

Teachers College
Contributions to Education
Columbia University



To my Aunt Floie
who has always
believed in me.

Clyde

*THE WRITING OF
INFREQUENTLY USED WORDS
IN SHORTHAND*

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*The Writing of
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in Shorthand*

VIII

Summary of Conclusions and Suggestions for Further Research

BARNHART [4], Odell [23], and Davis [8], among others, believed that frequently used words were written in a manner different from that for the writing of infrequently used words. There was no objective or research evidence available to show whether or not their belief was correct, and no techniques or equipment had been developed to yield such evidence. The problems of this study were, therefore: (1) to develop techniques and apparatus which would make it possible to compare the writing of frequently used and infrequently used words; and (2) to discover, by the use of the techniques and apparatus, some of the characteristics of the writing of infrequently used words in Gregg shorthand. The contributions of this research are to be evaluated in terms of these two purposes.

The wide boundaries of the problem field, which includes handwriting, speech, hearing, English spelling and grammar, and typewriting, and bears some similarity to the problems of translation in foreign languages, made it necessary to limit the area of research. The development of techniques and apparatus, the first general problem stated above, was accordingly limited to the choice of words and sentences to control variable elements and the study of the writing of frequently used and infrequently used words in shorthand by four instruments—a questionnaire, a transfer test, motion pictures, and a writing and pause timer called a Scriptochron. The second general problem stated above was limited to a study of pauses preceding and within the writing of frequently used and infrequently used words, and the writing time for such words, to determine

whether the pauses are statistically significant, whether the writing time is statistically significant, whether word elements aid in writing infrequently used words, and what explanations may be found for the time required to write infrequently used words.

The Techniques

One of the primary purposes of this research was the development of techniques for the study of shorthand problems. The control of variable elements in words and sentences, the use of a questionnaire to discover what students think about their writing, the measurement of transfer by errors, the application of motion pictures to shorthand study, and the construction of a unique machine to measure writing and pausing time, have been used in the study of shorthand writing for the first time. Their combined focus upon the problem of the writing of infrequently used words has made it possible to explore several phases of the problem, as well as to verify evidence.

The techniques are described in detail in Chapters III to VII and are summarized below in terms of their combined functions and in relation to the problems.

1. *Techniques for the choice of words and sentences.* Many variable elements in words and sentences were recognized from a study of the literature in related fields, as reported in Chapter I. Techniques were developed for the construction of sentences and words to control to a considerable extent these variable elements.

A context setting was employed in preference to isolated, unrelated words, since words are not used in isolated word form and because preliminary study had indicated a reaction for isolated word writing different from the reaction for writing in context. Watson stated [33 : 120] that "words should always be dictated in a contextual setting" and again [33 : 80], that "the spelling of any word is never an isolated function." Although this problem was not pursued to a conclusion in the

present study, equipment not previously available has now been constructed to provide evidence on it.

A feeling of unfamiliarity, often influencing the writing of infrequently used words, was limited by making each sentence a short definition of the word. The infrequently used words were placed at the ends of the sentences, to control the factor of position in the sentence. The lengths of the sentences were controlled within stated limits, and sentence structure and vocabulary were considered, but should be improved in any later experiment.

The elements of the infrequently used words were controlled by a criterion for length, and a criterion for position of the frequently used word element as the first part of the word.

Shorthand experience with the infrequently used words was controlled by the criterion of using words which were not contained in the shorthand texts used by the students, and words beyond the fifth thousand of the Horn word list.

Pronunciation was partially controlled by furnishing the cooperating teachers (in the questionnaire and transfer tests) with dictionary pronunciations, and by having the sentences dictated by one person (in the motion picture and Scriptochron studies).

2. *Techniques to discover differences between frequently used and infrequently used words.* Three techniques were developed.

A questionnaire, administered immediately after writing each infrequently used word in shorthand, produced evidence that (1) the students had not written the words before, (2) they recognized the fact that they hesitated in constructing the words, (3) they believed in certain causes of their hesitation, and (4) they believed words and rules help them to construct infrequently used words.

Motion pictures taken while the students were writing made it possible to count the number of pictures, or frames, used for writing time and pausing time preceding the writing of both frequently used and infrequently used words.

A Scriptoron machine made it possible to secure a type of data similar to that obtained by motion pictures, but with a larger number of cases, more natural writing conditions, and more accurate measurement.

The three techniques reinforce the findings of the fact of hesitation, and the use of words to construct infrequently used words, while the motion picture and Scriptoron techniques establish the differences between the writing of frequently and infrequently used words, the points of hesitation within infrequently used words, and the use of words (indicated by the questionnaire), syllables, and strokes in the construction process.

3. *Techniques to discover the use of frequently used words in constructing infrequently used words.* The motion pictures and Scriptoron records indicated the pauses within the writing of the infrequently used words. The strokes written between the pauses indicated the parts, single strokes, and stroke combinations which, pieced together, represented the construction process for the word. When these stroke combinations corresponded with frequently used word elements, it was concluded that the students had used such words to construct the infrequently used words.

In addition to the motion pictures and Scriptoron records, a transfer test was devised in which the student might write the first part of the infrequently used word according to sound, or according to a previously learned frequently used word form which differed from the sound and shorthand dictionary writing. Transfer was concluded when a student used the frequently used word form, in preference to the sound construction, thus indicating his recognition.

4. *Statistical techniques.* Standard statistical techniques were applied to the data, as indicated in Chapters III to VII. Briefly, percentages were interpreted on the basis of formulas for the standard error of percentages and the reliability of percentages. The significance of a distribution of percentages,

obtained from a check list of the questionnaire, was calculated by means of the Chi-Square Test. Comparisons of time elements of frequently used and infrequently used words were made by calculating means, standard deviations, standard errors, and the significance of differences between means.

Summary of Conclusions

Six specific problems were stated in Chapter II. Data on these problems were obtained by the multiple techniques described. Conclusions are restricted to the data, and are valid for the partially controlled factors of frequently used and infrequently used words and the pauses preceding them, as represented by the students tested, and the conditions of testing, including the techniques. These limitations of the conclusions should be recognized.

A summary of the conclusions pertaining to the specific problems follows.

1. Second, third, and fourth semester shorthand students agree in some of their beliefs as to how they write infrequently used words, but they differ sufficiently to require differentiation among semesters for purposes of research. The third semester group was deemed the best medium for study of the problem, and was chosen for intensive study.

Students are conscious of hesitation, but their opinions are not very significant as to the point of hesitation. They believe that rules and words help them to write infrequently used words. The transfer test, Scriptochron, and motion picture evidence justify their belief in the use of words, but the possible use of rules was not studied except by the questionnaire.

Students often think that they did not hear the word plainly, but they also admit that they are unfamiliar with its use and shorthand writing. They believe that stroke combinations involving changes in the direction of writing and difficult angles are a cause of hesitation, which suggests further research now made possible by these techniques.

2. Transfer does take place from frequently used words to infrequently used words which contain frequently used word elements as the first part of the words. The questionnaire data indicated that the students believed this, and the transfer test, the motion picture, and the Scriptochron data confirm this finding, although the percentages obtained by the several techniques differ, as might be expected. For example, the extent of the use of words was indicated by the questionnaire as 31.4 per cent, the transfer test as 44.7 per cent, the motion pictures as 43.7 per cent, and the Scriptochron as 38.5 per cent. The Scriptochron is considered to be the most accurate and the questionnaire the least accurate, while the transfer test represented a different group of words.

The transfer percentages for the separate words differ greatly, however, ranging from 3.7 to 84.5 per cent in the transfer test, indicating that some words transfer more than others, and that optimum conditions for transfer should provide a fertile field for further research.

3. Apparatus was constructed and tested to measure objectively writing time and pausing time preceding and within writing, and to indicate the points within the writing where the writers paused. The Scriptochron provides a very accurate measuring device, which can be improved and applied to a wide range of time measurements in shorthand and longhand writing by modifications occurring to this and other research workers.

4. The difference between the pausing time preceding the writing of frequently used words, as compared with the pausing time preceding the writing of infrequently used words, is significant. Evidence derived from both the motion pictures and the Scriptochron records substantiate this conclusion. The data for the motion pictures are found in Table VII; the data for the Scriptochron are found in Table X.

5. The writing time, as measured in time per stroke, for the writing of frequently used words, differs significantly from the

writing time per stroke for the writing of infrequently used words. The writing time for the writing of frequently used words, contained as the first elements in infrequently used words, also differs significantly from the writing time for the remainder of the infrequently used word, indicating that such elements facilitate the writing of infrequently used words. Both the motion picture and the Scriptochron data supply evidence for the first part of this conclusion (Tables VII and X). The motion picture data (Table VIII) provide the evidence for the second part of the conclusion.

6. The pattern indicated by the four sources of data for the writing of these infrequently used words is one of hesitation preceding and within the words, belief in the usefulness of words and rules, but without shorthand experience or knowledge of meaning, and writing in piecemeal fashion (1.7 strokes between pauses). Students use frequently used words and syllables to construct infrequently used words, but consume much time in passing from one word to another, and in connecting the parts of the words. Their performance shows some similarity to a puzzle reaction for which they possess few clues. Recognition of this pattern, with emphasis on the helpful procedures indicated, and further research by these and other techniques, should result in considerable improvement in the writing of infrequently used words in shorthand.

Suggestions for Further Research

This research has produced techniques and conclusions which may contribute to further research on three kinds of problems: (1) problems of survey; (2) problems of transfer; and (3) problems in which time is a crucial element. The following suggestions for further research are therefore confined to such problems.

1. To what extent do students understand or misunderstand infrequently used words? To what extent do they write successfully those words which they understand or misunderstand?

Do their attitudes and writing patterns for the words which they understand differ from those for words which they do not understand? The present study shows that students do not understand the meanings, and believe they hesitate when they do not understand the words.

2. To what extent are phonetic elements, such as syllables and frequently used sound combinations, used in writing infrequently used words? The present study shows that syllables are used to some extent, and that infrequently used words are written in approximately two-stroke (1.7 strokes) combinations, but this problem needs further study.

3. What are the optimum conditions for transfer of words, of syllables, and of sound combinations to the writing of infrequently used words? The transfer test, the *Scriptochron*, and motion pictures may be used to test further the several positions of the elements thought to be possible of transfer. A graduated scale of elements may be constructed, varying and controlling one element after another. For example, a progressive, one-two-three-stroke, etc., frequently used word, syllable, or stroke combination might be used in infrequently used words in primary, intermediate, and final positions. The infrequently used words might be placed in controlled positions within sentences, and the elements to be tested might be separated from the words containing them by a definite number of words to obtain a scale of transfer, which would be an important contribution to teaching.

4. What are the causes of the considerable differences in the transfer values of different words, or syllables, or stroke combinations? To what extent does such transfer correspond with frequency of use in the subject matter written, or with particular strokes or stroke combinations, or the number or lengths of strokes? This would be another contribution to the problem of the optimum conditions for transfer which might be made by the suggested techniques.

5. What kinds of shorthand writing are produced by con-

trolled amounts of several methods of teaching? The problem of whether words should be taught in isolated, group, or context form has vexed the teachers of shorthand, as well as those of foreign languages, spelling, and writing. The *Scriptochron* technique now makes it possible to measure the kind of writing, pausing time, writing time, and parts by which a word is written, and should show differences effected by teaching methods.

6. What are the relative merits of the circle, the curve, and the angle, the effect of the non-consecutive order of sound writing (possessed to a greater or lesser degree by nearly all the shorthand systems)? The *Scriptochron* should be especially helpful to the makers of shorthand systems. It should aid in the determination, without resort to subjective opinion, of which strokes and combinations require the least time (stop watch technique furnishing the only present available evidence).

7. Is there a finer classification than that of frequently used and infrequently used words? It has been established that there is a difference between the writing of frequently used words and infrequently used words. Further research by the techniques suggested here may show that this classification needs to be further refined, and methods functional to the finer classification may then be evolved to replace the present single method procedure in most general use.

8. Does writing time, reaction time, and pausing time preceding or within writing correlate with success in shorthand writing? What are the writing characteristics of experts, and poor and good writers of shorthand? The makers of prognostic tests have found difficulty in measuring the quick reaction required for the successful shorthand writer. A measuring instrument is now available.

9. To what extent do phrasing and other abbreviations save time? Is time actually saved, or does the writer waste the time gained by not lifting the pen in thinking about the phrasing or

abbreviation? This is another problem involving the measurement of time.

10. What rhythm pattern or patterns are there in shorthand? Does rhythm condition the writing and pausing time between and within words? Although this was not a part of the present study, there was some slight indication that the rhythm established by the pauses between words conditioned the strokes which were written without hesitation. Evidence on this point may indicate a method to decrease pausing time preceding and within words.

In summary, it may be concluded that the above problems are only a few of those which the techniques and conclusions of this research suggest, and through which other research workers may explore the problem of the improvement of the teaching of shorthand.