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Relationship between reading loss and visual disability for one hundred fifth and sixth grade pupils in Modesto, California

Lincoln Emil Isaac

University of the Pacific

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RELATIONSHIP BETWEEN READING LOSS AND VISUAL DISABILITY FOR ONE HUNDRED FIFTH AND SIXTH GRADE PUPILS IN MODESTO, CALIFORNIA

A Thesis
Presented to
the Faculty of the Department of Education
College of the Pacific

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Lincoln Emil Isaac
June 1959
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CHAPTER I

INTRODUCTION

In order to live in our modern world one must read. Although the average student learns to read by any of several methods, e.g., letter-by-letter method, word method, word group method, phonetic method, or combination of these methods, many reading failures have occurred.\(^1\) This study was conducted in an effort to determine if a correlation exists between reading loss and visual disability as disclosed by observations made with the Keystone Visual Survey Tests, administered to students at the fifth and sixth grade level in the elementary school.

This visual screening device has been used by schools, clinics, and industry for visual screening of subjects who have difficulties that could hamper optimum performance in their school work or visual efficiency in other dispatch of duties.\(^2\) The instrument has been used


in screening subjects for referral to optometrists and ophthalmologists. The Keystone Visual Survey Tests are not diagnostic; they have been designed to show whether the subject has normal over-all vision or whether he should be referred for professional attention. While the validity of the Keystone Tests cannot be compared with tests made by the practitioner in his office, their validity as screening tests has been verified in the offices of ophthalmologists and optometrists.\footnote{Ibid., insert.}
I. THE PROBLEM

Statement of the problem. The purpose of this study was to discover if there is a relationship between reading loss and visual disability and to assay the reading loss that is characteristic for individuals with a visual disability. The intent was not to diagnose that all reading loss can be attributed to a visual disability or define visual defects, for the latter requires a careful examination by an eye specialist, but rather to determine if the child's reading may be affected by a blurred visual image or by eye-muscle fatigue.

Justification of the study. Our schools have been referred to frequently as reading schools. In the regular classroom, reading activities require both near-point and far-point seeing responses. In addition, binocular (two-eyed) rather than monocular (one-eyed) responses are required. Hence the writer has felt that attention should be directed to screening out and correcting binocular near-point visual defects, since reading activity in most instances calls for sustained binocular effort at near-point vision.

The importance of effective eyesight cannot be
minimized. The premise in this study was based on the fact that if a child cannot see the printed symbol on the written page he cannot read, and pursuing this premise further, if he encounters difficulty in seeing the symbol, he will then encounter difficulty in reading. Until such time as the visual loss is eliminated or corrected, educators will have a percentage of pupils that will encounter difficulty in learning to read.

**Statement of the hypothesis.** The thesis of this study is that a difference will be found between the responses of the remedial readers and the responses of the normal reader to the Keystone Visual Survey Tests after the variable of comprehension has been eliminated or understood by the students screened.

**II. DEFINITION OF TERMS USED**

**Normal readers** are defined as those students who have no known or existing problem in reading as revealed through tests and daily class observations.

**Remedial readers** are defined as those students who have a definite reading loss and have been recognized and grouped accordingly by school authorities on the basis of observation and test scores.
Near point vision. The equivalent of an actual distance of sixteen inches (reading distance).

Acuity. The capacity of either eye alone to recognize small space intervals in the discrimination of form monocular vision.

Binocular. Pertaining to both eyes working together.

Esophoria. The tendency of both eyes to turn inward—overconvergence.

Exophoria. The tendency of the eyes to deviate outward—underconvergence.

Lateral imbalance. The tendency of the eyes to deviate inward or outward.

III. ORGANIZATION OF THE THESIS

Chapter I included a statement of the problem, justification of the study, statement of the hypothesis, and definition of the terms used. The second chapter reviews the related literature in the field. Chapter III presents the data and relates the techniques used in proceeding with the study. The subjects are identified,
and a description of the measuring instrument is given. A description of the manner of gathering data and the tables for gathering raw data appear in Chapter IV. A test of the null hypothesis, that there is no difference between the responses of the remedial reader and the responses of the normal reader to the Keystone Visual Survey Tests after the variable of comprehension has been eliminated, is found in Chapter V. The closing chapter presents the statistical formulas used and the tables of results. A summary of the thesis, the conclusions drawn, and recommendations for further study are presented in the concluding chapter.
CHAPTER II

REVIEW OF THE LITERATURE

While studies suggest that no one specific disorder is responsible for the apparent inability of some children and adults to learn to read, there is evidence that visual disability is a contributing factor in reading loss. Grace Fernald states:

All authorities agree that the causes for reading disability are numerous and vary from case to case. Certainly results with both children and adults suggest that no one specific disorder is responsible for the seeming inability of some individuals to learn to read. Such conditions as poor vision or hearing, illness, or other physical disabilities, poor homes, poor schools, or other unfavorable environmental conditions, extreme emotional instability, mental deficiency, or other mental maladjustments have been recognized as responsible for reading failures. In most of these cases, individual work and correction of faulty conditions result in normal learning. Many of these cases can be treated successfully in a schoolroom using accepted techniques, provided the child is given special attention in a small group with a strong teacher.¹

In relation to this Gesell says:

Vision is profoundly integrated with the total action system of the child--his posture, his manual skills and motor attitudes, intelligence, and even personality make-up.²


Understanding the visual system and total action system of the child is necessary in order to better understand the functions of the child and his potential. Some of the literature reviewed directed attention to visual disabilities that were encountered during the course of this investigation. Information was gained regarding the general attitude of disabled readers toward their disability from classroom teachers, service personnel, and parents. The writer agrees with Dr. J. P. Rogers who states:

There is no excuse for a teacher not to know in a rough but sufficient way whether a child is handicapped by defective eyesight.3

Modern society is so organized that in order to adequately take a meaningful place in it one must be literate. In his book Foundations of Reading Instruction, Betts states:

...most parents of today place a premium on reading as one of the school "subjects." Without reasonable facility with reading processes, the pupil's educational progress is blocked; he is denied many recreational opportunities; his language handicap is likely to be interpreted by teachers as mental retardation; his contemporaries may heap ridicule upon him in a most brutal fashion; the

vocational opportunities for which he may be otherwise qualified are withheld; and his personality development is likely to be distorted. Indeed, most parents, with considerable justification, emphasize reading ability as a significant acquisition for better living.⁴

In 1941, Dr. W. W. Charters expressed the following regarding the role of reading:

> Reading is man's most potent skill. Without reading his world is circumscribed by his neighbors. All he learns is what he picks up in conversation. . . . The world of newspapers, books, magazines, and bulletins is closed against him by massive walls of ignorance.⁵

If agreement can be reached that reading is man's most potent skill, then one aim of educators should be to guide the pupil from where he is to where he ought to be by compensating or endeavoring to correct a recognized visual disability in the child wherever and whenever possible. Current literature makes it clear that certain characteristics within the individual and factors in his environment influence the pupil's ability to master such difficult learning as reading and other basic educational skills.


In conducting this study the examiner felt assured that the visual screening device used gave the child adequate opportunity to demonstrate his true visual ability and did not measure his learning difficulty. There are factors other than intelligence and language which affect reading, and reading tests were designed to measure some of these. For example, visual perception is one important factor included in such tests.

Goins recently completed a study utilizing fourteen experimental tests of visual perception and found two major perceptual factors which were related to reading success in Grade I. One factor was designated as the ability to hold in mind a perceptual thought during rapid perception, which is usually called "speed perception." It requires simple discrimination. A second, not included in published tests, requires the pupil to keep in mind a configuration against distraction. Those who did well on these tests showed facility in learning to read, while the reverse was true for the others. It is significant that several of these tests

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embracing the two factors proved to be better predictors of reading progress than either the Stanford-Binet or the Kuhlman-Anderson intelligence tests.

A recent study by Harrington attempted to evaluate the relative importance of visual and auditory discrimination at the second grade level. She found that the influence of auditory discrimination was second to that of visual discrimination, while the influence of the two together was greater than that of intelligence.

Solomon conducted a study of Rorschach and children's apperception tests as a means for appraising the emotional adjustment of young readers. Her study, as well as earlier ones using the Rorschach tests, points up a particular problem of visual perception among poor readers. Specifically unsuccessful readers appear to give undue attention to minute and unimportant details. This finding supports the foregoing emphasis on

7Sister Mary James Harrington, "The Relationship of Certain Work-Analysis Abilities to the Reading Achievement of Second Grade Children" (unpublished Doctor's dissertation, School of Education, Boston University, 1953).

the importance of visual perception.

Although the consensus of opinion is that a healthy child with good vision and hearing is more likely to succeed in reading than is a child without these attributes, research has not yet clearly supported this conclusion. A carefully controlled study of the visual efficiency of a hundred unselected school children at Grades I-VIII at the University of Chicago does not reveal that single scores or combinations of scores on vision tests are significantly related to reading progress.

Dr. Spache further states:

In the case of other diagnostic steps, such as the measurement of vision or reading skills, there are similarly contradictory reports. One clinic in New York claims that 95 per cent of all retarded reading cases are due to difficulties in the convergence-vergence ratio in vision, while another clinic near Chicago apparently finds that most retarded readers are in dire need of visual training.

A report by Sheldon and Carrillo, based upon 868

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pupils representing eight schools, showed a clear trend as follows: "As the number of books in the home increases the per cent of good readers increases and the per cents of average and poor readers decrease."11

Authorities in the field agree that vision plays such an extremely vital part in the life of the individual at all age levels that screening for defects should be made on a regular basis.

Betts states:

In brief, there is an increasing awareness in schools and in industry of the need for an appraisal of visual functions in terms of the seeing task and of the possibilities for remedial training, or visual re-education.12

The examiner agrees with the statement made by Grace Fernald:

All cases in which there is any indication of visual defects that may either affect the child's ability to learn to read or his efficiency in reading after he has learned should be referred to a reputable ophthalmologist. The eye plays such an important part in reading skill that provision should be made for examinations of the eyes of school children by accredited ophthalmologists at intervals throughout the child's school life.13

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13 Fernald, op. cit., p. 61.
Dr. Speche pursues this point further and states:

The initial step when visual irregularities are diagnosed is usually to refer the case to a local "eye specialist", who, presumably, will make any corrections that are necessary. ...it must be pointed out that simple referral does not relieve the reading teacher of further responsibility in this diagnostic detail. In our opinion, it is the responsibility of the reading diagnostician to re-check the visual functioning of the retarded reader to determine whether the distress or handicap imposed by visual abnormality has been relieved as much as it is humanly possible to do so. This does not imply that the reading teacher is to attempt to judge the accuracy of the optical prescription or the competence of the visual specialist. Rather the reading diagnostician should continue to explore the possibilities of further aid to the visually handicapped student by consultation with several eye specialists who may represent different schools of philosophy of remediation.14

Betts in the chapter Visual Readiness For Reading lends support to the idea that there is an area for co-operation Between Teachers and Specialists,15 as do Strang, McCullough, and Traxler.16

According to Betts:

The up-to-date specialist in vision is concerned with three functional aspects of seeing: **Clearness of vision**, singleness of vision, and relationships between clearness and singleness of vision. The

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14Speche, op. cit., p. 18.

15Betts, op. cit., p. 18.

child who cannot see clearly at a distance will not be able to read what is written on the blackboard and the child who cannot see clearly at the near point will find the print in his book blurred. No one should question the wisdom of checking this factor of clearness. On the other hand, a child may be able to see clearly at all working distances but may experience difficulty in seeing singly. The emphasis on seeing clearly, on seeing singly, and on maintenance of normal relationships between those functions that contribute to clearness and singleness is of recent origin.17

In leading periodicals attention is directed toward recent developments for providing better, safer, and more comfortable vision. P. W. Kearney points out:

Eye care is important, in a nation where 70 per cent of the population has vision that requires some degree of correction. An estimated ten per cent are wearing lenses unsuited to their current needs. Whether you wear glasses continually, or only for certain tasks, common sense suggests a periodic check up.18

Kearney19 further indicates that help for cross-eyes should be given early, that children will not outgrow it, that it is possible for the child to lose the vision of one eye, due to the brain suppression of the confusing vision of the deviating eye in time causing the nerve to cease functioning. He also mentions that

17 Betts, op. cit., p. 174-175.
18 Paul W. Kearney, "Eye Care Up-to-Date," The Readers's Digest, LXXI, (August, 1957), 94.
19 Ibid.
trifocals with a third segment in the lens which gives sharp focus in the 27 to 50 inch range, now compensates for Presbyopia (old eyes). This facilitates adjustment from near to far to middle distance, for it eliminates the violent jump from one range to the next.

An optometrist, Dr. Donald A. Frantz of DeKalb, Illinois, made this interesting observation:

You can have 20-20 vision and still be crosseyed, color blind, lack two eyed fusion, lack depth perception, be a low achiever in school, be a slow reader, or not be able to aim both eyes toward the same word on the printed page simultaneously.

It is not how well you see that counts, but how much it costs you in wasted nerve energy to see as well as you do.

We do not see with our eyes, we see with our brain; our eyes merely focus the light. A child is born functionally blind, and begins to learn to see the day he is born. Seeing is a learned skill.20

There are no short cuts or easy resolutions to the problem of visual disability; educators must realize that "Visually inefficient learners are denied the use of the visual approach to learning unless they learn to compensate for their difficulty or the condition is corrected."21


21 Betts, op. cit., p. 200.
There are two theories which have been considered important in the past which have influenced man's thinking in relation to the problem of visual disability and its effect upon mastery of basic school subjects, e.g., reading. First, at one time teachers were taught to believe that all visual handicaps could be corrected by means of glasses. This simple statement of the problem would be excellent if true, but medical science has proved this not to be true.

The second theory, that case studies have been reviewed to show that where the individuals have made satisfactory compensations for their visual disabilities mastery of basic school subjects were noted. This however, would be a weak argument for the neglect of vision and remedial work necessary to correct visual inefficiency.

The evidence indicates that lack of visual efficiency may be serious drawback to children in their school work unless the condition of visual anomalies are corrected.
CHAPTER III

THE GROUPS STUDIED AND MATERIALS USED

This portion of the study is concerned with the techniques employed in conducting the investigation. A description of the screening device is rendered and the population investigated is identified.

I. THE SAMPLE

The population. One hundred forty-seven fifth and sixth grade students from Bret Harte and Fairview Schools in the Modesto City School System were visually screened by use of the Keystone Telebinocular for the purpose of conducting this study. Of the number screened only the results for one hundred subjects were used. A high rate of transciency, incomplete visual surveys, low I. Q. scores, and impaired hearing accounted for delimiting and not using the results of forty-seven subjects.

The selection was made after permission was granted from the Superintendent of Schools, Dr. James H. Corson, and the parents of the students screened.

Initially the investigation was to have been conducted at the eighth grade level, but a transfer of administrative assignment to the K-6 level necessitated
work in this area. Thoughts turned to the visual screening of second graders until it was learned that a maturity factor operating in the seven-and-eight-year old child could lead to subnormal results in this study. The literature reviewed indicated that the maturity factor affects not only vision but emotional, social, and personality factors. It was advised that "A more clear-cut experimental study situation might be more available if an older age group were used."¹

Fifth and sixth grade students represented the largest and oldest segment of student population of the Bret Harte and Fairview Schools. Only the students with whom daily contact was made were observed and screened.

Remedial readers. This population consisted of fifty remedial readers or students reading below the fifth and sixth grade level. The identification was based on a careful evaluation of cumulative cards, observations of regular classroom teacher, consultations with the principal, guidance worker, school psychologist, nurse, and parents. The intelligence quotient was based on results of group and individual test scores. The

¹Information obtained in correspondence with Mr. G. E. Hamilton, Keystone View Company, August, 1956.
California Test of Mental Maturity supplied the I. Q. scores for the group tests. The tests are administered during the fourth, sixth and eighth grades in the Modesto City Schools. The Stanford-Binet Test is administered to pupils upon the request of the teacher and principal.

**Normal readers.** This group of fifty normal readers or students reading at grade level or above were identified on the basis of evaluations based on classroom observation, cumulative record data, health cards, test scores (see description of tests for remedial readers), consultations, educators, parents, and special service personnel.

**II. DESCRIPTION OF THE TEST AND THE SCREENING**

The Keystone Visual-Survey Tests were used to screen the population's visual efficiency at far and near point to identify the problems of vision. They were particularly valuable in screening the vision of pupils in the elementary school who are required to make a heavy demand on their eyes in reading at near point.

The Keystone View Telebinocular is evaluated by Leo J. Brueckner and Guy L. Bond, of the University of Minnesota, as follows:
The Keystone View Telebinocular and the Eames Eye Test have proved to be effective screening devices for detecting any limitations in a child's vision. As a result of the findings, the diagnostician will know whether or not to refer the child to a specialist for visual diagnosis.2

While Strang, McCullough, and Traxler state the following:

To supplement and check the teacher's observation, a number of visual screening devices are available. Four other more adequate screening devices are available. Robinson (20) found that the Bausch and Lomb Orthorater and the Massachusetts Vision Test correlated highly with optometric examinations; the Eames eye test agreed least with optometric refraction. From the standpoint of reading, the Orthorater and the Keystone Visual Survey have the advantage of testing at both far-point and reading distance. All these tests except the Orthorater may be given by a properly trained teacher; the Orthorater should be used by an optometrist, oculist, or trained ophthalmologist. Further research is being conducted to ascertain which subtests relate to reading difficulty.3

The Keystone View Telebinocular and Survey Tests were used for two reasons; (1) a telebinocular was made available on a loan basis from the College of the Pacific, and (2) this instrument had the advantage of screening near and far point vision. This latter feature was


considered important for the purpose of the study.

While the tests were not designed to give diagnostic data, the records of these tests, however, evaluated for the purpose of the study, did render a reliable picture of the subject's visual efficiency.
CHAPTER IV

COMPILATION AND CONTINGENCY OF DATA

This chapter delineates the method of procuring the data. The tables of raw data are also tendered.

I. METHOD OF PROCURING DATA

These tests were administered in the nurse's rooms at both Bret Harte and Fairview Schools. Brilliant sunlight was excluded and the room was quiet. Only the examiner and two subjects were in the room at the time of the screening to prevent distractions and aid concentration. The subjects were admitted to the room two at a time in order to orient each with the procedure of the screening process. If the subject wore glasses, the tests were administered with the glasses on first and he was retested approximately one half hour later with glasses removed.

A comfortable posture was maintained with the student seated at the instrument near enough to it so that the back and head were erect. The instrument was adjusted to required height to maintain the desired body posture.

A profile of each pupil screened was maintained
by drawing a line on the record form through the checks on the several tests. This gave a graphic and an easily interpreted picture of the general condition of the subject's vision.

The record form is divided into three distinct areas (see Figure 1), "EXPECTED", "HATCHED", and "UNSATISFACTORY". A line going down the clear "EXPECTED" column was accepted as a satisfactory profile. Recordings in the "HATCHED" area required retesting to endeavor to determine whether unfavorable tendencies were developing.

With exception of Test 1, recordings in the area of "UNSATISFACTORY" were interpreted to indicate a symptom of a visual loss subject to the following general rules outlined in the manual of instructions.

Difficulties encountered and reasons for retesting.

1. No student was considered to have a visual anomaly on the basis of only one complete test. If the results of the first screening test indicated a visual deficiency, the subject was called back after a week and given a complete check following a conference with his teacher and Mrs. Vivienne Sisk to double check the findings of the first screening. For purposes of this study a child was considered to have a visual deficiency only after the results of at least two tests indicated there was a visual deficiency.
### KEYSSTONE VISUAL SURVEY TESTS

For Use with No. 46 Visual Survey Telebinocular

**Name:** __________________________ **Sex:** __________________________

**Date:** __________________________ **Teacher:** __________________________

**Date of Birth:** YY.MM.DD **Age:** M.Age **Grade:** YY.MM.

**School:** __________________________ **City:** __________________________

**Address:** __________________________ **Phone:** __________________________

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<th>Left Only</th>
<th>Right Only</th>
<th>UNSATISFACTORY</th>
<th>UNSATISFACTORY</th>
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<td><strong>Low Vision</strong></td>
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<td>:</td>
</tr>
<tr>
<td>Test 10 (DB-9B)</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Test 11 (DB-8K)</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Test 12 (DB-15)</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Test 13 (DB-16)</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Test 14 (DB-17)</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
<td>:</td>
</tr>
</tbody>
</table>

**Test 2 (DB-0C):** Vertical Fusion

**Test 3 (DB-9):** Lateral Fusion

**Test 4 (DB-4K):** Fused Point

**Test 5 (DB-8B):** Fused Point

**Test 6 (DB-5D):** Fused Point

**Test 7 (DB-0D):** Fused Point

**Test 8 (DB-13):** Vertical Fusion

**Test 9 (DB-14):** Lateral Fusion

**Test 10 (DB-9B):** Fused Point

**Test 11 (DB-8K):** Fused Point

**Test 12 (DB-15):** Vertical Fusion

**Test 13 (DB-16):** Lateral Fusion

**Test 14 (DB-17):** Fused Point

---

**Keystone Perimenter Test—75 is Passing.**

Complete directions for administration of these tests will be found in the manual provided for this purpose.

For Snellen Equivalents of Tests 4, 5, 6, 12, 13, and 14 see the Manual, pp. 12 and 14.

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2. A subject was not referred for retesting on the sole basis of failure on Test 7. Stereopsis (depth perception) is a learned visual function subject to maturational factors, more important to an aviation pilot flying formation, than an attribute necessary for learning to read.

3. Referrals were similarly not deemed necessary on the color test, Test 9. The information was shared with teachers in order to have students develop techniques of compensating for lack of color discrimination when crossing streets where colored signals directed traffic.

The wording of the questions listed in the manual was followed verbatim in order to insure uniform results from the subjects screened. The conversation between examiner and subject was kept at a minimum in order to save time during the actual screening. A brief orientation session in each classroom prior to the actual individual screening eliminated most anxiety on the part of the students and favorably conditioned the subjects for the test that followed. Whereas the manual stated that the complete record should take no more than from seven to eight minutes, the average time for testing required approximately nine and one half minutes per subject.

Following is a description of what the subtests are designed to do.

Test I. Test for Simultaneous Perception. The dog and pig should be seen simultaneously, con-
tinuously. Exact position not important.

Test II. A Test for Vertical Posture. The line should be seen passing through some part of the large ball. If it isn't, vertical imbalance is indicated.

Test III. A Test for Lateral Posture at Far Point. The arrow should point somewhere between $3\frac{1}{2}$ and $9\frac{3}{4}$.

Test IV. Test for Fusion at Far Point. The four balls should fuse into three, the two split balls becoming one.

Test V. Test for the Usable Vision of the Right Eye at Far Point. The dots on the signboards, right side, should be seen up to and including that on No. 9.

Test VI. Test for Usable Vision of the Left Eye at Far Point. The dots on the signboard on the left side should be seen up to and including that on No. 9.

Test VII. A Test for Stereopsis, or Depth Perception. The subject should be able to name the character standing forward progressively less on each succeeding line as he proceeds down to line 12.

Test VIII. An instruction card for Test IX, to show the subject how red letters are formed in the twelve squares. Even a completely color-blind subject can recognize the red letters.

Test IX. A Test for Color Perception. The subject should be able to call the reddish letters in each square. If colorblind he will combine the red and green lines into different letters.

Test X. A Test for Lateral Posture at Near Point. The arrow should be seen pointing between $4\frac{1}{2}$ and $5\frac{3}{4}$.

Test XI. Test for Fusion at Near Point. The four
balls should fuse into three; the two split balls becoming one.

Test XII. Usable Vision of the Right Eye at Near Point. The subject should indicate correctly whether disks are made of lines, dots, or gray up to No. 15 or No. 16.

Test XIII. Usable Vision of Left Eye at Near Point. The subject should indicate correctly whether disks are made of lines, dots, or gray up to No. 15 or No. 16.

Test XIV. Usable Vision of Both Eyes at Near Point. The subject should indicate correctly whether disks are made of lines, dots, or gray up to No. 15 or No. 16.

This screening procedure was not diagnostic but it did reveal whether the student had over-all normal patterns of seeing. The Keystone Tests could not be compared sub-test by sub-test with the examination made by a practitioner in his office.

II. PRESENTATION OF DATA

Each pupil entering the fifth and sixth grades at Bret Harte and Fairview Schools, in theory, will have completed adequate work in the area of reading during the first four and five years of school to achieve, on the average, a score of 5.0 and 6.0 on a standardized reading test. However, individual differences in ability, teaching methods used in lower grades, transciency, visual
anomalies, and other factors can cause a wide range of scores. The 147 fifth and sixth grade students screened in this study had scores ranging from 3.4 to 9.5, or from 2.5 grade levels below expected achievement to 2.6 grade levels above on the California Reading Test—a copy of which appears in Appendix A.

The mean and median of the total scores are 6.33 and 6.05, respectively. For the sixth graders they are 6.76 and 6.85, and for the fifth graders 6.27 and 5.81. The California Reading Test was administered during the ninth month of the fifth and sixth year of school. As a group the children fall below the level of achievement expected of them on standardized tests. However, this does not affect the outcome of the statistical methods used in this study because all of the fifth and sixth grade pupils were given the same test and each subject's reading score was compared statistically with his own score on the visual survey score sheet.

The program of reading in most modern elementary schools can be based upon the following instructional goals, as listed by Emmett E. Betts, Professor of Psychology and Director of the Reading Clinic, Temple University, in his textbook, *Foundations of Reading*
Instruction:

Developmental reading goals have been analyzed from many points of view. Each investigator has contributed to professional understandings of the nature of reading instruction. Each has emphasized the desirability of a comprehensive and balanced program to promote pupil independence and versatility.

Reading skills, techniques, etc., can be classified and reclassified ad nauseam. Long lists can (and have been!) extended to cover more than five hundred "specific" learnings. While analyses and classifications do call attention to the complex nature of the reading process, these "isolated" lists of learning can be overemphasized. The important consideration is the development of pupil competence in the reading facet of language.

It is not necessary for the purpose of this study to treat each process taught in reading, e.g., reading readiness, directed reading activities, word attack, vocabulary development, phonics, and others. However, the major emphasis, or outcomes, toward which the program of reading in grades five and six is pointed, as listed by Paul McKee are the following:

1. Independence in identifying strange printed words

2. Increased demand for meaning

3. Further independence in coping with meaning difficulties

---

4. Development of the skill and interest essential to reading a wide variety of material in many different fields. In addition reading for pleasure is stressed during the close of the sixth grade prior to promotion to the junior high school.

The California Reading Test is evaluated in the manual as follows:

This test is an instrument for accurately and objectively measuring pupil achievement in fundamental reading skills. The test is standardized and each item has been selected for its diagnostic value in measuring achievement in the nineteen essential elements of reading skill sampled in the sub-test sections. Scores made on this test will reveal the reading grade placement and percentile rank of pupils in relation to the general school population.

It is further noted that:

Standardization has been based on more than 50,000 cases at each test level. Basic information for the age-grade norms has come from approximately one-half million pupils in many of the school districts in twenty different states. The relationships shown in the age-grade norms are real, not hypothetical.

---


4Ibid.
This reading test is evaluated in Buros by John C. Flanagan, President American Institute for Research; and Professor of Psychology, University of Pittsburgh, as follows:

Although the test user might wish for somewhat more precise technical information regarding the test, it is the reviewer's opinion that he will find the California Reading Test a valuable tool in appraising the progress of pupils with respect to these important skills of vocabulary and reading comprehension.5

The California Reading Test provides two scores in reading, one for vocabulary, and the other for comprehension. A grade level of achievement is computed for each and for the average of both. The latter figure was used in this investigation.

CHAPTER V  

STATISTICAL TREATMENT OF DATA

This chapter relates the methods utilized in testing the Null Hypothesis indicating that there is no significant correlation found between the response of the remedial reader and the response of the normal reader to the Keystone Visual Survey Tests after the variable of comprehension had been eliminated or understood by the students screened (the pupils understood that it was not necessary to be a proficient reader in order to complete the visual survey).

The obtained r (coefficient of correlation) between the scores on the California Reading Test and the scores on Keystone Visual Survey Test for the one hundred children included in this study was .07. This figure was derived by using the product-moment method of calculation developed by Pearson.¹

Table I indicates that there is no relationship between a subject's ability to score well on the Keystone Visual Survey Test and his ability to read. The results

tabulated indicate approximately as many pupils reading below grade level scored as high on the visual survey tests as did the students reading above grade level. Conversely an equal number of subjects reading above and below grade level scored low on the visual survey tests. This survey indicates that 13 per cent both the normal and retarded readers had visual deficiencies, therefore there is no indication that ability to read is affected by visual efficiency among the one hundred pupils visually screened with the Keystone Telebinocular.

The reliability and validity of a coefficient of correlation are determined by applying to it the usual tests devised for this purpose.

In this study the obtained r and the probable error were identical, .07. This means that on the assumption that the true r in the population is zero, the obtained r of .07 could well be attributed to sampling errors and therefore is not significant.

A second method of testing the reliability of a coefficient of correlation is by using the Null Hypothesis. Application of the formula devised for this produces a t score of .69 for the obtained r of .07.

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2 Ibid., p. 298.
3 Ibid., p. 333.
<table>
<thead>
<tr>
<th>Reading Scores</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<tr>
<td>9.0 - 9.9</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.0 - 8.9</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7.0 - 7.9</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6.0 - 6.9</td>
<td></td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0 - 5.9</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>4.0 - 4.9</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0 - 3.9</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This involved a comparison between the t value of \( r \) with the t's to be expected by chance at the .05 and .01 levels of confidence for the one hundred cases; these are 1.97 and 2.59. In each case they are much larger than the t score for the obtained \( r \). This means the Null Hypothesis is proved and the obtained \( r \) may not be considered significant.

The conclusion at this point is that there definitely is no indication that ability to read is affected by quality of vision among the one hundred students tested. However it must be remembered that this is not a large sampling, that it is limited to a double school situation, and that the validity of the results obtained on the Telebinocular Test depends upon the relative proficiency of the examiner.

A further limitation is the condition prevailing at the time the reading and Telebinocular Tests were administered. The student's attitude toward the examiner in both cases must be taken into account.

The thesis with which the examiner approached this study was that there is a relationship between reading debility and visual disability was not supported by the results of the study. It is encouraging to observe this fact because if the obtained results can be consid-
ered valid, it means that for some reason, or perhaps for a combination of reasons, the students in this study are not being affected in reading by poor vision. This may be due to the emphasis placed upon reading by the principal and teachers within the two schools.
CHAPTER VI

SUMMARY, AND RECOMMENDATIONS

An attempt is made in this final chapter to condense the inferences presented in the earlier chapters. Conclusions are drawn and recommendations made.

I. SUMMARY

This study was an attempt to determine the significant correlation between visual loss and reading disability as disclosed by observations made with the Keystone Telebinocular and Visual Survey Tests. Tests number VIII and IX related to color blindness were not used.

The control cases consisted of fifty remedial readers who had a definite reading problem and an equal number of normal readers who had no known reading difficulty as determined by classroom observations and results of reading test scores.

Remedial readers were those subjects who were reading one year below grade level and had been recognized and grouped accordingly by school authorities on the basis of observation and test scores.

Normal readers were defined as those students who
had no known or existing problem in reading as revealed through results of the California Reading Test and daily class observations. An attempt was made to show that there is a significant correlation between reading loss and visual disability, and to assay the reading loss survey that is characteristic of readers with a visual disability.

II. RECOMMENDATIONS FOR FURTHER INVESTIGATION

Three recommendations for further study can be made on the basis of the information brought forth in this investigation. First, that there is need for further investigation to analyze the value of this survey test. Second, to investigate what visual disability affects reading. Third, test the validity of the Keystone Telebinocular for screening vision.
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D. PERIODICALS


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E. UNPUBLISHED MATERIALS


F. NEWSPAPERS

The Modesto Bee, June 26, 1957.

G. TESTS


FREQUENCY DISTRIBUTION OF READING SCORES ACHIEVED BY BRET HARTE AND FAIRVIEW STUDENTS WITH INFORMATION FOR COMPUTING COEFFICIENT OF CORRELATION

<table>
<thead>
<tr>
<th>Interval</th>
<th>fy</th>
<th>y'</th>
<th>fy'</th>
<th>f(y'^2)</th>
<th>Ex'y'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9.0 - 9.9</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>8.0 - 8.9</td>
<td>11</td>
<td>2</td>
<td>22</td>
<td>44</td>
<td>11</td>
</tr>
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<td>7.0 - 7.9</td>
<td>21</td>
<td>1</td>
<td>21</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>6.0 - 6.9</td>
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<td>0</td>
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</tr>
<tr>
<td>5.0 - 5.9</td>
<td>32</td>
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<td>-32</td>
<td>32</td>
<td>-11</td>
</tr>
<tr>
<td>4.0 - 4.9</td>
<td>9</td>
<td>-2</td>
<td>-18</td>
<td>36</td>
<td>-2</td>
</tr>
<tr>
<td>3.0 - 3.9</td>
<td>3</td>
<td>-3</td>
<td>-9</td>
<td>27</td>
<td>-6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>-10</td>
<td>178</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Legend:

- **fy**: Frequency of scores at each interval.
- **y'**: Deviation of interval from assumed mean.
- **fy'**: Frequency multiplied by deviation.
- **f(y'^2)**: Frequency multiplied by deviation squared.
- **Ex'y'**: Summation of the "product-deviations" from assumed mean both reading and visual screening scores at each frequency interval.
FREQUENCY DISTRIBUTION OF VISUAL SCREENING SCORES ACHIEVED BY BRET HARTE AND FAIRVIEW STUDENTS ON THE KEYSTONE VISUAL SURVEY TEST WITH INFORMATION FOR COMPUTING COEFFICIENT OF CORRELATION

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<th>fx'</th>
<th>f(x'^2)</th>
<th>Ex'y'</th>
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<td>2</td>
<td>52</td>
<td>104</td>
<td>0 - 4</td>
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<tr>
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<td>20</td>
<td>1</td>
<td>20</td>
<td>20</td>
<td>0 - 11</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
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<td>-18</td>
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<td>330</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Legend:

- **fx**: Frequency of scores at each interval.
- **x'**: Deviation of interval from assumed mean.
- **fx'**: Frequency multiplied by deviation.
- **f(x'^2)**: Frequency multiplied by deviation squared.
- **Ex'y'**: Summation of the "product-deviations" from the assumed mean of both reading and visual screening scores at each frequency interval.
COMPUTATION OF THE COEFFICIENT OF CORRELATION AND PROBABLE ERROR

\[ cx = \frac{\sum x}{N} \quad cy = \frac{\sum y}{N} \]

\[ cx = \frac{34}{100} = .34 \quad cy = \frac{-10}{100} = .1 \]

\[ cx^2 = .1156 \quad cy^2 = .01 \]

\[ \theta_x = \sqrt{\frac{\sum x^2}{N} - cx^2 \times 1} \quad \theta_y = \sqrt{\frac{\sum y^2}{N} - cy^2 \times 1} \]

\[ \theta_x = \sqrt{\frac{330}{100} - .1156 \times 1} \quad \theta_y = \sqrt{\frac{178}{100} - .01 \times 1} \]

\[ \theta_x = 1.79 \quad \theta_y = 1.33 \]

\[ r = \frac{\sum xy - cx \times cy}{\theta_x \theta_y} = \frac{6 - .1 \times .34}{1.79 \times 1.33} \]

\[ r = \frac{.17}{2.48} = .07 \]

\[ P.E. = \frac{.6745(1-r^2)}{\sqrt{N - 1}} \]

\[ P.E. = \frac{.6745 \times .9964}{\sqrt{99}} \]

\[ P.E. = \frac{.6721}{9.95} \]

\[ P.E. = .07 \]