		81	72	
l	C	B	p	62	93	96	97					77	86	116	96				
A	j	l	h	142	127	124	163					142	157	154	154				
m	i	s	C	136	71	123	88					131	82	107	81				
n	f	E	B	104	110	76	109					92	93	76	132				
f	i	q	k	149	115	183	101					126	133	152	123				
m	D	E	s	63	53	64	117					61	57	64	102				
j	B	m	q	75	106	94	113					93	128	90	94				

"Lower Case" Group

1st 2nd		Actual Time				Added Time				Converted Time				Converted Added Time					
Pr.	Pr.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
t	n	c	r	113	103	119	98					99	91	110	88				
n	s	j	e	91	93	65	79		95			81	81	80	79		83		
i	h	j	e	72	88	80	97					83	83	99	85				
c	o	a	k	107	77	98	99					99	84	98	121				
k	o	h	a	143	120	164	138					144	131	155	138				
c	a	f	d	151	156	110	86		50			140	156	99	93		50		
t	j	p	i	339	265	409	364	35				298	328	407	453	31			
k	e	c	h	107	98	166	178					130	99	154	169				
t	e	a	s	90	118	217	124					91	104	217	108				
a	i	s	b	92	35	85	41					92	44	74	50				
d	j	f	i	72	64	63	89					78	79	73	75				
r	b	e	g	117	82	94	86					105	99	95	87				
s	p	h	u	173	152	154	112					151	151	127	122				
u	n	j	r	124	99	91	119					102	94	113	107				
n	k	g	e	173	176	189	175					154	215	206	177				
n	u	j	o	85	92	76	64					75	76	83	79				
n	j	e	m	82	76	74	71					73	94	74	68				
a	a	m	k	81	113	110	122					82	113	106	123				
i	r	a	r	99	134	130	143					123	113	117	143				
s	i	u	f	121	87	120	118					105	100	99	100				
f	q	u	b	90	75	133	96					76	62	180	116				
i	t	e	j	208	273	413	242		50			240	240	417	300		44		
o	s	e	c	119	124	111	120					130	108	112	111				
d	r	p	m	127	104	108	140		20			137	93	107	116		18		
k	d	i	s	106	83	147	145					107	90	182	146				
h	b	s	e	244	199	135	134					231	241	118	118				

"Lower Case" Group

1st	2nd	Actual Time				Added Time				Converted Time				Converted Added Time			
Pr.	Pr.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
t s	f A	107	125	106	123					94	109	89	123				
b g	n I	145	155	218	197					127	157	194	177				
A D	g I	129	133	144	124					129	144	145	154				
h r	f p	91	99	96	85					86	89	81	84				
n q	l e	107	105	91	121					95	87	113	122				
u m	n h	55	51	72	51					46	49	64	48				
l k	r h	69	76	107	90					86	93	96	85				
A p	t q	89	70	101	82					89	70	89	68				
D f	g e	115	153	103	112					114	129	104	98				
q r	u k	170	185	164	200					141	166	136	244				
t f	h i	106	108	125	97					93	91	118	112				
f u	l i	148	145	128	119	180				125	120	159	137	152			
o m	g f	263	269	284	355					287	223	287	300				
p q	n l	106	107	112	85					102	107	99	106				
A o	A o	135	182	203	156	30				134	160	203	170	26			
g m	k o	181	155	176	207					183	149	215	251				
g u	h o	54	58	63	71					55	48	69	87				
k k	m c	78	89	113	127					95	84	109	117				
g k	n o	139	134	149	151					140	163	150	125				
g n	a o	85	119	130	100					84	106	113	109				
A f	h e	110	122	130	145	160				110	103	123	126	160			
m p	q u	100	116	184	169					96	115	153	140				
C i	h u	70	47	70	53					65	54	66	57				
t k	q i	108	89	143	95					95	109	119	118				
a q	g h	97	81	86	88					84	67	87	83				
u h	h q	95	85	101	96					79	85	96	80				
e h	o n	125	108	135	153					109	102	147	136				
e c	f j	83	83	97	80					73	77	82	99				
t k	e	38	35	63	55	10				46	30	57	55	9			

"Lower Case" Group

1st	2nd	Actual Time				Added Time				Converted Time				Converted Added Time			
Pr.	Pr.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
o	i	74	69	107	108					81	80	133	90				
i	e	110	137	136	151					127	123	135	151				
i	r	85	93	136	138					105	94	122	137				
i	e	60	65	103	115					69	81	92	95				
B	r	85	88	137	133					103	81	123	117			18	15
g	i	84	95	102	155			20	17	85	110	91	155				
i	e	48	77	69	67					55	77	84	68				
u	p	82	73	85	80					68	73	103	71				
A	h	104	102	72	71					104	97	72	82				
i	r	122	117	220	136					151	99	219	113				
D	e	76	115	188	155					82	101	156	131				
i	j	60	49	115	88					69	61	100	79				
D	h	44	39	46	66					48	37	53	55				
C	u	75	98	91	80					69	81	86	77				
C	e	126	108	74	86					106	109	92	94				
C	e	70	49	71	70					65	43	68	87				
k	m	60	68	40	72					73	65	50	72				
m	n	88	115	86	123					85	102	104	108				
s	m	125	130	190	295					109	125	176	249				
i	n	77	91	96	93					89	81	117	86				
C	k	97	87	88	89					90	106	96	80				
i	j	78	52	103	116					97	64	104	127				
i	e	85	113	86	79					86	140	81	65				
u	q	96	92	72	65					79	76	83	71				
e	c	79	83	87	91					79	77	76	87				
j	o	58	74	94	97					72	81	93	98				
u	e	70	52	67	79					62	53	62	69				
C	e	72	89	70	44					67	90	66	48				

"Lower Case" Group

		Actual Time				Added Time				Converted Time				Converted Added Time			
1st	2nd	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pr.	Pr.																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4														

"Lower Case" Group

1st 2nd		Actual Time				Added Time				Converted Time				Converted Added Time					
Pr.	Pr.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	B	E	E	103	99	172	421					111	120	174	378				
F	C	E	C	98	82	80	109					83	79	81	101				
H	D	B	D	85	73	89	66					80	90	108	71				
B	A	t	A	117	132	113	200					142	144	99	200				
m	I	k	f	114	141	153	131		105			110	175	187	153		131		
P	K	Q	S	110	107	129	169					109	130	107	147				
m	T	H	K	143	146	147	125					137	128	139	152				
r	K	f	D	147	141	152	93					132	172	128	101				
H	n	m	f	84	126	114	136					80	112	130	115				
L	n	D	I	34	43	28	34			60	60	42	38	30	39				
L	B	I	A	82	62	75	86					82	75	93	86		74	60	
E	A	I	B	112	114	94	82					113	97	95	95				
S	A	f	t	198	152	111	182					172	152	128	220				
u	I	f	t	149	53	148	103					123	61	125	91				
F	B	I	u	88	80	80	125					74	97	100	103				
Q	I	t	I	89	96	130	64					74	119	114	69				
A	r	t	I	78	83	56	72		105			78	74	65	73		105		
P	n	S	E	92	105	157	79					91	93	137	80				
E	A	I	u	140	138	75	236					141	138	87	195				
D	C	B	r	144	202	175	218					156	187	212	196				
E	B	Q	E	187	139	227	211					189	140	188	195				
P	I	K	A	102	128	77	90					101	115	78	110				
J	B	B	A	59	57	68	88					73	70	82	88				
B	B	G	n	62	80	67	69					75	66	68	61				
Q	P	E	n	112	83	122	108		80	80	140	93	83	108	95		80	17	123
I	C	n	t	71	82	92	70					88	76	87	70				
f	o	I	s	124	85	104	138					105	93	129	122				

"Lower Case" Group

1st Pr.		2nd Pr.		Actual Time				Added Time				Converted Time				Converted Added Time			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
n	C	u	s	132	129	156	162					117	119	129	141				
k	q	n	P	81	75	87	90					99	62	77	89				
q	i	C	B	169	80	159	153					140	92	147	185				
j	q	i	m	58	90	66	89					72	75	76	86				
i	E	n	m	74	67	114	58	35				85	67	101	56	40			
A	B	u	n	86	52	80	71					86	63	66	63				
u	m	i	D	94	77	82	87					78	74	102	94				
r	s	q	o	148	195	219	134					133	170	182	146				
p	j	B	f	112	96	124	172	45				111	119	150	145	45			
f	C	q	n	99	99	146	112					84	92	121	99				
f	k	C	n	108	75	92	104				56	91	91	85	92			50	50
B	q	t	E	117	85	136	70		115	30		142	71	120	70		95	26	
B	m	D	q	53	60	81	106	10				64	58	88	88	12			
h	t	A	m	109	97	124	127					103	85	124	122				
B	s	E	u	107	134	126	186	148	188			130	117	127	154	179	164		
o	i	u	r	119	115	162	204	50	190	185	25	130	143	134	183	55	236	153	22
o	m	k	p	166	144	204	96					181	138	249	95				
s	u	f	i	188	121	191	152					164	100	161	189				
p	E	o	f	148	119	44	150					147	120	48	127				

APPENDIX IV

Predictor-Variable Data for Each
Reading Passage Equated to
2,000 Type Spaces

Reading Passage Data per 2,000 type spaces

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
A	84	54	22.13	21	15.03	163	0	333	42	87	1.623
T	92	73	34.00	1	8.97	207	0	305	46	43	1.853
R	77	45	21.54	7	15.92	154	1	343	42	67	1.664
I	63	52	29.00	11	12.22	163	0	354	47	76	1.555
O	62	54	42.63	10	8.03	150	0	342	46	59	1.548
L	77	53	39.29	1	7.91	164	0	311	51	24	1.785
F	46	39	13.94	24	26.17	117	12	364	34	115	1.451
I	65	45	23.42	19	14.93	153	0	350	46	72	1.573
r	50	45	22.65	19	15.25	141	0	345	45	94	1.527
s	61	52	26.40	35	13.06	127	5	345	31	108	1.510
t	67	63	24.60	10	13.18	160	0	324	37	70	1.713
E	41	46	18.67	52	18.12	160	0	338	35	117	1.604
K	34	29	15.99	31	23.39	108	13	366	28	103	1.406
D	66	34	16.58	8	20.55	120	3	341	48	72	1.635
J	59	48	24.07	3	13.46	137	0	325	46	64	1.709
M	53	51	27.71	6	11.96	143	0	333	44	66	1.680
N	47	40	21.53	49	16.87	117	6	363	46	134	1.368
h	55	58	22.44	27	15.15	153	2	340	31	83	1.627
i	24	40	11.43	64	34.64	121	7	396	35	149	1.332
m	42	37	22.29	29	16.34	120	0	364	42	114	1.475
n	59	43	16.52	15	20.43	145	7	337	36	62	1.566
q	55	37	29.14	13	11.62	120	6	339	37	85	1.689

Reading Passage Data per 2,000 type spaces

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉
B	74	56	26.60	5	12.11	179	0	322	46
F	56	52	31.75	3	10.24	169	0	325	44
G	52	38	16.05	11	21.89	131	2.08	351	34
Q	74	62	24.73	7	13.34	168	0	330	54
E	51	36	15.39	14	23.23	122	11.11	357	33
J	59	33	24.08	14	14.86	128	0	358	40
K	49	28	17.88	0	19.51	122	0	349	38
W	51	44	34.33	13	9.92	147	0	340	57
C	63	61	23.20	0	13.88	143	0	322	34
H	56	58	21.25	14	14.00	208	0	298	41
P	52	50	19.18	23	18.40	120	0	353	40
S	66	64	24.54	0	13.41	162	0	329	46
U	63	63	21.27	28	15.78	152	0	336	42
O	71	67	18.81	2	17.46	154	0	328	43
P	51	50	23.07	14	14.91	141	0	344	36