U. of M.

THE UNIVERSITY OF MINNESOTA

GRADUATE SCHOOL

Report

of

Committee on Thesis

The undersigned, acting as a Committee of the Graduate School, have read the accompanying thesis submitted by Mary Cerufel for the degree of Master of Arts. They approve it as a thesis meeting the requirements of the Graduate School of the University of Minnesota, and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts.

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Report

of

Committee on Examination

This is to certify that we the undersigned, as a committee of the Graduate School, have given Mary Carufel final oral examination for the degree of Master of Arts . We recommend that the degree of Master of Arts be conferred upon the candidate.

Minneapolis, Minnesota

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A STUDY IN MENTAL TESTING INVOLVING THE PRINCIPLE OF GENERALIZATION

by

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of the Requirements for the Degree
of Master of Arts in Education,
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CONTENTS

A STUDY IN MENTAL TESTING INVOLVING THE PRINCIPLE OF GENERALIZATION.

INTRODUCTION

This thesis is a study of the comparison of anagram tests with a number of other mental tests to determine their relative value as measures of that intellectual capacity commonly referred to in works on psychology as generalization. Before taking up the tests and their treatment, a survey of the literature bearing upon generalization and generalizing ability will be given.

The literature for this survey may be classified as follows:

(1) Opinions of psychologists as to the nature of generalization.

(2) An introspective study of the processes involved in generalizing abstraction.

(3) A study involving questions whose purpose was to discover whether children from ten to fourteen years of age do actually generalize.

(4) Review of the Binet Fable Test which involves generalization.

(5) A puzzle experiment whose solution involved generalization

(6) Special articles and studies

(a) showing the value and significance of generalization to the individual and to the teacher.

(b) dealing with methods of teaching which aim to develop generalizing ability

(c) showing the relative value of school subjects with regard to the development of generalizing ability.

(d) explaining the role of the elementary school in developing generalizing ability.

The literature indicated by the foregoing classification is studied and reviewed with special reference to its bearing upon the problem involved in this investigation.

CHAPTER I.

SURVEY OF RELATED LITERATURE

1. Opinions of psychologists with reference to the nature of generalization.

Generalization Defined

"Generalization is the perception of similar elements in different contents."[1] The foregoing explanation is not adequate. As used in this investigation, generalization is something more than perceiving the common element or elements in two or more contents; it also involves the use of this common quality or element as a principle in dealing with related contents.

James on General Ideas

James', in his theory of the idea, says, "Both the concept and the image, qua subjective, are singular and particular. Both are moments of the stream, which come and go and in an instant are no more. The word universality has no meaning as applied to their psychic body or structure which is always finite. It only has a meaning when applied to their use, import or reference to the kind of object they may reveal. The representation, as such, of the universal object is as particular as that of an object about which we know so little that the interjection 'Ha!' is all it can evoke from us in the way of speech."[2]

Titchener emphasizes the theory of James and states it

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1. Fisher, Sara Carolyn, The Process of Generalizing Abstraction, Psychological Review: Monograph Supplements, XXI, 1916, 6.
2. James, William, Principles of Psychology, I, 1904, 479.

more simply and directly:-

Titchener on General Ideas

"It is no more correct to speak in psychology of an abstract idea, or a general idea than it would be to speak of an abstract sensation or a general sensation. What is abstract and general is not the idea, the process in consciousness, but the logical meaning of which that process is the vehicle."[3]

Major, in emphasizing the main points of Titchener and James, asserts:

Major's View of a General Idea

"There is no such thing as a general idea in the field of actual mental experience. x x x x Certain of our conscious processes mean, point to, groups or classes of objects which possess characteristic attributes or properties. x x x x These meanings, or thoughts of, groups or classes of objects having common features are called 'generalizations', or 'general ideas' or 'general notions' or x x x x 'concepts' x x x x."[4]

The Acquiring of General Meanings

Major also answers the question of how we come into possession of our general meanings and what mental processes serve as their vehicles. The answer to the first question is:

"That thoughts of classes of objects x x first appear naturally in the course of our learning the language of our elders. We hear them apply the names - 'tree', 'knife', 'clock', to certain objects, and we imitatively use the same words to designate the same things. Then it is a simple step from using a given sign to mean

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3. Titchener, E. B., Experimental Psychology of the Thought Processes 1909, 15.
4. Major, D. R., The Elements of Psychology, 1913, 282-283.

a given individual object to using the same sign to mean any or all objects which resemble the first. That these are the early steps in the acquirement of general meanings, or so-called 'general ideas', is clearly shown by observation of the language of little children, particularly the mistakes which they make at first. x x x

"x x x x A distinctly higher state of this form of thinking is reached when a child begins consciously to compare objects, events, situations, in order to determine their likenesses and differences, and when he begins to make ascertained differences and likenesses the basis of his classifications. Moreover, he may at this later stage undertake the revision of his earlier general meanings, he inquires into their grounds. x x x x "[5]

In answer to the second question as to what mental processes are the vehicles of generalizations Major says:-

"It may be observed x x x that any item or content of consciousness may serve as the vehicle of our thought of any particular thing or group of things, or of judgments concerning them.x x x

"No doubt most meanings are carried by images either of the things meant or by signs and words that name and describe them. But they may be carried also by sensational processes of various kinds. x x x "[6]

Judd's View of Generalization

Concerning generalization, Judd asserts: "Furthermore, whenever the mind reaches the stage where it can select and concentrate on single aspects or attributes of experience, it can at the same time group together under each selected attribute many individual cases.

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5. Major, D. R., Elements of Psychology, 1913, 283-285.
6. Major, D. R., Elements of Psychology, 1913, 266-267

This is called the power of generalization. Thus, once the mind has fixed on roundness as a selected attribute of objects, it can bring together and group in one class the earth, a ball, an apple, etc.

"Abstraction and generalization are valuable not merely as feats of inner control; they make possible highly developed forms of conduct. If one can select and hold steadily before the mind one aspect of an object, conduct can be made more effective through concentration than when the observer is distracted and confused by an effort to deal with unanalyzed complexity.

". . . . . The more fully ideas are abstracted and generalized, the more conduct will be guided by inner motives. The man who sees values in objects and decides to be thrifty is guided by an abstraction and is so far forth acting in response to an inner motive."[7]

Miller's View of Generalization and Generalizing Ability

In discussing general and individual notions, Miller asserts:

"It is an inherent and original characteristic of mind when confronted with a situation demanding reaction to adapt the reaction to the individual character of the situation. It is equally just as fundamental and original a tendency of the mind (and this is evidenced by the law of apperception) to apply a mode of reaction once effected of a meaning once attained to a new situation or a new object which has not yet been discriminated as different. That is, the tendency to generalize is fundamental to mind. Which comes first in actual experience, the individualizing or the generalizing tendency, is a function of the situation which presents itself."[8]

7. Judd, C. H., Psychology, 1917, 264.
8. Miller, I. E., The Psychology of Thinking, 1909, 201.

In discussing the process of generalization Miller states:

"This does not consist merely in massing together the common, or even the essential common, qualities of all the individuals into one complex,-a sort of composite photograph affair. It does consist in setting up under the control of a single image the abstracted essential qualities as a standard, as a central core of meaning, by which to judge and interpret all the individuals of a group. Under one image are organized a system of meanings which serves as a rule for the determination of all the individuals of a class. The outcome is that this image more adequately symbolizes the appropriate reaction, mental or motor, to all the individuals of the group.

"When we have gathered together the characteristics which are essential to a trade center,- that it shall be a place which receives and transmits goods, that it shall have facilities for the conversion of raw materials into manufactured articles, that it shall have suitable means of conveyance by rail or by water from one place to another etc., we set up these abstracted qualities, organized into one whole, as a standard, or rule, which we apply to every city to determine whether it is a trade center or not. The act of mentally asserting that this core of meanings does constitute the standard, and that every city that shall be called a trade center must conform to the standard of possessing these characteristics,- this act is generalization. Generalization is, then, a far more constructive and a far more dynamic and purposive process than any sort of mental composite photography."[9]

9. Miller, I. E. The Psychology of Thinking, 1909, 248-249.

But this dynamic and purposive process is not obtained at once; there are several steps leading up to it, each step being closely associated and related to the other. No distinct line can be drawn from one to the other, distinctly separating them because their chief use is in description only. The word phase or division would probably be better than steps for observation is not a step leading to comparison, both are phases of a process. Nevertheless observation is necessary for comparison although the two might go hand in hand. Likewise, abstraction is necessary for generalization although these two may work together. In fact, these phases are so closely related, and work together so closely, one process with the other, that they can not be separated; nor can we say that each phase works individually. Thus observation, comparison, abstraction, generalization and application are essential phases of the generalizing process.[10]

Motor Theories Concerning Generalization

Miss Fisher summarizes the so-called Motor Theories concerning generalization in the following paragraph:

"Within very recent years there has become conspicuous in the literature a tendency to regard generalization as a function which belongs in part at least to the response side of mind, rather than to the receptor — the sensory and ideational side proper. Perceptual contents become formed into classes in virtue of the co-operating, accommodating, and adjusting of the motor processes which mark their impingement upon the organism and which constitute the reactions of the organism to them. Generalization is therefore a progressive organization of motor processes. x x x The arranging

10. Miller, I. E., The Psychology of Thinking, 1909, 249-50.

of new cases under an individual concept, i. e., generalization, does not consist in the comparing of the new instance with the old, feature by feature, but rather in the determining of whether the new case suits the attitude evoked by the old. If the motor attitude or response evoked by any perception is similar to that which is habitually evoked by certain other past perceptions of the organism, the new perception belongs to the same group as do these latter. The upholders of the motor view of generalization have for the most part turned their attention not so much to the nature of the generalizing activity carried out on "attitudes" as to the part played by the generalized "attitude" in meaning and in the concept. x x x "[11]

Summary of Foregoing Views

From the foregoing reviews we conclude that:-

(1) There is no such thing in consciousness as a general idea or general concept.

(2) It is the meaning which is general, not the process in consciousness.

(3) The mental processes serve as vehicles of general meanings or general ideas or concepts.

(4) James, Titchener and Major consider the nature of the Mental Processes in regard to general ideas or concepts.

(5) Miller and Judd view generalization as do the motor theories. They view generalization as to the part played by generalized behavior in various situations.

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11. Fisher, Sara Carolyn, The Process of Generalizing Abstraction, Psychological Review, Monograph Supplements, Vol, XXI, 1916, 4.

2. An introspective study in generalizing abstraction.

Purpose of Experiment

The purpose of this experiment was to obtain introspections in regard to the mental processes involved in generalizing abstraction.

It was conducted at the Psychological Laboratory of Clark University by Sara Fisher during the Fall of 1912 and the Spring of 1913.

Problem:- To investigate the process of generalizing abstraction.

Method:- Material consisted of drawings of figures which were sufficiently homogeneous to constitute members of a group. The drawings were of unusual shapes. Each of the drawings possessed certain characteristics which were common to all the other members of the group and each drawing contained characteristics peculiar to itself alone or to only a few of its fellow members.

Conclusions and Interpretations:- "Abstraction is generalizing abstraction when the abstracted contents are features which are common to a group of experiences, when the previous conscious situation is one in which features are similar to the ones at present attended to have been likewise stressed."[12]

"We have found that the essence of the process of generalizing abstraction consists in a specific and characteristic mode of behavior in consciousness of a succession of imaginal or sensory contents, i. e., in their changing relative focality, in their

12. Fisher, Sara Carolyn, The Process of Generalizing Abstraction, Psychological Review, Monograph Supplements, XXI, 1916, 30.

temporal aspects, such as their rate of rise, their degree of persistence and their rate of disappearance. This behavior of the contents of consciousness is immediately experienced as such; and it is characteristic of the process of generalizing abstraction that, during the course of the process, those contents which prove to be common to a group of perceptions or images obtain an ascendency over the other contents and hence come to prevail in consciousness."[13]

Criticism:- The results of this experiment are too vague and indefinite to be of any value in obtaining concrete evidence. This emphasizes the need for scientific methods of investigation and interpretation of results. The results of an investigation carried on for a definite purpose should serve that purpose.

3. A study involving questions whose answers required generalization

Value of Experiment

This experiment was conducted by Mr. H. A. Peterson at the Illinois State Normal University. This experiment does not test or measure satisfactorily the generalizing ability of children, nevertheless it is a step in the right direction.

Purpose

The object of the experiment was to secure more definite information regarding the generalizing ability of children.[14]

Method

Teachers of certain grades were asked to make out questions requiring generalization and to make the

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13. Fisher, Sara Carolyn, The Process of Generalizing Abstraction, Psychological Review, Monograph Supplements, XXI, 1916, 205.
14. Peterson, H. A., The Generalizing Ability of Children, Journal of Educational Psychology, V, 1914, 561.

questions adaptable to their own grade. The questions involved geography, arithmetic, history, and literature. The answers to the questions were limited to a narrow range so that they would be easier to grade. Twenty questions were obtained in this way and eight were selected and used for the experiment. The children in the training school from ten to fourteen years old were tested and twenty-five high school children aged thirteen and fourteen years.

Results

The questions were arranged in difficulty so that practically all the ten-year-olds answered the first ones and hardly any of the fourteen-year-olds answered the last ones. The questions were read twice, once by the instructor and once by the pupil. No limit was put upon time, and examples of generalizing were always given.

Conclusions

"The increase in the number of generalizations per question is one of the changes with age."[15]

"The increased breadth of survey is due to several causes, particularly to instruction and greater fluency in reading."[16]

"There was a decided improvement in comprehension with age."[17]

About fifty per cent of the ten-year-old children and seventy-five per cent of the twelve-year-old children gave generalized answers. This indicates that the teachers have been successful in their methods of instruction.[18]

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15. Peterson, H. A., The Generalizing Ability of Children, Journal of Educational Psychology, V, 1914, 565.
16. Ibid., 566.
17. Ibid., 569.
18. Ibid., 569.

4. The Binet Fable Test. (Terman Revision)

This is a study which emphasizes generalization in regard to social experiences or environmental training rather than educational training. The two are closely related and no one can doubt the importance of testing educational training as well as environmental training.

Description and Purpose of the Fable Test

This test consists of five fables. The lesson connected with each fable "presents for interpretation situations which are closely paralleled in the every day social experience of human beings. It tests the subjects' ability to understand motives underlying acts or attitudes. It gives a clue to the status of the social consciousness which is highly important in the diagnosis of the upper range of mental defectiveness. The criterion of the subnormal's fitness for life outside an institution is his ability to understand social relations and to adjust himself to them. Failure of a subnormal to meet this criterion may lead him to break common conventions, and to appear disrespectful, sulky, stubborn, or in some other way queer and exceptional. He is likely to be misunderstood because he so easily misunderstands others. The skein of human motives is too complex for his limited intelligence to untangle.

"For the intelligent child even the common incidents of life carry an endless succession of lessons in right conduct. On the average school playground not an hour passes without some happening which is fraught with a moral hint to those who have intelligence enough to generalize the situation. x x x x The child of

normal intelligence sees the point, draws the appropriate lesson and (provided emotions and will are also normal) applies it more or less affectively as a guide to his own conduct. To the feeble-minded child all but lacking in the power of abstraction and generalization, the situation conveys no such lesson. It is but a muddle of concrete events without general significance; or even if its meaning is vaguely apprehended, the powers of inhibition are insufficient to guarantee that right action will follow.

x x x x "It (the generalization test) tells us quickly whether the subject tested is able to see beyond the incidents of the given situation and to grasp their wider relations —whether he is able to generalize the concrete."[19]

5. A puzzle experiment whose solution involved generalization.

Description of the Puzzle

The Chinese Puzzle Ring[20] constituted the material for this experiment. It was divided into five arrangements: (1) four rings; (2) five rings; (3) six rings; (4) seven rings; (5) ten rings. This puzzle illustrates the use of generalization because one single formula might be developed from the solution of any given case which would apply to all possible cases. All movements used in the solving of one part of the puzzle applied in the solving of the other parts and some movements in addition.

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19. Terman, L. M., The Measurement of Intelligence, 1916, 298-299.
20. Ruger, A. H., The Psychology of Efficiency, Columbia Contributions to Philosophy and Psychology, XIX, No. 2, p. 74.

Summary

Twenty-six subjects started the experiment. Four subjects, of those performing the experiment, generalized the method and applied it, thereby solving the ten-ring arrangement. The subjects who did not generalize the method were able to do only the four and five-ring arrangements and became confused in the more complicated steps. In one or two instances generalization was developed but the wrong methods of earlier performances prevented the successful solution of the puzzle.

Value of Puzzles

Whether or not the solution of puzzles would prove valuable in testing generalizing ability is yet to be determined. Nevertheless this experiment indicates that generalization does aid in the solution of a mechanical type of problem. That generalization and scientific training are closely allied is indicated in the statement that boys without scientific training failed to develop a general rule or formula in the case of one puzzle (The Chinese Ring Puzzle) where manipulation was successful if a general formula of solution had been developed for the solution of the puzzle in its first form. This generalization was made by those with scientific training.[21]

Only actual results and careful analysis would show whether scientific training induces generalization more than any other training. If so, then scientific training would be extremely valuable.

Value of Generalization Tests Depends on Value of Generalizing Ability

The scope of investigation in the field of generalization has so far been rather limited. Experiments

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21. Ruger, A. H., The Psychology of Efficiency, Columbia Contributions to Philosophy and Psychology, XIX, No. 2, p. 47.

conducted for the purpose of introspection are far from satisfactory on account of their subjectivity, i. e., their reliance on opinion. Experiments or tests carried on objectively are meager both in quantity and quality. In order to know whether tests of generalization are valuable, the value and significance of generalization must be considered.

6a. The value and significance of generalization to the individual.

Age for Generalizing

Generalization is not limited to a certain period in the life of an individual for "the little child generalizes as truly as does the adolescent and adult, even though he does not arrive at the same generalities."[22] An individual should be able to generalize his behavior, that is, experiences due to environmental training as well as educational training. That it is profitable and necessary to generalize behavior due to environmental training has been asserted by Terman in his summary of the Binet Fable Test in which he says a child must generalize in order to progress in society and meet the demands which society places upon him.[23]

The Problem of Education

Judd has said that the problem of education is a problem of generalizing experience.[24]

Judd believes in a generalizing mind; that generalization is transferable. He refutes Thorndike's theory of identical elements yet he supports his belief by the theory of identical

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22. Dewey, John, How We Think, 1910, 211.
23. Terman, L. M., The Measurement of Intelligence, 1916, 299.
24. Judd, C. H., The Psychology of High School Subjects, 1915, 419.

elements, in so far as the generalizing mind is the identical element in generalization.[25]

The students of educational psychology would hesitate to agree with this theory, without absolute proof. However, this experiment deals with the ability of children to generalize rather than the transfer of this ability. Generalization must first be obtained and acquired as shown by specific evidence.

Generalizing of social experiences is extremely helpful to the individual if we accept Terman's statements.[26] Will the generalizing of educational experiences (by educational experiences is meant behavior due to educational training rather than environmental training) be valuable and to what extent can school subjects and methods be successful in training the child to generalize? We are of the opinion that certain subjects lead to generalization more than others, but to be sure, there must be definite proof, for opinions are far from reliable. All subject matter induces generalization for "The problem of generalizing experience is one of the major problems of education. Each subject in the curriculum seeks to develop the power of generalization in some way."[27]

The foregoing statements have shown that generalization is important along educational lines as well as social. The individual will benefit by his generalizations and he should put forth every possible effort to obtain generalizations. This is a problem for both teacher and student and with both working in co-operation, certainly advantageous results will be obtainable. The individual

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25. Judd, C. H., The Psychology of High School Subjects, 1915, 392-435.
26. Terman, L. M., The Measurement of Intelligence, 1916, 290-301.
27. Judd, C. H., The Psychology of High School Subjects, 1915, 344.

should not accept statement for statement and fact for fact merely at its face value.[28] After certain exercises or divisions have been studied this knowledge should be formulated into general principles and the individual should be able to apply them. The child himself ought to look ahead and foresee new situations and new problems in which this generalizing principle will be applicable.[29]

Reviews as a Means of Obtaining Generalizations

"Further than this, generalization of experience can be cultivated through frequent reviews. Indeed, the student and the teacher ought to realize that the function of a review is to crystallize earlier studies in more comprehensive forms than were possible while the subjects were being studied in detail. The student who gets an impression that a review just before an examination means a hasty running over of all the material which has been covered in the course will not gain from the review the advantage which he ought to secure. He ought to realize that, having learned the subjects in its details, he is now in a position to take a more general view of the whole subject. Principles, too broad to be included in a single exercise, ought now to be the subjects of his thought. After he has studied a certain period of history, for example, he ought to be able to characterize the whole of that period. This is a period during which military operations were the most significant public activities; this is a period during which the internal operations of the state were of more significance than any outside relations; this was a period during which the country prospered financially and commercially; and so on. None of these general statements would be significant to a student, if made at the beginning of a study, in any such

28. Judd, C. H. The Psychology of High School Subjects, 1915, 465.
29. Miller, I. E. The Psychology of Thinking, 1909, 184-185.

degree as they ought to be after he has canvassed in detail the military or commercial enterprises which are summarized in his final review.

The Summary as a Means for Acquiring Generalizations

"The general summary is also a great aid to the organization and presentation of the details if one wishes to elaborate these details later in answer to specific questions. Thus a review in science makes it possible to hold in mind, through the use of general formulas, the details of physics or zoology. One needs for education not merely the detailed facts about motion and forces; he ought to be able to grasp the general topics and to show that all of the details group together under the general principles of distribution and conservation of energy. He ought to be able to describe in zoology the whole animal kingdom, pointing out the major characteristics of the different parts of the animal kingdom rather than the detailed structures of any particular species.

"Broad general views of this type are the significant results of all specific courses when the student has really mastered the subject matter that he has been going over. Broad general views of this sort will also encourage students to realize that any subject which they study will be of significance to the broad-minded individual. The student who is going on into business is not likely to care about the details of zoology or physics; but if he can feel when he has completed a course, that he has secured nine or ten general principles in each of the sciences, he will be encouraged to regard these as permanent elements of his intellectual equipment, where as now he commonly believes that he is at the end of the subject and is entirely content to forget all of the information which he has

accumulated in these courses.

"Generalization is the most important result of any study; and any course which does not permit its material to be generalized in a few salient principles that can be comprehended and carried away by the student is not organized in the form which justifies its retention."[30]

6b. Generalization in regard to methods of teaching.

Need of Thorough Methods

The teacher plays an important part in developing generalizing ability in planning the lessons but especially in conducting the recitation and formulating recitation methods. There is need through out the present educative system for thorough methods "but few attempts have been made to formulate a method, resting on general principles, of conducting a recitation. One of these is of great importance and has probably had more and better influence upon the "hearing of lessons" than all others put together; namely, the analysis by Herbart of a recitation into five successive steps. The steps are commonly known as "the formal steps of instruction". The underlying notion is that no matter how subjects vary in scope and detail there is one and only one best way of mastering them, namely, there is a single "general method" uniformly followed by the mind in effective attack upon any subject. Whether it be a first-grade child mastering the rudiments of number, a grammar-school pupil studying history, or a college student dealing with philology, in each case the first step

30. Judd, C. H. The Psychology of High School Subjects, 1915, 465-467.

is preparation, the second is presentation, followed in turn by comparison and generalization, ending in the application of the generalizations to new and specific instances. x x x x x The next two steps are directed toward getting a general principle or conception. The local river is compared with, perhaps, the Amazon, the St. Lawrence, the Rhine; by this comparison accidental and unessential features are eliminated and the river concept is formed: the elements involved inthe river-meaning are gathered together and formulated. This done, the resulting principle is fixed in mind and is clarified by being applied to other streams, say to the Thames, the Po, the Connecticut."[31]

Role of the Teacher

It is not necessary that these steps be followed rigidly. To be sure they are important "but the teacher's problem - as a teacher - does not reside in mastering a subject matter only, but in adjusting a subject-matter to the nurture of thought. Now the formal steps indicate excellently well the questions a teacher should ask in working out the problem of teaching a topic. What preparation have my pupils for attacking this subject ? What familiar experiences of theirs are available ? What have they already learned that will come to their assistance ? How shall I present the matter so as to fit economically and effectively into their present equipment ? What pictures shall I show ? To what objects shall I call their attention ? What incidents shall I relate ? What comparisons shall I lead them to draw, what similarities to recognize ? What is the general principle toward which the whole discussion should point as its conclusion ? By what applications shall I try to fix, to clear up, and to make real their

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31. Dewey, John, How We Think, 1910, 202-203.

grasp of this general principle ? What activities of their own may bring it home to them as a genuinely significant principle ?

"No teacher can fail to teach better if he has considered such questions somewhat systematically. But the more the teacher has reflected upon pupils' probable intellectual response to a topic from the various standpoints indicated by the five formal steps, the more he will be prepared to conduct the recitation in a flexible and free way, and yet not let the subject go to pieces and the pupils' attention drift in all directions; the less necessary will he find it in order to preserve a semblance of intellectual order, to follow some one uniform scheme. He will be ready to take advantage of any sign of vital response that shows itself from any direction. One pupil may already have some inkling - probably erroneous - of a general principle. Application may then come at the very beginning in order to show that the principle will not work, and thereby induce search for new facts and a new generalization. Or the abrupt presentation of some fact or object may so stimulate the minds of pupils as to render quite superfluous any preliminary preparation. If pupils' minds are at work at all, it is quite impossible that they should wait until the teacher has conscientiously taken them through the steps of preparation, presentation, and comparison before they form at least a working hypothesis or generalization. x x x x "[32]

The teacher should also take pains "to see to it that the object on which thought centers is typical; material being typical when, although individual or specific, it is such as readily and fruitfully suggests the principles of an entire class of facts. No

32. Dewey, John, How We Think, 1910, 204-206.

sane person begins to think about rivers wholesale or at large. He begins with the one river that has presented some puzzling trait. Then he studies other rivers to get light upon the baffling features of this one, and at the same time he employs the characteristic traits of his original object to reduce to order the multifarious details that appear in connection with other rivers. This working back and forth preserves unity of meaning, while protecting it from monotony and narrowness. Contrast, unlikeness, throws significant features into relief, and these become instruments for binding together into an organized or coherent meaning dissimilar characters. The mind is defended against the deading influence of many isolated particulars and also against the barrenness of a merely formal principle. Particular cases and properties supply emphasis and concreteness; general principles convert the particulars into a single system."[33]

Tendency toward Generalizing

Thus we see how very essential generalizations are in the field of subject matter. Perhaps we are not aware of their importance for if we stop to analyze the store of facts and knowledge about certain subjects we find that generalizations have slipped in and it is through their influence that we retain knowledge and use it again and again when occasion demands. We are not always aware of forming generalizations and especially we are not aware of them in the making because "generalization is not a separate and single act; it is rather a constant tendency and function of the entire discussion or recitation. Every step forward toward an idea that comprehends, that explains, that unites what was isolated and therefore, puzzling,

33. Dewey, John, How We Think, 1910, 210-211.

generalizes. . . . . If he (the student) is studying a river basin, his knowledge is generalized in so far as the various details that he apprehends are found to be the effects of a single force, as that of water pushing downward from gravity, or are seen to be successive stages of a single history of formation. Even if there were acquaintance with only one river, knowledge of it under such conditions would be generalized knowledge."[34]

Various Steps in Acquiring Generalizations

If the teacher realizes the assistance that generalization gives to the pupil not only in enlarging and broadening his field of knowledge and application but also in retaining and using this knowledge when the situation demands. The various steps in planning a lesson and conducting a recitation may be greatly aided with this definite end in view. The teacher should have in mind the purpose of a definition and she should be ready to give it and use it when time demands. Summaries are also very important for by means of summaries the field of knowledge just studied is emphasized and formed into a unified statement or conclusion which may serve as an intellectual deposit. Again, rules and principles should not be given merely for drill exercises but for insight into ideas and understanding.[35] The teacher should see to it that the child does not generalize by bringing about the application of the rules and principles he has learned; not an haphazard or speculative generalization which consists of a few words or statements but actual application which clearly indicates that he sees what he is about. If the teacher gradually and skillfully brings the child to form

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34. Dewey, John, How We Think, 1910, 211.
35. Ibid., 212.

generalizations, habits will undoubtedly be formed to form these principles and if they are rightly formed, application will naturally follow. There are no fixed rules, which the teacher must rigidly follow to induce generalizations, for if she is thoroughly equipped and an able teacher, her clear insight and her ability to generalize will enable the child to generalize also. Perhaps a definition , a suggestion, or the statement of some part of the principle will aid the pupil in gaining the general principle, but application must follow in order that the teacher may know that he has grasped it. Comparisons of a number of cases will also aid a pupil in grasping the principle but it must be remembered that each individual must form his own generalizations. In addition to comparisons, or the finding of similar elements, contrast may be employed by the teacher to point out wherein certain elements are not alike, thus arriving at a principle in an entirely different way.[36] Occasionally it is advantageous for the teacher to make a statement in order to induce the child to draw conclusions or form a general principle but this matter will best be left to the judgment of a skillful teacher.

6c. Generalization with regard to the curriculum.

Subject Matter with Reference to Generalization

Now the question arises, should every subject in the curriculum be taught with a view towards generalization ? From the foregoing opinions of educators and psychologists, every subject should be taught with a view toward acquiring generalizations as far as the

36. Judd, C. H., The Psychology of High School Subjects, 1915, 433-434.

subject matter permits itself to be generalized. If generalizations are considered a stock of tools which will equip the individual and serve him later on, then the acquisition of these generalizations should be the highest aim for all subject matter.[37] Generalization is important because it enlarges the scope of understanding and also because it serves as a bond for the retention of related associations.

Another question which undoubtedly will arise in the mind of the instructor is "Can all subject matter in the curriculum be made the basis of generalizations or for the forming of the habit of generalizing or is one kind of subject more adapted for these functions than others." Judd asserts that "Science is a system of thought. Science is a body of generalizations. To construct this system of thought and these generalizations is a step in intellectual development beyond the mere acquisition of the impressions out of which science may grow. . . . . Each subject in the curriculum seeks to develop the power of generalization in some way; and science, in making this its chief aim, is not departing in any measure from the traditions of the course of study as this course has always been organized by strong teachers, whatever the content with which they have worked."[38]

Another subject in the curriculum in which generalization is essential is language, for generalizations may be arrived at through the use of words. Through the use of words many similar situations may be likewise treated and thus the child should be trained to form and apply a principle.[39] Mathematics also involves

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37. Miller, I. E., The Psychology of Thinking, 1909, 224.
38. Judd, C. H., Psychology of High School Subjects, 1915, 344.
39. Ibid., 427.

the cultivation and application of generalization, "for example, the series of exercises which are used in the algebra class to make a student thoroughly familiar with a given principle of factoring or a given mode of procedure as it appears in a variety of different connections. He uses a certain principle of factoring now in one situation and now in another, or he uses the process of multiplication now with one combination of letters and now with another. The common factor in each of these different situations is the mathematical process as distinguished from the actual recombination of the particular elements that enter into the special exercise. From the point of view of the mathematician, there is a common element in all of these situations; but that common element is a general principle, which general principle and general mode of procedure must be discovered after one has solved a number of the particular situations in which the general mode of procedure occurs. The general principle to be comprehended is not a part of each one of the situations. It is the product in the individual's mind of a comparison of all these particular cases. It cannot be said that the general mode of procedure appears in case one and case two and case three, or that it is something which can be detached from each of these cases and looked at as a common element. The general principle arises from the comparison of case one with case two and case three. The power of making this comparison and of arriving at a general mode of procedure is a higher power than the power of solving the particular problem. This fact, that the recognition of the general principle is a higher type of power than that which is involved in the solution of particular problems, appears again and again in the training of students. There are many students who know how to solve a problem

if they are told which process to employ, but they do not know enough about the problem to select the process which is appropriate to the situation in hand. The mastery of the general principle is therefore a new type of mental achievement.

"In the same way the student discovers a general principle of language structure when he learns, for example, that all nominative cases have certain characteristics. He is not merely taking an element that appears in one example of the nominative cases, and in the second example the same sort, and so on, recognizing an element common to all of these different situations; he is learning rather to to extract from a variety of experiences a general principle or rule. The discovery of this general principle or rule is a new performance; it is an expression of the power of generalization. The cultivation of this power of generalization is the most important achievement in the student's education. It will not come without special endeavor on the part of the student and on the part of the teacher."[40]

6d. The Elementary school in regard to training for generalization

Generalization is obtained through effort and co-operation of the teacher and the individual. It is not a process which must be left until the individual has advanced into high school or college. The elementary school plays a very essential part in the matter of training the child to think. How can the elementary school train the child to think ? "If the child is to be trained to think he must be given opportunity to consciously adjust means to ends.

40. Judd, C. H., The Psychology of High School Subjects, 1915, 431-32

But the emphasis must fall upon those types of situation in which the ends are results that are quite definitely related to processes from which they spring. All the manual training and industrial activities are from this point of view especially valuable as furnishing the right sort of problems. In geography there is the opportunity to emphasize valleys, rivers, mountains, cities, etc., as the outgrowths of certain processes. They are results, definite and concrete of activities which are perfectly relevant and comparatively easy of comprehension because of their concreteness. A valley, for example, may quite easily be seen to be the result of certain processes. It has an explanation. The child can see even now that erosion is going on at some points and deposit of soil at others. In the light of certain present concrete causes and conditions he can work out the process by which the valley came to be what it now is. In doing this, he is mentally adjusting means to ends, but this he is doing within a particular concrete whole. But in doing this repeatedly with many concrete whole, he is forming a habit of looking upon things as explainable by reference to principles. Thus he will ultimately come to the appreciation of principles and laws themselves. In nature study also, it is easy to correlate cause and effect in a multitude of simple situations. In history this is a little more difficult, requiring more effort of the imagination, but here much can certainly be done in the way of cultivating the habit of thinking of the institutions and modes of life with which we are familiar as the outcome of certain preceding processes. The child is more interested in seeing relations within a particular whole than in seeing broad and sweeping generalizations. His training in thinking should begin with a pretty concrete

consciousness of results and the means to secure them, from which should be gradually developed a more generalized sense of the relation between means and ends. This would culminate in the formation of rules rather than principles. The child may reasonably understand the 'how' if not the 'why'. I say understand, not merely know. Understanding the 'how' implies a consciousness of the relation between the means and the end within a particular whole, at least: knowing the 'how' may be a purely blind process, which is from the child's point of view wholly arbitrary.

"The child in the grades should be so trained that before he leaves he has acquired the habit of not taking things as mere brute facts, but of thinking of them as having a background, a setting, a context, as belonging to some system of other, and as finding their explanation in some set of relationships whwithin a larger whole. Here is abundant scope for the exercise and development of the power of wider generalization and genuine appreciation of abstract principles and laws which make possible the larger unifications of experience. Give the practical interest of the child full and free satisfaction, and you furnish a dynamic basis for the development and rapid expansion of the reflective interest which is more characteristic of the adolescent."[41]

Summary of Foregoing Opinions

In summarizing the value of significance of generalization we should remember

(1) That generalization is essential in the socialand educational experiences of the child; socially because it enables him to cope with the situations brought about by contact with other people; educationally, because as a process, it opens new relationships and also, as a group of general principles, it serves as an intellectual storehouse of related facts which are better retained for future use.

41. Miller, I. E., The Psychology of Thinking, 1909, 183-185.

(2) That it is the duty and should be the aim of the teacher to train or induce the individual to generalize by means of a carefully planned and conducted recitation with this end in view.

(3) That the elementary school as well as the higher institutions have a part in the training of an individual which will aid him in developing the ability to generalize.

(4) That every subject in the curriculum should result in generalizations and that all subject matter can be organized with reference to the forming of generalizations and should be thus organized in order to make it more lasting and helpful to the child.

(5) "That the generalization of ideas and extension of any subject to its possible applications is, therefore, a larger and more signfficant aim in education than mere training in any given particular object."[42]

Need for tests measuring generalization.

Material Inadequate

In considering the experiments involving generalization which have been performed, we have seen how unreliable and unsatisfactory the results are, since introspection is the only measure of their efficiency. In the light of the value of generalization we have seen how very important is the habit of forming generalizations. Very little has been done in an experimental way to determine on the basis of concrete results whether children do generalize or not. The only satisfactory means of knowing whether children have the ability to generalize and apply this ability is to obtain concrete evidence. Of course, school work to a certain extent ought to and probably does show generalizing ability. But here again the evidence is unreliable because opinion is submitted as evidence and neither will serve the purpose of con-

42. Judd, C. H., Psychology of High School Subjects, 1915, 424.

crete, specific results. Only tests which will test the ability to generalize and the ability to apply the principle of generalization will be a reliable measure. But such tests are yet in the making, and, in fact we know as little about the mental processes involved in the solution of such tests that the making is a complicated matter. The mere fact that a psychologist classifies a test as involving a certain process does not prove that that process is involved.[43] "Whipple says that a mental test is the experimental determination for a given individual of some phase of his mental capacity, the scientific measurement of some one of his mental traits. New tests of the right kind and evaluation of the old is the most urgent need, also exhaustive investigation. We need to devise tests so that we do know what we are measuring, and in order to do so, we must subject out tests to intensive study and analysis. Then standardization can proceed intelligently. How do we know we are measuring a certain ability, a certain trait, a certain function ? We say, correlation. We must correlate performance in tests with performance in some larger line of activity which clearly is indicative of ability of one kind or another. The trouble is we cannot deal with function directly, we must deal with concrete specific fact. We feel that the science of Mental Tests is still in its infancy and that it will surely develop and play a most important role in education, industry and psychiatry.x x x x x . . . . .

Class Marks

"Class marks are not reliable for correlation with Mental Tests on account of their objectivity. Judgments are more reliable on account of being less objective. Do such tests measure intelligence or serve as an aid to analysis ? We

43. Brigham, C, Diagnostic Value of the Binet Tests. Psychological Review, Monograph Supplements, XXIV, 1917, 158.

believe tests will measure such and such a trait because we can see symptons of such traits in them. To be sure, memory, perception, imagination, association, attention, generalization, etc., enter formally into every operation of the mind. But we do not know the relation of content to form therefore by investigation and careful analysis only can this be obtained and until we do know relation of content to form we can not say with perfect surety that such and such a test will measure such and such a trait. We must find out if it will, show that it does before we can make such a statement."[44]

Purpose of Analyzing Tests

From the above statements we know our tests are only "symtomatic" that is we think they will measure such and such a trait. This is exactly the case in devising tests of generalization. We must measure our tests with some line of activity which clearly indicates generalization. So far no concrete results indicative of generalization are obtainable with which to compare or correlate tests. Then tests must be subjected to analysis and this can be done by measuring with other tests, indicative of other traits, in order to see to what degree such traits are common to the two. By the process of elimination and comparison tests can begin to be made efficient and useful. By comparison, not on the basis of opinions but on the basis of actual results, we may formulate and form foundations on which to build. Likewise, on the basis of the results, we accept or reject certain elements or certain tests which have been thoroughly tried out and analyzed. It is through elimination that investigation can proceed intelligently and with an aim towards definite specific results.

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44. Rosenow, C., The Analysis of Mental Functions, Psychological Review, Monograph Supplements, XXIV, 1917, 1-43.

Elimination means that we must discard what is not essential and keep that which is essential. In a broad field of investigation it is first necessary to study thoroughly one phase of the whole situation; to draw definite conclusions and by actual concrete results determine the validity of these conclusions. In such a manner, step by step or phase by phase, the entire field may be investigated.

CHAPTER II.

PROBLEM, METHOD OF ATTACK AND SOURCE OF DATA.

Problem

The purpose of this investigation is to study the significance and relative value of anagram tests as a means for measuring generalization. While generalization has involved several meanings in the survey, in this experiment, the meaning will be confined to the perception of the element common to two or more situations, and the application of this element as a principle or method in solving similar problems in the series, or to some phase of this process in meeting new situations.

The assumptions on which the validity of the results depends are these: that the anagram tests which involve a method or principle of solution running through several problems can be more readily solved by pupils who perceive and apply the method than by pupils who do not; that anagram tests involving the grasping and applying of a method are more readily solved than are those which do not; that those involving the same phases of generalizing ability should correlate with each other more highly than those not involving the same phases.

The investigation has been conducted with these points in view:-

(1) To what extent is the ability to solve anagram tests related to the abilities as represented by reading, working analogy tests, spelling, word perception, completing series of numbers, completing sentences and substituting numbers for letters?

(2) Which one of the three types of anagram tests used is most closely related to each group of abilities involved in each of the other tests ?

(3) Do these relationships seem to indicate that any one type of the anagram tests involves generalization to a greater extent than do the others ?

(4) Are anagram tests, which seem to involve generalization, more closely related to other tests which seem to involve generalization than to tests which do not seem to involve such an ability or capacity ?

The Tests.

A copy of each test, except the Army Test, is included in the Appendix, pages 71-102. The source of each test is also given in the Appendix, pages 60-62.

Groups Tested.

The subjects tested in this investigation conprise two groups:-

(1) A high school group of fifty-one freshmen of the University High School.

(2) An elementary grade group of ninety-five seventh-grade pupils of the Lake Harriet and Robert Fulton Schools.

Since each group furnishes some different material for results, the following plan of listing the tests for each group is advisable.

(1) The high school group was tested with:-

1. Omnibus Test I-B
2. Army Test, Form E
3. Anagram Test, Continuous Principle (A & B)*
4. Anagram Test, Five Principle (A & B)
5. Anagram Test, No Principle (A & B)
6. Generalizing Word Test (A & B)
7. Number Completion Test (A & B)

* A & B refers to the two companion tests comprising each pair.

The Omnibus Test I-B and Army Test were given in the Fall of 1917 by Mr. Miller of the University High School. The remaining tests were given by the author in the Spring of 1918. A combined score of each two similar tests (A & B) was correlated with the Omnibus and Army Tests. The results are shown in Chapter III, Table V.

(2) The elementary grade group was tested with:-

1. Anagram Tests, Continuous Principle (A & B)
2. Anagram Test, Five Principle (A & B)
3. Anagram Test, No Principle (A & B)
4. Generalizing Word Test (A & B)
5. Number Completion Test (A & B)
6. Trabue Language Scale (B & C)
7. Written Analogies (A & B)
8. Oral Analogies (C & D)
9. Spelling (Ayres) (A & B)
10. Thorndike - Visual Vocabulary B (X & Y)
11. Learning Test (B_1 & C_1)

The above tests were given by the author. The children were tested one day a week for four successive weeks during March and April 1918. This group did not include the entire seventh grades of both schools but they furnished a random sampling. Results of these tests can be found in Chapter III, Table IV.

Grade Group 2A.

Correlations were found between the tests listed above and the scores made on the Yerkes-Bridges Point Scale for fifty-six of the ninety-five seventh grade pupils. These fifty-six pupils were tested individually with the Yerkes-Bridges Point Scale during January and February, 1918. The combined scores of each two similar tests was used for correlation with the Yerkes-Bridges Point Scale scores. Results can be found in Chapter III, Table VII.

Grade Group 2B.

Correlations were found between the tests as listed for the seventh grade group and the scores made on the Thorndike Reading Test, Scale Alpha 2, for sixty-two of the ninety-five seventh grade pupils. The Thorndike Reading Test was given in January 1918. The combined scores of each two similar tests ware used for correlation with the Thorndike Reading Test. Results can be found in Chapter III, Table VI.

Order, Time and Method of Scoring Tests.

Order of Tests	Time	Credits for each correct response
1. Anagram-Continuous Principle A[1]	3½ min.	2[2]
2. Number Completion A	3½	2
3. Anagram-No Principle A	4½	2
4. Generalizing Word Test A	4	2
5. Anagram-Five Principle A	3	2
6. Spelling A	3	1
7. Anagram-Continuous Principle B	3½	2
8. Number Completion B	3½	2
9. Anagram-No Principle B	4½	2
10. Generalizing Word Test B	4	2
11. Anagram-Five Principle	3	2
12. Spelling B		1
13. Written Analogies A	5	1
14. Oral Analogies C	5 sec. each[4]	1
15. Trabue Language B	7	See Footnote 5
16. Written Analogies B	7½	1
17. Oral Analogies D	5 sec. each	1
18. Trabue Language C	7 min.	See Footnote 5
19. Learning Test B_1	20 min.	Number of substitutions per minute[7]
20. Visual Vocabulary-X Series		See Footnote 6
21. Learning Test C_1	20 min.	Number of substitutions per minute[7]
22. Visual Vocabulary-Y Series	—	See Footnote 6

1. A & B, C & D, X & Y refer to the two companion tests in each case
2. This method of scoring is arbitrary as no scales have been worked out by which to score the tests.
3. A dash indicates no definite time limit.
4. See directions for giving tests, page 41.
5. The Trabue Method of Scoring was used for B and C Scales. The tests were scored by two people and the average of the two scores was used as a final score. This method can be found in Teachers College, Columbia University Contributions to Education, No. 77, pp. 80-87
6. Each test was scored as follows: the number of the last line which did not contain over two errors was used as the score for the test.
7. The number of letters marked during each minute was the method used in scoring this test. The results of five minutes work in each ten-minute period was used as a total score for Test B_1 and Test C_1. The results of the first two minutes and the last

The remaining tests

1. The Omnibus Test I-B
2. The Army Test
3. Yerkes-Bridges Point Scale
4. The Thorndike Reading Test

were not given with reference to order.

(1) The time and scoring for the Omnibus Test I-B was followed by Mr. Miller according to directions. The original data can be obtained at the University High School and the University of Minnesota Bureau of Co-operative Research.

(2) The Army Test was timed and scored according to directions which are not allowed to be given here.

(3) The Yerkes-Bridges Point Scale was scored according to directions given in "A Point Scale for Measuring Mental Ability."[8]

(4) The Thorndike Reading Test was scored according to the Thorndike Method as given in the Teachers College Record for November 1915.

Methods and directions used in giving the tests.

In each case the subjects - the seventh grade pupils and the high school students - were furnished with a copy of the printed or mimeographed test, face down, or with a blank sheet on which to write their responses as in the case of the spelling tests and oral analogies tests.

In giving the Anagram Tests-Continuous Principle, the papers were turned face up at a given signal and the directions at

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7. con. three minutes work in each ten-minute period was excluded. This was done in order to obtain a more uniform rate of work.
8. Yerkes, R. M., Bridges, J. W., Hardwick, Rose S, A Point Scale for Measuring Mental Ability, 1915, 139-162.

the top of the page read aloud to the subjects by the experimenter while they followed. All directions were given by the experimenter. At a given signal the pupils started to work. At a given signal, when the time was up, the pupils stopped working. The finished tests were then collected.

The same procedure was followed in the case of the

Anagram Tests-No Principle
Anagram Tests-Five Principle
Generalizing Word Tests
Number Completion Tests
Written Analogies
Thorndike Visual Vocabulary B Tests

Spelling

In giving the spelling tests the subject was furnished with a blank sheet on which he wrote the words as the experimenter pronounced them. A list of sixty words was pronounced for each test and each word was repeated to make sure the pupil heard and understood. When the sixty words were finished the papers were collected.

Oral Analogies

In giving the oral analogy tests the following directions were given to the subjects: "Three words will be read aloud and you are to think of a fourth word and write it down as soon as you can. The first two words bear a certain relationship to each other and the last two words bear a certain relationship to each other. You are to study that relationship and be sure that the word which you write has the correct relation to the other words. I shall read the words rapidly and no word will be repeated. As soon as you think of the word write it on the space left for it."

Five seconds were allowed for the experimenter to read the

three words and for the subjects to write the fourth word and thereby complete the analogies. The analogies were read in succession, one every five seconds, until fifty for each test were finished. Sheets with lines on which to write the responses were furnished the subjects in this test. When the fifty analogies were finished (fifty for each test) the papers were collected.

Trabue Language Scale

The following directions were used in giving the Trabue Language Scales B and C:

"This sheet contains some incomplete sentences, which form a scale. This scale is to measure how carefully and rapidly you can think, and especially how good you are in your language work.

"You are to write one word on each blank, in each case selecting the word which makes the most sensible statement.

"You may have just seven minutes in which to sign your name at the top of the page and write the words that are missing. The papers will be passed to you with the face downward. Do not turn them over until we are all ready. After the signal is given to start, remember that you are to write just one word on each blank and that your score depends on the number of perfect sentences you have at the end of seven minutes."[9]

At the end of seven minutes, the signal was given to stop writing and the papers collected.

Learning Test

In the case of the Learning Test the children were told to study the key given at the top of the page. They were then told

9. Trabue, M. R., Completion Test Language Scales, Teachers College Columbia University Contributions to Education, No. 77, p. 21.

when the signal to start was given to write the correct numbers under the letters and to write as many as they could before the signal was given to stop. The experimenter called "mark" at the end of every minute. When the signal "mark" was given the subject marked the letter he was working on and continued his work until the signal to stop work was given. This method continued for ten minutes. After a five-minute rest the method was repeated for another ten minutes. At the end of the second ten-minute period, the papers were collected.

CHAPTER III.

QUANTITATIVE RESULTS AND THEIR INTERPRETATIONS.

The coefficients of correlation for the tests described in Chapter II are given in the following tables. Interpretations of the correlations follow the tables. The raw coefficients, from which these tables are derived, are given in Tables XIII and IX in the Appendix.

The following formula[0] has been used in working correlations in this investigation:-

$$r = \frac{\Sigma \xi \eta - n d_1 d_2}{n\sqrt{\frac{\Sigma \xi^2}{n} - d^2_1}\sqrt{\frac{\Sigma \eta^2}{n} - d^2_2}}$$

In using this formula, first take a guessed average for each test, then find the deviations (ξ, η) from that guessed average for each test.

$\Sigma \xi \eta$ = the sum of the products of the deviations from the two guessed averages.

d = the difference between the sum of the plus deviations and the minus deviations divided by the number of cases, n.

d_1 refers to the ξ deviations

d_2 refers to the η deviations.

$\Sigma \xi^2$ and $\Sigma \eta^2$ = sum of the squares of the deviations in each case.

0. Thorndike, E. L., Mental and Social Measurements, 1916, 173.

This formula gives the same result as the use of the Pearson Products Moment Formula, $r = \frac{\Sigma x y}{n \sigma_1 \sigma_2}$ with a considerable saving in time in working the arithmetical calculations.

The same formula is used in finding the raw coefficients throughout this investigation.

The P. E. of the Coefficient of Correlation are given in every case.

The formula used for finding the P. E. is as follows:

$$\frac{.6745\ (1-r^2)}{\sqrt{n}}$$

n = number of cases

r = coefficient of correlation

TABLE I

High School Group 1.

Correlation between each two similar tests.

	Standard Deviation	r
1. Anagram-Continuous Principle	A & B 8.64 8.95*	.51 ± .07
2. Anagram-No Principle	A & B 9.48 11.07	.66 ± .053
3. Anagram-Five Principle	A & B 11.77 9.96	.51 ± .07
4. Generalizing Words	A & B 12.61 9.66	.90 ± .018
5. Number Completion Test	A & B 13.63 11.48	.86 ± .024

* A & B refers to the two companion tests comprising each pair.

TABLE II.

Grade, Group 2.

Correlation between each two similar tests.

	Standard Deviation		r
1. Anagram-Continuous Principle	A & B 9.33 & 9.38		.56 ± .04
2. Anagram-No Principle	A & B 8.86 & 7.74		.56 ± .04
3. Anagram-Five Principle	A & B 11.17 & 11.04		.57 ± .04
4. Generalizing Words	A & B 8.89 & 6.66		.58 ± .04
5. Number Completion	A & B 9.63 & 10.53		.77 ± .02
6. Spelling	A & B 13.13 & 13.44		.92 ± .01
7. Trabue Language Scale	B & C 2.71 & 2.57		.63 ± .04
8. Written Analogies	A & B 9.27 & 8.02		.71 ± .03
9. Oral Analogies	C & D 6.62 & 8.15		.85 ± .01
10. Visual Vocabulary	X & Y 15.03 & 9.5		.60 ± .04
11. Learning Test	B_1 & C_1 7.54 & 7.76		.71 ± .03

In Tables I and II are given the coefficients of correlation between the two tests of each pair. On the basis of these correlations one is able to determine the reliability of the tests.

Table I, by the use of the William Brown Formula, $r_n = \frac{nr}{1 + (n-1)r}$, one is able to determine the number of similar tests necessary to reach any desired degree of correlation. In the Journal of Philosophy, Psychology and Scientific Methods for November 8, 1917, Ruml shows that to get a reliability of .5 of the standard deviation one must have a coefficient of .86. The reliability of the test may be determined from the coefficient of correlation by the use of the formula $S = \sqrt{1 - r^2}$ SD, in which the mean square error is equal to the square root of $1-r^2$ multiplied by the standard deviation. Thus, in the Anagram Test, Continuous Principle, S = .86 of the standard deviation; that is, .86 of 8.64 for A and .86 of 8.95 for B. This result (.86SD) divided by the square root of the number of cases ($\sqrt{51}$) gives the reliability in terms of the standard deviation for the group; namely .12 S. D. or 1.04 for A and 1.07 for B.

The correlations for reliability as shown in Table I and II indicate that the Generalizing Word Test is probably better adapted for high school pupils than elementary school pupils. The Number Completion Test correlates somewhat higher for the high school group than it does for the grade group.

The No-Principle Anagram Test is slightly higher for the grade group, also the Five-Principle Anagram Test. The reliability of the No-Principle Anagram Test and the Five-Principle Anagram Test is the same for the grade or elementary group.

The reliability of the No-Principle and Five-Principle Anagram Tests is practically the same for the high school group. The reliability of the No-Principle Anagram is considerably higher

for the high school group than for the grade group. In general there is little difference in the reliability of the three anagram tests in the two groups.

The correlation for reliability for spelling is high, considerably higher than any of the other tests.

With reference to reliability the oral analogies are probably a better test than the written analogies.

The coefficients of reliability of the other tests used in the grade or elementary group, excluding those used in the high school group, were somewhat higher than in the case of the anagram. For instance

1. Spelling	.92
2. Oral Analogies	.85
3. Written Analogies	.71
4. Learning	.71
5. Trabue	.63
6. Visual Vocabulary	.60

Tables III and IV are derived from the raw coefficients of correlation given in Tables VIII and IX of the Appendix by the use of Spearman's formula for the correction of attenuation.

In order to correct for the attenuation of the coefficient of correlation by chance error in the data, it is necessary to have at least two independant scores of the particular traits to be measured. If these can be found, one method of procedure is as follows:-

Suppose A and B to be the series to be related.

Let P be a series of exact measures of A.

Let Q be a series of exact measures of B.

P_1 and P_2 be two independent series of measures of A; Q_1 and Q_2 be two independent series of measures of B; then with the

usual notation, a more probable correlation is shown,

$$r_{pq} = \frac{\sqrt{r_{p_1q_2} \times r_{p_2q_1}}}{\sqrt{r_{p_1p_2} \times r_{q_1q_2}}}$$

To use this formula, it is necessary to have two independent series of measures of each function.[1]

TABLE III.

High School Group 1.

Coefficients of Correlation (Corrected for Attenuation)

	Anagram-Continous Principle	Anagram-No Principle	Anagram-Five Principle	Generalizing Words	Number Completion
1. Anagrams-Continuous Principle	—	.58	.78	.48	.56
2. Anagrams-No Principle	.58	—	.91	.50	.77
3. Anagrams-Five Principle	.78	.91	—	.27	.60
4. Generalizing Words	.48	.50	.28	—	.51
5. Number Completion	.56	.77	.60	.51	—

1. Chapman, J. C., Individual Differences in Ability and Improvement in Their Correlations, Teachers College, Columbia University Contributions to Education, No. 63, p. 23.

TABLE IV.

Grade, Group 2.

Coefficients of Correlation (Corrected for Attenuation).

	Continuous Principle Anagram	No Principle Anagram	Five Principle Anagram	Generalizing Words	Number Completion	Trabue Language	Written Analogies	Oral Analogies	Visual Vocabulary	Spelling	Learning Test
Continuous Principle Anagram	___	.55	.77	.36	.40	.69	.53	.55	.38	.42	.13
No Principle Anagram	.55	___	.81	.33	.35	.42	.49	.56	.25	.67	.02
Five Principle Anagram	.77	.81	___	.36	.46	.56	.69	.65	.70	.55	.__*
Generalizing Words	.36	.33	.36	___	.34	.40	.38	.72	.52	.36	.20
Number Completion	.40	.35	.46	.34	___	.25	.57	.29	.37	.27	.__
Trabue Language	.69	.42	.56	.40	.25	.__	.56	.68	.56	.32	.08
Written Analogies	.53	.49	.69	.38	.57	.56	___	.64	.55	.28	.08
Oral Analogies	.55	.56	.65	.72	.29	.68	.64	___	.60	.40	.__
Visual Vocabulary	.38	.25	.70	.52	.37	.56	.55	.60	___	.46	.__
Spelling	.42	.67	.55	.36	.27	.32	.28	.40	.46	___	.__
Learning Test	.13	.02	.__	.20	.__	.08	.08	.__	.__	.__	___

* .__ indicates no correlation.

In the high school group the abilities involved in the Five-Principle Anagram Test correlate higher with those involved in the Continuous -Principle Anagram (.78) than with those involved in the No-Principle Anagram (.58), which indicates that the same or similar abilities are probably involved in the first two types of tests that may not be involved to as great an extent in the third. In every case but one (that of the Generalizing Words) the correlations of the abilities involved in the Five-Principle Anagram are higher than those involved in the Continuous Principle.

Since, in the high schoolgroup, the abilities involved in the Continuous-Principle Anagram correlate higher with those involved in the Five-Principle Anagram (.78) than with those involved in the No-Principle Anagram (.58), they seem to have in common some factor not contained in the No-Principle to as great an extent, this factor perhaps being of a generalizing nature.

At the same time the abilities involved in the Five-Principle correlate higher with those of the No-Principle (.91) than with those of the Continuous-Principle (.78). This may indicate that certain other factors, perhaps also of generalization, are involved in the Five-Principle and in the No-Principle perhaps to a greater degree than in the case of the Continuous-Principle.

The abilities involved in the No-Principle Anagram also seem more closely related to the abilities involved in both the Generalizing Words (.50) and Number Completion (77) than do the abilities involved in either the Five-Principle (.27 with Generalizing Words) (.60 with Number Completion) or Continuous Principle (.48 with Generalizing Words) and (.56 with Number Completion.)

Thus, the foregoing statement suggests that in so far as each of these tests involves generalization the factors may be different in those involving principles than in those in which the situation needs a separate analysis for each case.

The close relationship between abilities involved and the Five -Principle and in the No-Principle Anagram (.91) may be due to the Five-Principle in many cases being merely a NoPrinciple Anagram Test for some pupils. This seems supported by the closer relationship between the abilities involved in the Five-Principle and the Continuous-Principle (.78) than between the abilities involved in the No-Principle and Continuous-Principle (.58).

In the case of the elementary school group the same facts of relationships are found for the Anagram Tests. For the Generalizing Word Test and Number Completion Test the abilities involved in the No-Principle seem to show practically the same relationships (.33 & .35) as do the abilities involved in the Five-Principle (.36 & .46) and Continuous-Principle (.36 & .40).

In the case of the abilities involved in the Oral Analogies (.65), Written Analogies (.69) and Visual Vocabulary (.70) the abilities of the Five-Principle Anagram show higher correlations than do either the No-Principle (.56, .49, .25) or the Continuous-Principle (.55, .53, .38)

In the case of the abilities involved in the Trabue Language the Continuous Principle is higher (.69) than the Five-Principle (.56) and the Five-Principle is higher than the No-Principle Anagram (.42).

In the case of spelling ability a higher correlation is found between the abilities involved in the No-Principle Anagram (.67) than with those involved in the Five-Principle Anagram (.55). The spelling ability also correlates higher with the abilities in the Five-Principle (.55) than with those involved in the Continuous-Principle (.42). The fact that the ability in spelling correlates higher with the abilities involved in the analogies tests (.28, .40) than with the abilities involved in the Learning Test (zero correlation) suggests that spelling may involve some of the abilities involved in generalization. If so, they seem to be related to those in the No-Principle Anagram Test (.67) more highly than with those abilities involved in the anagram tests containing principles of solution (.42, .55).

In the case of the Learning Test, where one would not expect the capacity for generalizing to play a part, we find no significant relation between the abilities involved in it and the abilities involved in any of the Anagram Tests.

If one selects from among the abilities tested, the one which shows the highest correlation (oral analogies) and the one which shows the lowest correlation (Learning Test) and next to the lowest correlation (Spelling) the abilities involved in the Five-Principle Anagram Test suggest the presence of different factors than do those involved in the No-Principle Anagram Test, or their presence to a smaller extent at least, and, in each case, factors which do not seem present in the abilities involved in the Learning Test. A resort to partial correlations would be advisable for making final determinations.

Table V shows the coefficients of correlations for the combined scores of each two similar tests with the Omnibus I-B Test and the Army Test, Form E.

TABLE V.

High School, Group 1.

1. Omnibus I-B with Anagram Continuous-Principle	A + B	.35 ± .08
2. Omnibus I-B with Anagram Five-Principle	A + B	.40 ± .08
3. Omnibus I-B with Anagram No-Principle	A + B	.43 ± .07
4. Omnibus I-B with Generalizing Words	A + B	.49 ± .07
5. Omnibus I-B with Number Completion	A + B	.55 ± .07
6. Army Test with Anagram Continuous-Principle	A + B	.38 ± .08
7. Army Test with Anagram Five-Principle	A + B	.54 ± .07
8. Army Test with Anagram No-Principle	A + B	.51 ± .07
9. Army Test with Generalizing Words	A + B	.44 ± .08
10. Army Test with Number Completion	A + B	.51 ± .07

The Omnibus Test can hardly be classified with any of the types of tests with which it is correlated as shown in Table V. The highest correlation obtained is that with the Number Completion Test (.55). As the correlations now stand they seem to indicate no significant relationship.

Table V also shows the correlations of the Army Test with the combined scores of each two similar tests. The correlations in every case were rather low, the highest being with the Five-Principle Anagram Test. From these correlations, though higher than in the case of the Omnibus Test, it is safe to say that none of the various

types of tests used in this experiment can be classified with the Army Test as a whole. As the Army Test involved several types of tests this situation is what one would expect in case these tests are indicative of generalizing capacity. A more detailed analysis would be necessary to bring out the relationships of the other tests used to each test of the Army Test.

Table VI shows the coefficients of correlation for the combined scores of each two similar tests with the Thorndike Reading Test, Scale Alpha 2.

TABLE VI.

Grade, Group 2B.

1.	Thorndike Reading Test with Anagram-Continuous-Principle	A + B	.47 ± .01
2.	Thorndike Reading Test with Anagram-Five-Principle	A + B	.38 ± .01
3.	Thorndike Reading Test with Anagram-No-Principle	A + B	.12 ± .01
4.	Thorndike Reading Test with Generalizing Words	A + B	.38 ± .01
5.	Thorndike Reading Test with Number Completion	A + B	.18 ± .003
6.	Thorndike Reading Test with Trabue Language	B + C	.36 ± .01
7.	Thorndike Reading Test with Visual Vocabulary	X + Y	.40 ± .01
8.	Thorndike Reading Test with Written Analogies	A + B	.57 ± .03
9.	Thorndike Reading Test with Oral Analogies	C + D	.46 ± .02
10.	Thorndike Reading Test with Spelling	A + B	.26 ± .06
11.	Thorndike Reading Test with Learning Test	B + C	.05 ± .0002

The Written Analogies give the highest correlation (.57) with the Thorndike Reading Test. The correlations of the Number Completion (.18) and No-Principle Anagram (.12) are significant because of their smallness. This probably indicates that these two

types of tests are different types of tests to a great extent and have but little in common with the type of test such as is indicated by the Reading Test.

The Continuous-Principle Anagram (.47) and the Five-Principle Anagram (.38) have a considerably higher correlation with the Reading Test than does the No-Principle Anagram. This emphasizes the significance of the Five-Principle and Continuous-Principle type of anagram test.

Table VII shows the coefficients of correlation for the combined scores of each two similar tests with the scores of the Yerkes-Bridges Point Scale.

TABLE VII.

Grade, Group 2A.

1.	Yerkes-Bridges Point Scale with Anagram-Continuous Principle	A + B	.36 ± .08
2.	Yerkes-Bridges Point Scale with Anagram-No-Principle	A + B	.37 ± .08
3.	Yerkes-Bridges Point Scale with Anagram-Five-Principle	A + B	.45 ± .07
4.	Yerkes-Bridges Point Scale with Generalizing Words	A + B	.49 ± .07
5.	Yerkes-Bridges Point Scale with Number Completion	A + B	.39 ± .08
6.	Yerkes-Bridges Point Scale with Trabue Language	B + C	.48 ± .07
7.	Yerkes-Bridges Point Scale with Visual Vocabulary	X + Y	.37 ± .08
8.	Yerkes-Bridges Point Scale with Written Analogies	A + B	.55 ± .06
9.	Yerkes-Bridges Point Scale with Oral Analogies	C + D	.67 ± .05
10.	Yerkes-Bridges Point Scale with Spelling	A + B	.27 ± .08
11.	Yerkes-Bridges Point Scale with Learning Test	B + C	.02 ± .09

The oral analogies correlate the highest of the various tests with the Yerkes-Bridges Point Scale which emphasizes its value as shown in Table IV. The No-Principle Anagram Test gives a

low correlation (.27)with the Yerkes-Bridges Scale. This same situation is true with the Thorndike Reading Test (12). The spelling and Learning Tests also show a low correlation. This indicates that the types of tests correlated are not similar to the Yerkes-Bridges Point Scale to any significant extent.

Again wthe Continuous-Principle Anagram (.36) and the Five-Principle Anagram Tests (.45) show a higher correlation with the Yerkes-Bridges Point Scale than does the No-Principle Anagram Test (.27).

Conclusion

From the foregoing interpretations the general tendency indicates that the abilities involved in the Continuous and Five-Principle Anagram Tests are more closely related to tests apparently involving generalization than to the tests seeming to involve less generalization.

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APPENDIX

The Tests.

A variety of tests were selected or devised that ranged from those involving the mere improvement of simple connections as in the Learning Tests B_1 and C_1 to those seeming to fulfill the requirements set for the problem: namely the

(1) Anagram Tests,-Continuous Principle, A and B
(2) Anagram Tests -Five Principle, A and B
(3) Number Completion Tests, A and B
(4) Written Analogies, A and B
(5) Oral Analogies, C and D

The other tests used

(6) The Anagram Tests-No Principle, A and B
(7) The Generalizing Word Tests, A and B
(8) Thorndike Visual Vocabulary, X and Y
(9) The Spelling Tests, A and B
(10) The Trabue Language Scales, B and C

probably involve generalizing abilities to some extent or some phase of it.

The tests, other than the anagram tests, were selected or devised for the purpose of affording material with which to compare the results of the anagram tests.

The Learning Tests-B_1 and C_1
The Written Analogies A and B) are at present unpublished but have been used in other connections.
The Oral Analogies C and D)

The Spelling Tests consist of two sets of sixty (60) words each made from Columns S, T, U, V, and W of the Ayres Spelling Scale, by including every other word in each test. The Ayres Spelling Scale is published

by the Russell Sage Foundation.

The Number Completion Tests and the Generalizing Word Tests were given to a non-selected group of sixty (60) high school pupils in the University High School in order to determine the time required for solving each task. This made it possible to arrange the tasks of each test in a tentative order of difficulty and to make the two tests of approximately equal difficulty by including in the companion tests tasks taking approximately the same amount of time to solve.

Three types of anagram tests were used: (1) the continuous principle tests inwhich the solution of the anagram depended upon the use of the same principle or method throughout the series.

(2) The five-principle tests in which the solution of each of the five sets of five anagrams each depended upon a different method for each set.

(3) The no-principle anagram tests in which the solution depended upon no definite principle that could be applied in meeting the new anagrams as they occurred.

The purpose in desiring new tests was to meet the requirements of the problem specifically and also to give a basis for determining the reliability of the tests themselves.

The remaining tests: the Thorndike Visual Vocabulary and the Probus Language Scales are published in the Teachers College Record for November 1916 and in the Teachers College, Columbia University Contributions to Education No. 77, respectively, and can be obtained through the Teachers College Bureau of Publications.

The results of these tests were correlated with the scores of the Thorndike Reading Test, Scale Alph 2, and of the Yerkes-Bridges Point Scale in case of the seventh grade group[a], and with the scores of the Haggerty Omnibus Test I-B and of the Group Army Test, Form E, in the case of the high school group.[b] These scores had already been obtained by people competent to give and score the tests and furnished a basis for getting additional information regarding the relations of the anagram tests.

The Thorndike Reading Test, Scale Alpha 2, is obtainable from the Teachers College Bureau of Publications.

The Haggerty Omnibus Test I-B can be obtained from the University of Minnesota Bureau of Co-operative Research.

The Army Test, Form E, is not published and not permitted to be published or used outside the field of the army field.

The Yerkes-Bridges Point Scale with directions for use and scoring can be found in "A Point Scale for Measuring Mental Ability" by Yerkes, Bridges and Hardwick, published by Warwick and York, Inc. Baltimore.

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a. See page 36.
b. See page 36.

Table VIII contains the raw coefficients of correlation for the high school group and Table IX contains the raw coefficients of correlation for the grade group, from which the tables in Chapter III have been derived. The original scores of all tests can be obtained at the University of Minnesota Bureau of Co-operative Research.

TABLE VIII.

High School Group 1.

Raw Coefficients.

Anagram-Continuous Principle			A	with	Anagram-No Principle	B	.31 ± .08
"	"	"	A	"	" Five Principle	B	.37 ± .08
"	"	"	A	"	Generalizing Words	B	.31 ± .08
"	"	"	A	"	Number Completion	B	.42 ± .07
"	"	"	B	"	Anagram-No Principle	A	.37 ± .08
"	"	"	B	"	" Five Principle	A	.43 ± .07
"	"	"	B	"	Generalizing Words	A	.34 ± .08
"	"	"	B	"	Number Completion	A	.31 ± .08
Anagram- No Principle			A	"	Anagram-Five Principle	B	.59 ± .06
"	"	"	A	"	Generalizing Words	B	.58 ± .06
"	"	"	A	"	Number Completion	B	.69 ± .05
"	"	"	B	"	Anagram-Five Principle	A	.47 ± .07
"	"	"	B	"	Generalizing Words	A	.26 ± .08
"	"	"	B	"	Number Completion	A	.43 ± .07
Anagram-Five Principle			A	"	Generalizing Words	B	.20 ± .09
"	"	"	A	"	Number Completion	B	.34 ± .08
"	"	"	B	"	Generalizing Words	A	.17 ± .09
"	"	"	B	"	Number Completion	A	.44 ± .07
Generalizing Words			A	"	Number Completion	B	.33 ± .08
"		"	B	"	Number Completion	A	.61 ± .06

TABLE IX.

Grade Group 2.

Raw Coefficients.

Anagram-Continuous	Principle	A	with	Anagram - No Principle	B	.33	± .06
" "	"	A	"	Anagram-Five Principle	B	.48	± .05
" "	"	A	"	Generalizing Words	B	.36	± .06
" "	"	A	"	Number Completion	B	.37	± .06
" "	"	A	"	Trabue Language	C	.54	± .05
" "	"	A	"	Written Analogies	B	.42	± .06
" "	"	A	"	Oral Analogies	D	.53	± .05
" "	"	A	"	Visual Vocabulary	Y	.26	± .07
" "	"	A	"	Spelling	B	.21	± .07
" "	"	A	"	Learning	C_1	.	
Anagram-Continuous	Principle	B	with	Anagram - No Principle	A	.29	± .07
" "	"	B	"	Anagram-Five Principle	A	.39	± .06
" "	"	B	"	Generalizing Words	A	.12	± .07
" "	"	B	"	Number Completion	A	.19	± .07
" "	"	B	"	Trabue Language	B	.31	± .06
" "	"	B	"	Written Analogies	A	.27	± .07
" "	"	B	"	Oral Analogies	C	.27	± .07
" "	"	B	"	Visual Vocabulary	X	.19	± .07
" "	"	B	"	Spelling	A	.30	± .06
" "	"	B	"	Learning	B	.	

Table IX continued.

Anagram-No Principle	A with Anagram-Five Principle	B	.45 ± .06
" " "	A with Generalizing Words	B	.35 ± .06
" " "	A with Number Completion	B	.19 ± .07
" " "	A with Trabue Language	C	.22 ± .07
" " "	A with Written Analogies	B	.27 ± .07
" " "	A with Oral Analogies	D	.36 ± .06
" " "	A with Visual Vocabulary	Y	.12 ± .07
" " "	A with Spelling	B	.62 ± .04
" " "	A with Learning	C_1	.__
Anagram-No Principle	B with Anagram-Five Principle	A	.43 ± .06
" " "	B with Generalizing Words	A	.10 ± .07
" " "	B with Number Completion	A	.28 ± .07
" " "	B with Trabue Language	B	.29 ± .07
" " "	B with Written Analogies	A	.36 ± .06
" " "	B with Oral Analogies	C	.41 ± .06
" " "	B with Visual Vocabulary	X	.18 ± .07
" " "	B with Spelling	A	.38 ± .06
" " "	B with Learning	B_1	.__

Table IX continued.

Anagram-Five Principle			A	with	Generalizing Words	B	.39 ± .06
"	"	"	A	"	Number Completion	B	.36 ± .06
"	"	"	A	"	Trabue Language	C	.41 ± .06
"	"	"	A	"	Written Analogies	B	.47 ± .06
"	"	"	A	"	Oral Analogies	D	.54 ± .05
"	"	"	A	"	Visual Vocabulary	Y	.33 ± .06
"	"	"	A	"	Spelling	B	.33 ± .06
"	"	"	A	"	Learning	C_1	.—
Anagram-Five Principle			B	with	Generalizing Words	A	.20 ± .07
"	"	"	B	"	Number Completion	A	.30 ± .06
"	"	"	B	"	Trabue Language	B	.31 ± .06
"	"	"	B	"	Written Analogies	A	.39 ± .06
"	"	"	B	"	Oral Analogies	C	.38 ± .06
"	"	"	B	"	Visual Vocabulary	X	.50 ± .05
"	"	"	B	"	Spelling	A	.48 ± .05
"	"	"	B	"	Learning	B_1	.08
Generalizing Words			A	with	Number Completion	B	.14 ± .07
"		"	A	"	Trabue Language	C	.20 ± .07
"		"	A	"	Written Analogies	B	.19 ± .07
"		"	A	"	Oral Analogies	D	.60 ± .04
"		"	A	"	Visual Vocabulary	Y	.34 ± .06
"		"	A	"	Spelling	B	.29 ± .06
"		"	A	"	Learning	C_1	.09

Table IX continued.

Generalizing Words	B with	Number Completion	A	.38 ± .06
"	"	B "	Trabue Language	B	.30 ± .06
"	"	B "	Written Analogies	A	.32 ± .06
"	"	B "	Oral Analogies	C	.42 ± .06
"	"	B "	Visual Vocabulary	X	.27 ± .06
"	"	B "	Spelling	A	.24 ± .07
"	"	B "	Learning	B_1	.16 ± .07
Number Completion	A "	Trabue Language	C	.14 ± .07
"	"	A "	Written Analogies	B	.39 ± .06
"	"	A "	Oral Analogies	D	.26 ± .06
"	"	A "	Visual Vocabulary	Y	.29 ± .06
"	"	A "	Spelling	B	.24 ± .07
"	"	A "	Learning	C_1	.—
Number Completion	B with	Trabue Language	B	.22 ± .07
"	"	B "	Written Analogies	A	.45 ± .05
"	"	B "	Oral Analogies	C	.21 ± .07
"	"	B "	Visual Vocabulary	X	.22 ± .07
"	"	B "	Spelling	A	.22 ± .07
"	"	B "	Learning	B_1	.38 ± .06

Table IX continued.

Trabue Language	B	with	Written Analogies	B	.43 ± .06
" "	B	"	Oral Analogies	D	.50 ± .05
" "	B	"	Visual Vocabulary	Y	.37 ± .06
" "	B	"	Spelling	B	.28 ± .06
" "	B	"	Learning	C_1	.—
Trabue Language	C	with	Written Analogies	A	.32 ± .06
" "	C	"	Oral Analogies	C	.48 ± .05
" "	C	"	Visual Vocabulary	X	.32 ± .06
" "	C	"	Spelling	A	.28 ± .06
" "	C	"	Learning	B_1	.06 —
Written Analogies	A	"	Oral Analogies	D	.53 ± .05
" "	A	"	Visual Vocabulary	Y	.34 ± .06
" "	A	"	Spelling	B	.22 ± .07
" "	A	"	Learning	C_1	.—
Written Analogies	B	with	Oral Analogies	C	.47 ± .05
" "	B	"	Visual Vocabulary	X	.38 ± .06
" "	B	"	Spelling	A	.24 ± .07
" "	B	"	Learning	B_1	.—

Table IX continued.

Oral Analogies	C	with	Visual Vocabulary	Y	.41 ± .06
" "	C	"	Spelling	B	.31 ± .06
" "	C	"	Learning	C_1	.—
Oral Analogies	D	"	Visual Vocabulary	X	.46 ± .06
" "	D	"	Spelling	A	.41 ± .06
" "	D	"	Learning	B_1	.—
Visual Vocabulary	X	"	Spelling	B	.44 ± .06
" "	X	"	Learning	C_1	.04
Visual Vocabulary	Y	"	Spelling	A	.26 ± .07
" "	Y	"	Learning	B_1	.—
Spelling	A	"	Learning	C_1	.05-
"	B	"	Learning	B_1	.004

(4 A)

Name_____ School_____ Grade_____ Age_____

On this page are a number of anagrams or groups of letters which if properly arranged will spell the name of some animal. Look at the letters and as soon as you have formed the name of some animal write it on the line beneath. Work as rapidly as you can.

1	2	3	4
R	N	L	X
B	L	S	L
E A	I O	E A	Y N
_____	_____	_____	_____

5	6	7	8
K	S̈	E	S
S	H	O	M
N A	O R	T T	O O
E	E	R	E
_____	_____	_____	_____

9	10	11	12
K	H	V	O
M	G	B	B
O N	O P	E A	A B
E Y	E R	E R	O N
_____	_____	_____	_____

13	14	15	16
R	M	U	O
T	S	I	F
P	O	C	B
A N	P O	A R	U F
H E	S U	B O	A L
_____	_____	_____	_____

17	18	19	20
O	E	E	N
G	N	I	P
K	R	S	C
A N	E I	Q U	H I
A R	D E	R R	M U
O	R	L	K
_____	_____	_____	_____

21	22
I	T
C	I
C	A
R O	L L
O D	G A
L E	O R
_____	_____

(4 B)

Name _____ School _____ Grade _____ Age ____

1	2	3	4
F	R	E	R
W	D	M	B
L O	E E	C I	A O

5	6	7	8
I	E	E	E
T	S	T	C
P A	E H	G I	M A
R	P	R	L

9	10	11	12
B	O	C	S
R	C	B	W
B A	Y O	D A	A E
T I	E T	R E	L E

13.	14	15	16
D	T	E	A
P	K	A	I
L	M	G	G
O E	S U	R I	R O
R A	A R	F F	L L

17	18	19	20
N	O	N	S
P	G	H	M
E	H	F	D
E L	D E	X O	R O
A H	H E	U O	U O
T	G	D	E

21	22
L A A M R I D O L	I C P R O P U E N

Test 2 A

On this page are anagrams or groups of letters which when put in the right order will spell the first name of a boy or girl. Form the words as quickly as you can and write them on the line beneath.

Sample 1.

M
Y
A
R

Mary

Sample 2.

E
N
T
K

Kent

1.
K
A T
E

2
H O N
J

3
A
N A
N

4
A
P U
L

5
R Y
A R
H

6
P
T E E
R

7
E
A M B
L

8
E
I S E
L

9
H
Y N E
R

10.
A
I D D
V

11
A
G C R
E

12
E
E T L
H

13
D
O
R A L
H

14
G
O E R
G
E

15
I
S A E
B
L

16
H
P
J E S
O

17
T
I E
A R R
H

18
P I
H L
L I
P

19
N
K E E
N
T
H

20
M
L D I
R D
E

21
D
O T R
O
H Y

22
L I
A
N
I L
L

23
M
A R A
G R
E T

24
L
A
S R H
A
M

25
H
R C A
E S L

Test 2 B

On this page are anagrams or groups of letters which when put in the proper order will spell the names of objects that you will find in a school room. Look at the letters and form the words as quickly as you can.

Example 1.

P
A . I
N
T S

paints

Example 2.

R
S U H
B

brush

1
S
E K
D

2
B
O O
K

3
N
P E
S

4
E
S
A
T

5
C
A I R
H

6
A
P P E
R

7
C
H L A
K

8
C
O K C
L

9
P
U P L
I

10
R
A T
C H

11
F
L R
O O

12
U
E R R
L

13
K
A B S
E
T

14
C Y
A R
O N

15
E
S A R
R
E

16
L N
L C
P E

17
W
I D
N O
W

18.
B
T L E
A
T

19
P
C R T
I U
E

20
E E R
C A H
T

21
U C
T R
I A
N

22
C E
L I
I G
N

23
R
T E
L O T
B

24
P
O
N I T
E R

25
R
A D I
A T
O R

(6 A)

Name _____ School _____ Grade _____ Age _____

On this page are a number of anagrams or groups of letters, which, if put in the proper order will spell the name of some important city of the world. Look at the letters and as soon as you have formed the name of some city write it on the line beneath. Work as rapidly as possible.

1	2	3	4	5
P	L	O	G	T
I A S	D E S H M A		N H T	I O O
R	E	A	E	K
_____	_____	_____	_____	_____
6	7	8	9	10
E	T	O	R	R
O G D	B U T	G E N	H A V	C A I
N	E	A	E	O
_____	_____	_____	_____	_____
11	12	13	14	15
B O	B E	L O	V E	M A
S T	R L	N D	N I	N I
O N	I N	O N	C E	L A
_____	_____	_____	_____	_____
16	17	18	19	20
H V N	D B I	P A U	A R N	P K N
A A A	U L N	R G E	L A Y	E I G
_____	_____	_____	_____	_____
21	22	23	24	25
T	B	S	N	G
O O	E T	E E	A G	L W
R T	L S	A L	M R	A O
O N	F A	T T	B U	S C
_____	_____	_____	_____	_____

(6 B)

Name _____ School _____ Grade _____ Age _____

On this page are a number of anagrams or groups of letters, which, if put in the proper order will spell the name of some important country of the world. Look at the letters and as soon as you have formed the name of some country write it on the line beneath. Work as rapidly as possible.

1	2	3	4	5
C H	J A	I T	E G	S P
I	P	A	Y	A
N A	A N	L Y	P T	I N
_____	_____	_____	_____	_____
6	7	8	9	10
L E	I A	E S	E A	I S
H I	N D	A L	O R	U N
C	I	W	K	T
_____	_____	_____	_____	_____
11	12	13	14	15
E R	R A	E X	W E	E R
P	B	M	S	S
S I	Z I	I C	D E	B I
A	L	O	N	A
_____	_____	_____	_____	_____
16	17	18	19	20
E Y	I A	C E	A Y	N D
U R K	U S S	R A N	O R W	O L A
T	R	P	N	P
_____	_____	_____	_____	_____
21	22	23	24	25
U A	E G	E B	O H	M A
T S	M R	G L	L L	R E
I R	N A	U I	N A	C I
A	Y	M	D	A
_____	_____	_____	_____	_____

Name _____ _____ School_____Grade_____Age_____

Test 3 A.

Look at the words in group 1. Find the way in which they are alike, write your answer on the lines as in the samples, then go at once to group 2 and so on. If you cannot find the common element in about ten seconds, go to the next one. Work as rapidly as possible.

trees
flowers plural nouns
boys
men

on
above prepositions
for
with

(1) ELM
BIRCH_____
FIR _____
MAPLE

(2) LINCOLN
WASHINGTON _____
TAFT _____
WILSON

(3) CANDLE
LAMP _____
GAS-JET _____
TORCH

(4) ROBIN
BLACKBIRD _____
BLUEJAY _____
STORK

(5) SHOE
RUBBER _____
SLIPPER _____
BOOT

(6) HORSE
COW _____
MOUSE _____
DOG

(7) BREAD
CAKE _____
MEAT _____
SUGAR

(8) ROSE
ASTER _____
DAFFODIL _____
TULIP

(9) OATS
BARLEY _____
WHEAT _____
RYE

(10) WALK
RIDE _____
SWIM _____
RUN

Test 3 A

(11) GEOGRAPHY
READING _____
ARITHMETIC _____
SPELLING

(12) FIVE
SIXTEEN _____
THIRTY _____
SEVEN

(13) GUN
CANNON _____
RIFLE _____
PISTOL

(14) JANE
MARY _____
JANET _____
ESTHER

(15) BALL
BAT _____
MITT _____
MASK

(16) EXPECT
EXAMINATION _____
EXCUSE _____
EXTENSION

(17) PEN
DESK _____
PENCIL _____
TABLET

(18) OPENED
RULED _____
MOVED _____
WALKED

(19) ME
MEAT _____
MANY _____
MINNESOTA

(20) FALL
DOLL _____
WELL _____
TILL

(21) TO
ME _____
IN _____
SO

(22) RIDER
TINT _____
TRUST _____
DREAD

(23) RIDER
POP _____
TEST _____
HASH

(24) DRIVE
TRIBE _____
RANK _____
TREE

(25) EAT
TAT _____
SHE _____
ICE

Test 3 B

Name _____ School _____ Grade _____ Age _____

(1) MISSISSIPPI
ST. LAWRENCE _____
AMAZON _____
NILE

(2) CROQUET
BASEBALL _____
TENNIS _____
TAG

(3) BICYCLE
MOTORCYCLE _____
STEAMSHIP _____
AUTOMOBILE

(4) PIANO
VIOLIN _____
DRUM _____
HORN

(5) MINUTE
SECOND _____
HOUR _____
DAY

(6) HAT
COAT _____
SHOES _____
GLOVES

(7) WALNUT
ALMOND _____
PEANUT _____
PECAN

(8) BARK
BRANCHES _____
LEAVES _____
ROOTS

(9) RED
YELLOW _____
BLUE _____
GREEN

(10) SILK
WOOL _____
COTTON _____
LINEN

(11) RAKE
HOE _____
SHOVEL _____
SPADE

(12) COAL
WOOD _____
GAS _____
KEROSENE

Test 3 B.

(13) ENGINE
CAR _____
TRACK _____
WHISTLE

(14) KETTLE
PAN _____
SPOON _____
DISH

(15) WOOD
BRICK _____
STONE _____
PLASTER

(16) HEN
HAND _____
HORN _____
HAPPY

(17) TABLE
TUB _____
TRAMP _____
TEASE

(18) BANK
BIG _____
BITE _____
BREAK

(19) THE
THEY _____
THIS _____
THREAT

(20) DEED
DEER _____
GEESE _____
HEEL

(21) PUSH
DRAW _____
RUN _____
JUMP

(22) NOON
PRETTY _____
MERRY _____
PENNY

(23) FOUR
MEAT _____
HAND _____
THEY

(24) GREEN
HOLLOW _____
RUBBER _____
CHERRY

(25) BRAVE
KNIFE _____
CHAIR _____
CHART

Name_____ Number Completion Test Grade_____ 4B

School_____ (5 A)

In the lines below each number is gotten in a certain way from the numbers coming before it. Study out what this way is in each line, and then write in the space left for it the number that should come next. The first two lines are already filled in as they should be.

Samples	(10	12	14	16	18	20
	(10	11	13	14	16	17
1.	5	10	15	20	25	_____
2.	21	24	27	30	33	_____
3.	10	9	8	7	6	_____
4.	6	12	18	24	30	_____
5.	27	29	31	33	35	_____
6.	20	19	18	17	16	_____
7.	43	46	49	52	55	_____
8.	32	30	28	26	24	_____
9.	6	16	26	36	46	_____
10.	9	18	27	36	45	_____
11.	43	40	37	34	31	_____
12.	27	25	23	21	19	_____
13.	7	8	8	9	9	_____
14.	50	52	55	57	60	_____
15.	5	6	8	11	15	_____
16.	7	8	18	19	29	_____
17.	20	21	24	25	28	_____
18.	31	33	34	36	37	_____
19.	5	6	8	11	15	_____
20.	5	7	12	14	19	_____
21.	2	6	8	12	14	_____
22.	11	14	15	18	19	_____
23.	30	25	22	17	14	_____
24.	10	14	19	23	28	_____
25.	30	33	39	48	60	_____

Test 5 B

1.	18	15	12	9	6	_____
2.	42	52	62	72	82	_____
3.	30	35	40	45	50	_____
4.	40	35	30	25	20	_____
5.	62	61	60	59	58	_____
6.	47	48	49	50	51	_____
7.	5	9	13	17	21	_____
8.	22	19	16	13	10	_____
9.	11	13	15	17	19	_____
10.	51	49	47	45	43	_____
11.	9	15	21	27	33	_____
12.	14	15	15	16	16	_____
13.	42	43	46	47	50	_____
14.	50	52	53	55	56	_____
15.	3	12	21	30	39	_____
16.	22	25	26	29	30	_____
17.	8	10	15	17	22	_____
18.	4	6	10	12	16	_____
19.	10	11	13	16	20	_____
20.	12	14	17	19	22	_____
21.	9	10	12	15	19	_____
22.	25	26	36	37	49	_____
23.	27	22	19	14	11	_____
24.	32	36	41	45	60	_____
25.	3	6	12	21	33	_____

ANALOGIES TEST

READ THE DIRECTIONS AND DO JUST WHAT THEY TELL YOU TO DO.

In each of the lines below, one pair of words has a certain relation. Notice that relation and then draw a line under the one of the four words in the parenthesis which has that particular relation with the other word not in the parenthesis. Begin with No. 1 and mark as many sets as you can before time is called. Do not waste any time.

SAMPLES
(SKY : BLUE :: GRASS : (grow, green, cut, dead)
(FISH : SWIM :: (man, boat, flower, tree) : WALK
((hour, week, long, day) : NIGHT :: WHITE : BLACK
(TOE : (knee, foot, arm, nail) :: FINGER : HAND

1. FIRST : LAST :: BEGINNING : (commence, end, one, first) 1.
2. GOOD : BAD :: (high, long, boy, thin) : SHORT 2.
3. BOOT : (strap, heel, leather, foot) :: GLOVE : HAND 3.
4. SEEING : (things, mouth, eyes, far) :: HEARING : EARS 4.
5. SKIRTS : GIRLS ::.TROUSERS : (pants, boys, shoes, long) 5.
6. FLYING : BIRDS :: SWIMMING : (water, fish, sport, balloons) 6.
7. PRINCE : PRINCESS :: (king, president, country, man) : QUEEN 7.
8. SAILOR : NAVY :: (war, officer, land, soldier) : ARMY 8.
9. (arm, foot, toe, finger) : LEG :: HAND : ARM 9.
10. BOY : GIRL :: (dress, hat, he, little) : SHE 10.
11. (Japanese, Tokio, island, Asia) : JAPAN :: CHINESE : CHINA 11.
12. SMALL : (little, child, large, short) :: BOY : MAN 12.
13. (snow, cold, ice, skating) : WINTER :: BATHING : SUMMER 13.
14. BREAD : (loaf, white, flour, cut) :: CANDY : SUGAR 14.
15. MOON : SUN :: (shine, heat, night, man) : DAY 15.
16. TABLE : WOOD :: WINDOW-PANE ::(house, glass, room, iron) 16.
17. (John, James, boy, girl) : JIMMIE :: WILLIAM : WILLIE 17.
18. TEARS : SORROW :: (weep, fun, cry, laughter) : JOY 18.
19. (eat, food, tea, taste) : HUNGER :: WATER : THIRST 19.
20. AX : (handle, sharp, cut, wood) :: SCISSORS : CLOTH 20.

21. MOWING : HAY :: REAPING : (grain, horse, machine, cut) 21.

22. (trunk, circus, large, ride) : ELEPHANT :: HAND : MAN 22.

23. MOON : (light, night, star, earth) :: EARTH : SUN 23.

24. D : (alphabet, letter, F? C) :: I : K 24.

25. (liquid, hard, iron, boat) : SOLID :: WATER : ICE 25.

26. BANISH : SPANISH :: DANGLE : (German, Spangle, Spain, language) 26.

27. FLOAT : SINK :: CORK : (float, light, heavy, lead) 27.

28. GULF : OCEAN :: (cape, bay, land, lake) : CONTINENT 28.

29. BALLOONS : (float, air, explode, large) :: CORKS : WATER 29.

30. (midnight, day, dinner, sun) : NOON :: NIGHT : DAY 30.

31. BICYCLE : TRICYCLE :: TWO WHEELS : (wagon, motorcycle, three wheels, cart) 31.

32. SIX : NINE :: (eight, dozen, ten, fifteen) : TWELVE 32.

33. RIVERS : (boats, lakes, ocean, Amazon) :: FRESH WATER : SALT WATER 33.

34. (light, burn, electric, oil) : LAMP :: TALLOW : CANDLE 34.

35. INFANTRY : CAVALRY :: WALKING : (running, horses, army, riding) 35.

36. TODAY : TOMORROW :: (day-before-yesterday, tonight, yesterday, sun) : TODAY 36.

37. FOREMAN : (boss, employer, workman, work) :: CAPTAIN : PRIVATE 37.

38. KING : EMPEROR :: KINGDOM : (province, country, ruler, empire) 38.

39. YARD STICK : SPACE :: (minutes, hour, clock, measure) : TIME 39.

40. (plenty, abundant, wealth, money) : ABUNDANCE :: WISE : WISDOM 40.

Write your name here_____

Date of your birth. Month_____Day_____Yr._____Age____Yrs__Mo.

Year in Elementary School (underscore) 5th, 6th, 7th, 8th

Year in high school (underscore) 1st 2nd 3rd 4th

Time_____minutes_____seconds. Score_____Rank_____

In each of the lines below, the first words have a certain relation. Notice this relation and draw a line under the one word in the parenthesis which has that particular relation to the third word. Begin with number one and mark as many sets as you can before time is called.

Examples:
sky : blue :: grass : (short, green, brown)
skirt : woman :: trousers : (suit, hat, boy)
spoon : soup :: fork : (plate, dinner, meat)

1. hat : head :: glove : (hand, kid, colored, foot)
2. eat : food :: drink : (thirsty, water, swallow, satisfied)
3. skate : winter :: tennis : (courts, summer, exercise, ball)
4. walk : land ::swim : (ducks, men, fine, water)
5. pan : tin :: table : (round, polish, wood, iron)
6. hour : minute :: minute : (hour, watch, day, second)
7. ship : captain :: army : (general, captain, obey, private)
8. trust : friend :: fear : (cold, punishment, enemy, dogs)
9. moon : night :: sun : (warmth, day, clear, shine)
10. hand : man :: fins : (fish, turtle, crocodile, wings)
11. blond : brunette :: light : (yellow, brown, colored, dark)
12. whole : part :: body : (man, arm, warmth, feeling)
13. swim : water :: fly : (wings, bird, air, aeroplane)
14. bird : sings :: dog : (drinks, barks, walks, eats)
15. kid : glove :: leather : (table, wood, foot, shoe)
16. nest : birds :: home : (house, comfort, children, bird-house)
17. mutton : sheep :: veal : (calf, lamb, pig, cow)
18. poem : poet :: play : (singer, playwright, actor, reader)
19. chauffeur : automobile :: aviator : (air, aeroplane, submarine, flies)
20. holly : Christmas :: lily :(white, Thanksgiving, flower, Easter)
21. he : him :: she : (her, it, hers, woman)
22. England : London :: France :(Marseilles, Madrid, Paris, city)
23. Macbeth : Shakespeare :: Ivanhoe :(Scott, novel, Emerson, Lowell)
24. tears : sorrow :: laughter : (comedy, joy, woe, sadness)
25. oyster: shell :: banana : (food, fruit, yellow, peel)
26. house : people :: barn : (animals, hay, wagon, book)
27. greed : miser :: generosity :(capitalist, philanthropist, financier, employer)
28. citizen : savage :: christian :(protestant, catholic, heathen, minister)
29. Marconi : wireless :: Bell :(phonograph, telephone, steam engine, automobile)
30. teeth : chewing :: tongue :(tasting, coated, red, sweet)
31. apples : trees :: peanuts :(bushes, trees, shrubs, vines)
32. pearls : oysters :: diamonds :(sea, rivers, mines, factory)
33. candy : sugar :: bread :(water, hunger, flour, baking)
34. lead : pencil :: ink : (writing, corking, paper, pen)
35. Cluny : lace :: Marquisette : (net, cotton, silk, satin)
36. cub : bear :: baby :(childhood, woman, dog, child)
37. silk : satin :: wool : (muslin, goods, serge, dresses)
38. spruce : tree :: anemone :(shrub, plant, tree, flower)
39. tea : China :: spice :(France, India, cloves, Japan)
40. prunes : plums :: raisins : (figs, grapes, oranges, seeds)

Oral Analogies-Set C

Light: day:: dark: _____

Birds: fly:: fish: _____

Chalk: white:: carbon: _____

Sun:shines:: wind: _____

Summer: hot:: winter: _____

Cats: scratch:: bees; _____

Emerald: green:: ruby: _____

Water: drink:: air: _____

Father: son:: mother _____

Hat: head:: shoe: _____

Chair: wood:: stove: _____

Fast: fastest:: great: _____

Cup: saucer:: knife: _____

Man: husband:: woman: _____

Write: stories:: draw: _____

Lamp: oil:: stove: _____

Daily: newspaper:: monthly: _____

Hair: black:: eyes: _____

Food: eat:: books: _____

Clothes: tear:: dishes: _____

Air: birds:: water: _____

Barn: hay:: library: _____

Month: week:: day: _____

Far: near:: there: _____

July: month:: Friday: _____

Oral Analogies-Set C, continued.

Opaque: wood:: transparent: _____

Thermometer: temperature:: clock: _____

Potato: vegetable:: veal: _____

Light: dark:: dry: _____

Sight: blind:: hearing: _____

City: mayor:: state: _____

Slipper: shoe:: cap: _____

Present: known:: future: _____

Work: problems:: play: _____

Water: glass:: coffee: _____

Factory: workman:: store: _____

Fat: heavy:: thin: _____

Bread: flour:: candy: _____

Live: die:: life: _____

After: before:: earlier: _____

Sparrow: bird:: mosquito: _____

Picture: frame:: field: _____

Happy: laugh:: sad: _____

Ounce: pound:: inch: _____

Mail: write:: telephone: _____

Complex: difficult:: simple: _____

Linen: cool:: wool: _____

Victory: defeat:: success: _____

Cheap: many:: costly: _____

pencil: write:: broom: _____

Oral Analogies-Set D

Work: day:: sleep: _____

Vinegar: sour:: sugar: _____

Rain: summer:: snow: _____

Year: month::week: _____

Iron: heavy:: aluminum: _____

Rose: bush:: oak: _____

Country: road:: city: _____

Eat: food:: wear: _____

Horn: blow:: bell: _____

High: low:: near: _____

Water: liquid:: ice: _____

Stove: heat:: lamp: _____

Snow: sleds:: ice: _____

Rugs: floor:: pictures: _____

Boston: city:: Kentucky: _____

Silver: tarnish:: iron: _____

Hard: soft:: rough: _____

Triangle: three:: square: _____

Delicious: taste:: fragrant: _____

Number: figures:: word: _____

See: colors:: hear: _____

Box: wood:: bottle: _____

Fruit: basket:: water: _____

Front: back:: top: _____

Foot: ankle:: hand: _____

Oral Analogies, Set D continued.

Raise: lower:: open: _____

Much: more:: good: _____

Foot: leg:: hand: _____

Sugar: bowl:: milk: _____

Navy: sailors:: army: _____

River: Hudson:: mountain: _____

Coal: black:: gold: _____

Hair: goat:: wool: _____

Grain: wheat:: fruit: _____

Leg: knee:: arm: _____

Park: play:: school: _____

Baker: bread:: bees: _____

Wall: paper:: floor: _____

People: house:: birds: _____

Sit: sat:: fly: _____

Bright: colors:: loud: _____

Park: gate:: house: _____

Man: legs:: carriage: _____

Lilac: shrub:: fern: _____

Violet: odor:: red: _____

Under: over:: down: _____

Kettle: utensil:: chair: _____

Fire: warms:: ice: _____

Fork: tine:: knife: _____

April: March:: Tuesday: _____

Name _____ Class _____ Age _____ yrs. mo.

1. _____	31. _____
2. _____	32. _____
3. _____	33. _____
4. _____	34. _____
5. _____	35. _____
6. _____	36. _____
7. _____	37. _____
8. _____	38. _____
9. _____	39. _____
10. _____	40. _____
11. _____	41. _____
12. _____	42. _____
13. _____	43. _____
14. _____	44. _____
15. _____	45. _____
16. _____	46. _____
17. _____	47. _____
18. _____	48. _____
19. _____	49. _____
20. _____	50. _____
21. _____	51. _____
22. _____	52. _____
23. _____	53. _____
24. _____	54. _____
25. _____	55. _____
26. _____	56. _____
27. _____	57. _____
28. _____	58. _____
29. _____	59. _____
30. _____	60. _____

2-17 5m

Write only one word on each blank
Time Limit: Seven Minutes

NAME_____

TRABUE
LANGUAGE SCALE B

1. We like good boys _____ girls.

6. The _____ is barking at the cat.

8. The stars and the _____ will shine tonight.

22. Time _____ often more valuable _____ money.

23. The poor baby _____ as if it were _____ sick.

31. She _____ if she will.

35. Brothers and sisters _____ always _____ to help _____ other and should _____ quarrel.

38. _____ weather usually _____ a good effect _____ one's spirits.

48. It is very annoying to _____ _____ tooth-ache, _____ often comes at the most _____ time imaginable.

54. To _____ friends is always _____ the _____ it takes.

Write only one word on each blank
Time Limit: Seven Minutes

NAME _____ _____

TRABUE
LANGUAGE SCALE C

2. The sky _____ blue.

5. Men _____ older than boys.

12. Good boys _____ kind _____ their sisters.

19. The girl fell and _____ her head.

24. The _____ rises _____ the morning and _____ at night.

30. The boy who _____ hard _____ do well.

37. Men _____ more _____ to do heavy work _____ women.

44. The sun is so _____ that one can not _____ _____ _____ directly _____ causing great discomfort to the eyes.

53. The knowledge of _____ _____ use fire is _____ of _____ important things known by _____ but unknown _____ animals.

56. One ought to _____ great care to _____ the right _____ of _____ , for one who _____ bad habits _____ it _____ to get away from them.

THORNDIKE READING SCALE B. WORD KNOWLEDGE OR VISUAL VOCABULARY

(x series)

City _____ County _____ School _____ Date _____

Name _____ When is your next birthday? _____

How old will you be? _____ Are you a boy or a girl? _____

In what grade are you? _____ Teacher's name _____

Write the letter W under every word that means something about *war* or *fighting*.
Write the letter B under every word that means something about *business* or *money*.
Write the letters CHU under every word that means something about *church* or *religion*.
Write the letter R under every word like *father* or *wife* that means something about *relatives* or the *family*.
Write the letters COL under every word that means a *color*.
Write the letter T under every word like *now* or *then* that means something to do with *time*.
Write the letter D under every word like *here* or *north* that means something about *distance* or *direction* or *location*.
Write the letter N under every word like *ten* or *much* that means something about *number* or *quantity*.

4x. camp, flag, west, mother, two, general, green, troops, south, fort

4½x. gray, cousin, pink, uncle, yellow, hour, pay, aunt, early, commander

5x. marriage, defeat, many, afternoon, guard, buy, captive, military, relation, late

6x. hymn, defend, across, merchant, noon, forty, conquer, dagger, profit, tuesday

6½x. month, dozen, fortress, cavalry, tax, bishop, below, october, million, owe

7x. fortification, ownership, there, year, june, half, scarlet, soon, november, beneath

7½x. during, forward, edge, recruit, orphan, some, rampart, instant, lilac, several

8x. overhanging, cardinal, future, plural, where, numeral, immediate, each, exterior, plurality

8½x. odd, recent, installment, protestantism, seldom, canteen, emerald, parallel, century, opposite

9x. bounding, previous, strategy, from, encircling, middle, tawny, formerly, thereabouts, perpendicular

9½x. adjutant, buckler, margin, kinship, creed, monachism, negotiable, every, monasticism, gradual

10x. fawn, rarely, finance, insolvent, minority, eternal, turquoise, rebate, transverse, quadruple

THE THORNDIKE SCALES
PUBLISHED BY TEACHERS COLLEGE
NEW YORK CITY

Spelling Test - A

Sixty words selected from Columns S, T, U, V and W of Ayres Spelling Scale.

1. stopped
2. theater
3. century
4. mention
5. simply
6. difference
7. particular
8. local
9. further
10. doubt

11. government
12. believe
13. possible
14. certain
15. investigate
16. too (meaning too much)
17. circular
18. volume
19. summon
20. victim

21. accident
22. accept
23. concern
24. automobile
25. decide
26. political
27. recent
28. refer
29. ought
30. conference

31. really
32. folks
33. earliest
34. distinguish
35. colonies
36. relief
37. probably
38. expense
39. beginning
40. difficulty

41. finally
42. circumstance
43. material
44. mere
45. receive
46. agreement
47. majority
48. citizen
49. divide
50. testimony

51. arrangement
52. evidence
53. session
54. association
55. height
56. emergency
57. sincerely
58. extreme
59. proceed
60. character

Spelling Test - B

Sixty words selected from Columns S, T, U, V and W of Ayres Spelling Scale.

1. often
2. motion
3. improvement
4. total
5. arrive
6. assist
7. examination
8. affair
9. neither
10. marriage

11. serious
12. condition
13. opinion
14. system
15. piece
16. witness
17. therefore
18. pleasant
19. guess
20. argument

21. organize
22. official
23. estimate
24. invitation
25. impossible
26. associate
27. various
28. entitle
29. national
30. business

31. minute
32. absence
33. Wednesday
34. celebration
35. meant
36. consideration
37. assure
38. occupy
39. foreign
40. responsible

41. application
42. scene
43. develop
44. issue
45. suggest
46. senate
47. respectfully
48. unfortunate
49. elaborate
50. necessary

51. discussion
52. reference
53. experience
54. secretary
55. career
56. organization
57. appreciate
58. athletics
59. practical
60. separate

Name _____ Class _____ Age _____ yrs. mo.

1. _____	31. _____
2. _____	32. _____
3. _____	33. _____
4. _____	34. _____
5. _____	35. _____
6. _____	36. _____
7. _____	37. _____
8. _____	38. _____
9. _____	39. _____
10. _____	40. _____
11. _____	41. _____
12. _____	42. _____
13. _____	43. _____
14. _____	44. _____
15. _____	45. _____
16. _____	46. _____
17. _____	47. _____
18. _____	48. _____
19. _____	49. _____
20. _____	50. _____
21. _____	51. _____
22. _____	52. _____
23. _____	53. _____
24. _____	54. _____
25. _____	55. _____
26. _____	56. _____
27. _____	57. _____
28. _____	58. _____
29. _____	59. _____
30. _____	60. _____

Thorndike Reading Scale B. Word Knowledge or Visual Vocabulary

(y series)

City _____ County _____ School _____ Date _____

Name _____ When is your next birthday? _____

How old will you be? _____ Are you a boy or a girl? _____

In what grade are you? _____ Teacher's name _____

Write the letter W under every word that means something about *war* or *fighting*.
Write the letter B under every word that means something about *business* or *money*.
Write the letters CHU under every word that means something about *church* or *religion*.
Write the letter R under every word like *father* or *wife* that means something about *relatives* or the *family*.
Write the letters COL under every word that means a *color*.
Write the letter T under every word like *now* or *then* that means something to do with *time*.
Write the letter D under every word like *here* or *north* that means something about *distance* or *direction* or *location*.
Write the letter N under every word like *ten* or *much* that means something about *number* or *quantity*.

4y. priest, fight, money, gun, father, captain, blue, soldier, pray, cannon

5½y. niece, evening, here, purple, morning, monday, nephew, catholic, sell, minute

6y. altar, violet, december, nine, colonel, worship, baptism, wednesday, tan, april

6½y. forenoon, battery, blockade, ammunition, lieutenant, january, insurance, last, purchase, february

7y. inside, august, while, more, toward, right, couple, infantry, cartridge, guarantee

7y. run, income, meantime, entrenchment, back, interest, lease, monk, psalm, count

7½y. pair, firm, corporal, crimson, double, olive, outward, invader, brigade, sentinel

7½y. convent, ruby, left, singular, catechism, outside, centre, score, mortgage, crowd

8y. out-flank, lasting, freight, chestnut, adoption, even, forgery, russet, patent, descendant

8½y. narrow, majority, horizontal, elevated, chaplain, hazel, plum, diocese, henceforth, abbott

9y. frequent, either, quartet, lavender, duplicate, manoeuver, multitudinous, vertical, neighboring, bulwark

10y. diagonal, surmounting, friar, azure, forthwith, carmine, incessant, peculation, contemporary, frontal

Key—	N	U	C	R	L	G	K	E
	7	5	9	2	6	3	8	4

1.	L	U	K	R	E	C	G	N	R	C	L	G	E	U	K	N	L	R	N	C
2.	K	E	U	G	N	R	C	L	K	G	U	E	K	R	U	L	E	C	G	N
3.	N	G	L	K	C	E	R	U	N	L	R	G	U	K	E	C	U	G	R	L
4.	C	E	N	R	K	U	G	L	K	E	N	C	L	E	C	G	N	U	K	R
5.	L	C	K	G	N	R	U	E	R	K	U	E	N	C	G	L	R	E	G	K
6.	N	U	C	K	U	G	L	C	N	L	E	R	L	G	U	K	N	C	R	E
7.	G	E	U	L	R	K	N	E	C	K	R	G	U	C	L	R	K	L	L	C
8.	U	G	E	N	C	E	R	L	U	G	K	N	R	L	U	N	K	C	G	E
9.	R	U	N	L	E	K	G	C	E	R	L	C	N	U	K	G	U	E	N	G
10.	L	K	C	R	L	N	E	G	R	C	K	U	E	C	U	L	N	R	G	K
11.	N	C	G	K	E	U	R	L	G	E	U	R	C	K	L	N	C	K	L	U
12.	R	N	E	G	U	K	E	C	R	G	N	L	G	E	C	L	U	R	N	K
13.	E	K	R	U	C	N	L	G	K	U	L	R	C	N	E	G	C	N	U	G
14.	K	R	L	E	G	R	K	L	C	N	U	E	K	L	U	N	E	R	G	C
15.	E	K	C	L	R	N	G	C	U	E	N	L	U	R	K	G	C	K	R	E
16.	N	L	U	G	N	R	E	L	G	K	U	C	R	G	N	U	K	E	L	C
17.	L	K	N	C	R	G	U	E	K	C	N	U	G	E	L	R	L	C	R	K
18.	G	N	U	R	E	U	N	L	C	K	E	G	K	U	C	L	R	G	N	E
19.	N	C	E	K	U	R	G	R	L	N	C	L	U	E	K	G	L	E	C	K
20.	U	G	R	N	C	G	K	U	R	L	E	N	G	L	C	K	R	N	U	E

LEARNING TEST B-1

Name..... School..... Class..... Age..... Yr. ..... Mo.

Key—	M	X	O	J	T	B	F	I
	4	6	8	2	7	5	9	3

1.	B	I	J	F	M	T	X	O	J	F	O	X	B	T	I	M	O	T	B	F
2.	M	X	F	I	X	J	B	M	T	J	I	O	T	F	J	B	X	O	M	I
3.	J	B	O	X	F	M	T	I	X	M	B	I	F	M	O	T	B	I	J	O
4.	I	X	F	J	T	I	X	F	B	T	J	O	M	X	J	F	M	B	O	T
5.	B	I	O	X	M	T	J	O	T	F	I	B	F	M	I	X	J	O	F	X
6.	T	J	M	B	F	I	M	B	X	T	O	J	X	F	M	T	B	I	O	J
7.	M	O	T	J	I	F	X	O	B	J	X	F	B	M	I	J	M	B	I	T
8.	F	X	O	T	X	O	J	F	T	B	M	I	F	B	T	I	X	O	J	M
9.	X	I	T	F	B	J	M	O	I	J	O	B	T	M	F	X	J	I	X	F
10.	O	T	B	M	F	O	B	T	J	M	I	X	B	T	M	I	X	F	J	O
11.	I	M	X	T	O	B	J	F	O	I	T	J	M	F	X	B	F	T	O	M
12.	X	I	B	J	T	I	O	B	J	X	F	M	I	O	T	F	B	M	X	J
13.	F	O	J	T	X	M	B	I	X	F	M	O	B	I	J	T	X	O	F	M
14.	T	J	B	I	M	X	F	B	T	O	J	I	M	T	O	B	J	F	I	X
15.	O	I	X	M	T	B	J	O	X	M	B	T	F	J	I	F	M	O	B	T
16.	I	F	J	O	I	M	X	F	J	T	X	B	O	M	T	B	X	J	I	F
17.	X	J	F	I	M	T	B	O	X	M	J	F	I	B	O	J	F	O	X	J
18.	M	T	I	B	J	B	F	M	T	I	X	O	T	F	X	I	O	J	M	B
19.	F	O	M	I	X	T	B	J	X	O	B	F	I	J	B	M	F	T	O	M
20.	X	I	T	J	B	O	M	T	J	I	F	X	O	T	F	I	B	M	X	J

LEARNING TEST C-1

Name..... School..... ..... Class..... Age..... Yr. ..... Mo. .....

Page 1 Time ..... minutes ..... seconds

TEST I-B

READ THE GENERAL DIRECTIONS BEFORE YOU DO ANYTHING ELSE

GENERAL DIRECTIONS

Do what the printed instructions tell you to do.

Do not ask the examiner any questions about this test.

Do not ask any other person who is taking the test any questions or watch any one to see what he or she does.

Work as rapidly as you can without making any mistakes.

If you do make a mistake, correct it neatly.

Do 1 first, then 2, then 3, and so on.

Do not use any paper except this test blank.

Follow the directions in order. Do not go over work a second time.

1. Write your name here at once,

[redacted] and your age here ..... years ..... months

Instructions for 2, 3 and 4.

After each word printed below you are to write some word, according to the further directions. Write plainly, but as quickly as you can. If you cannot think of the right word in about three seconds, go ahead to the next.

2. Write the opposites of the words in this group, as shown in the first two:

good——*bad*	far	hot .....
day——*night*	smooth	asleep .....
long	early	behind .....
soft	alive	black .....

3. Write words that fit the words in this group, in the way shown in the first two:

drink——*water*	climb	sail .....
ask——*questions*	lock	dig .....
smoke	write	eat .....
catch	throw	pick .....

4. Write words that tell what sort of a thing each thing named is, as shown in the first two:

lily——*flower*	mumps	Sanskrit .....
blue——*color*	wheat	trout .....
wasp	water	elm .....
apple	March	Bible .....

Go on to the next page at once.

5. Add 17 to each of these numbers. Write the answers as shown in the first three:

29	*46*	74	38
18	*35*	53	28
60	*77*	67	65
64		25	41
49		10	50
62		61	42
57		71	58
68		33	

6. Get the answers to these problems as quickly as you can:

1. How many apples can be bought for 50 cents at the rate of 2 for 5 cents?
2. Mary gave 2 3 of her apples to her mother and had 8 left. How many had she at first?
3. If you buy 7 apples at 2 cents each and a book for 55 cents, how much change should you receive from a two-dollar bill?
4. James caught 4 times as many fish as John. He caught 16 fish. How many fish did John catch?
5. A lady bought horses for $400. She sold them for $460 gaining $30 per horse. How many horses were there?

7. Write opposites for this group, as shown in the first two. If you cannot think of the right word in about 10 seconds, go ahead to the next:

bravery——*cowardice*	proud	up .....
friend——*enemy*	fertile	gentle .....
superior	separate	foreign .....
joy	always	ancient .....

8. Write in each line a fourth word that fits the third word in that line in the way that the second word fits the first, as shown in the first two lines. If you cannot think of the right word in about 10 seconds, go ahead to the next.

color——red :: name——*John*

page——book : handle——*knife*

chew——teeth :: smell.....

pen——write :: knife.....

water——wet :: fire.....

he——him :: she.....

boat——water :: train.....

crawl——snake :: swim.....

horse——colt :: cow.....

nose——face :: toe.....

bad——worse :: good.....

hungry——food :: thirsty.....

hat——head :: glove.....

ship——captain :: army.....

man——woman :: boy.....

Go on to the next page at once.

9. Do what it says to do as quickly as you can, but be careful to notice just what it does say:

With your pencil put a period before any one of these figures: 6 3 9 7 4 ; and underscore the longest of these words: leaves, boys, box. If Abraham Lincoln was never president of the United States put the first letter of his first name here.....; but if he was give a wrong answer to this question: Does the sun rise in the west?..... Note these two letters—A and a. If lead is more valuable than gold write the small letter here....., but if gold is more valuable than lead write the capital letter here..... Do nothing here.....unless you think blood is green; if you do not think so, write the letter that comes after *n* in the alphabet on this line..... Write any two letters in the next blank even though you are sure that stones are heavier than feathers ..... Write an X here.....and two X's here.....and then write *no* if high and black are opposites..... Give a wrong answer to this question: Does water flow down hill?....., and then draw a line through your answer. Complete this example, 4 plus 2 equals....., and if you have ever jumped over 30 yards write *no* in this blank..... Give a correct answer to this next question: Do cats have feathers?..... If you have given a correct answer to the previous question, write the first letter of your last name on this line..... unless you have more money than you can spend. In any case write the figures which indicate the year of your birth inside the following parenthesis (.....) and complete this sentence: Ice.....cold.

10. Write only one word on each blank:

1. The boy will.....his hand if.....plays with fire.
2. The.....rises.....the morning and.....at night.
3. The poor little.....has.....nothing to.....; he is hungry.
4. Very few people.....how to spend time and.....to the best advantage.
5. One.....not, as a....., ...attention.....uninteresting things.

THE END

11. Record your time at once in the upper right hand corner of page 1.

Do not turn this paper over until the Examiner gives the signal.

TEST I-B

1. Write the name of your school here:.....

2. Write the date here:.....

3. Put a cross in the square after the name of the class to which you belong:

Freshman	First semester	☐
	Second semester	☐
Sophomore	First semester	☐
	Second semester	☐
Junior	First semester	☐
	Second semester	☐
Senior	First semester	☐
	Second semester	☐

When the examiner gives the signal, turn the test over to page 1 and

DO WHAT IT SAYS TO DO.

RECORD BLANK FOR YERKES-BRIDGES POINT-SCALE EXAMINATION

DATE_____

EXAMINED BY_____ AGE_____ MENTAL AGE_____ COEF. I. A._____

NAME_____ DATE OF BIRTH_____ NATIONALITY_____ SCHOOL GRADE_____ TOTAL CREDITS_____

TEST	CREDITS
1. Chooses, twice, prettier of two pictures, (1 each).	
2. Sees picture lacks: (*a*) arms; (*b*) nose; (*c*) mouth; (*d*) eyes. (1 each).	
3. Compares, twice: (*a*) Lines, 5 and 6 cm. (1)	
(*b*) Weights, 3 and 12 grams. (1)	
(*c*) Weights, 6 and 15 grams. (1)	
4. Memory span for digits.	
(*a*) 374. 581. (1)	
(*b*) 2947. 6135. (1)	
(*c*) 35871. 92736. (1)	
(*d*) 491572. 516283. (1)	
(*e*) 2749385. 6195847. (1)	
5. Counts backward: 20—1 (4); 15—1 (3); 10—1 (2); 5—1 (1).	
6. Repeats: (*a*) It rains. I am hungry. (1)	
(*b*) His name is John. It is a very fine day. (1)	
(*c*) The sun is very large and red. Our train was more than two hours late. (2)	
(*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2)	
7. Reaction to three Binet pictures: enumeration, (1 each); description, (2 each); interpretation, (3 each).	
(*a*) Man and boy	
(*b*) Man and woman	
(*c*) Man	
8. Arranges weights: two trials. All correct but one (1); correct (2). Trial 1. Trial 2.	
9. Compares: (2 each)	
(*a*) Apple and banana	
(*b*) Wood and glass	
(*c*) Paper and cloth	
10. Defines in terms of use, (1 each); superior to use, (2 each).	
(*a*) Spoon	
(*b*) Chair	
(*c*) Horse	
(*d*) Baby	

TEST	CREDITS
11. Resists suggestions: (1 for each resistance)	
12. Copies (on back of this sheet) (*a*) square (1 or 2); (*b*) diamond (1 or 2).	
13. Gives words for three minutes: 30—44 (1); 45—59 (2);	
60—74 (3); 75— (4). 1st half minute 2d	
3rd 4th 5th 6th	
14. Writes (on back of this sheet) sentence containing Boston, money, river. Three words in two (2); three words in one (4).	
15. Comprehends questions: (2 each)	
(*a*) Missed train	
(*b*) Someone unkind	
(*c*) Action versus words	
(*d*) Forgive easier	
16. Draws (on back of this sheet) designs from memory, after 15 sec. exposure. (1 or 2 each)	
17. Sees absurdity: (1 each)	
(*a*) Swinging cane	
(*b*) Unfortunate cyclist	
(*c*) Three brothers	
(*d*) Guide-post directions	
(*e*) Last car	
18. Puts dissected sentences together: (2 each)	
(*a*) My teacher	
(*b*) A good dog	
(*c*) We started	
19. Defines: (*a*) Charity (2)	
(*b*) Obedience (2)	
(*c*) Justice (2)	
20. Analogies: (1 each)	
(*a*) Oyster is to shell as banana is to	
(*b*) Arm is to elbow as leg is to	
(*c*) Head is to hat as hand is to	
(*d*) Truth is to falsehood as straight line is to	
(*e*) Known is to unknown as present is to	
(*f*) Storm is to calm as war is to	

C. H. Stoelting Co., Chicago, Ill., U. S. A.

78630

Write your name here.....
Write your age.....years.....months.

SET IV. DIFFICULTY 7

Read this and then write the answers to 1, 2, 3 *and* 4. *Read it again if you need to.*

You need a coal range in winter for kitchen warmth and for continuous hot-water supply, but in summer when you want a cool kitchen and less hot water, a gas range is better. The xyz ovens are safe. In the end-ovens there is an extra set of burners for broiling.

1. What effect has the use of a gas range instead of a coal range upon the temperature of the kitchen?

.....

2. For what purpose is the extra set of burners?....

.....

3. In what part of the stove are they situated?.....

.....

4. During what season of the year is a gas range preferable?.....

Read this and then write the answers to 5, 6 *and* 7. *Read it again if you need to.*

Hay-fever is a very painful, though not a dangerous, disease. It is like a very severe cold in the head, except that it lasts much longer. The nose runs; the eyes are sore; the person sneezes; he feels unable to think or work. Sometimes he has great difficulty in breathing. Hay-fever is not caused by hay, but by the pollen from certain weeds and flowers. Only a small number of people get this disease, perhaps one person in fifty. Most of those who do get it, can avoid it by going to live in certain places during the summer and fall. Almost every one can find some place where he does not suffer from hay-fever.

5. What is the cause of hay-fever?.....

.....

6. How large a percentage of people get hay-fever?..

.....

7. During what seasons of the year would a person have the disease described in the paragraph?.....

.....

SET V. DIFFICULTY 8

Read this and then write the answers. Read it again if you need to.

It may seem at first thought that every boy and girl who goes to school ought to do all the work that the teacher wishes done. But sometimes other duties prevent even the best boy or girl from doing so. If a boy's or girl's father died and he had to work afternoons and evenings to earn money to help his mother, such might be the case. A good girl might let her lessons go undone in order to help her mother by taking care of the baby.

1. What is it that might seem at first thought to be true but really is false?.....

.....

2. What might be the effect of his father's death upon the way a boy spent his time?.....

.....

3. Who is mentioned in the paragraph as the person who desires to have all lessons completely done?

.....

4. In these two lines draw a line under every 5 that comes just after a 2, unless the 2 comes just after a 9. If that is the case, draw a line under the next figure after the 5:

5 3 6 2 5 4 1 7 4 2 5 7 6 5 4 9 2 5 3 8 6 1 2 5
4 7 5 2 3 9 2 5 8 4 7 9 2 5 6 1 2 5 7 4 8 5 6

Read this and then write the answers to 5, 6, 7 *and* 8. *Read it again if you need to.*

In Franklin, attendance upon school is required of every child between the ages of seven and fourteen on every day when school is in session unless the child is so ill as to be unable to go to school, or some person in his house is ill with a contagious disease, or the roads are impassable.

5. What is the general topic of the paragraph?.....

.....

6. How many causes are stated which make absence excusable?.....

7. What kind of illness may permit a boy to stay away from school, even though he is not sick himself?

.....

8. What condition in a pupil would justify his non-attendance?.....

SET VI. DIFFICULTY 8 2/3

Read this and then write the answers to 1, 2, 3 *and* 4. *Read it again if you need to.*

We often think of a rich man as one who has much money, as if money and wealth meant the same thing. However, money is only one sort of wealth and some money is not exactly wealth. A twenty dollar bill, for example, is only someone's promise to pay so much gold. Wealth means land, houses, food, clothes, jewels, tools, gold, silver, coal, iron,—anything that a man can have that satisfies some want. Money means something which a person can exchange for any one of many sorts of wealth. The main value of any piece of wealth, such as a barrel of flour, a house, or a cow is the direct use you can make of it. The value it has by reason of what you can exchange it for is of less importance. The main value of any piece of money, such as a silver dollar, a ten-dollar bill, or a nickel, is *not* any direct use you can make of it. Its main value *is* by reason of what you can exchange it for.

1. In what does the main value of wealth lie, according to the paragraph?.....

.....

2. In what does the main value of money lie, according to the paragraph?.....

.....

3. Name something that is money, but is not exactly wealth.....

4. What do you suppose is the thing which is defined by business men as "a medium of exchange"?..

.....

SET VII. DIFFICULTY 9

Read these paragraphs and then write the answers to questions 1, 2, 3, 4 *and* 5. *Read the paragraphs again if you need to.*

The most serious objection against the government ownership of railways is connected with the question of rates. Every change in rates means a change in the relative advantages of one part of the country as compared with another part of the country.

Under national ownership and management of the railways there would be a continual struggle of section with section for advantageous rates, and unless the rate problem could be worked out in some simple, easily comprehended way which would commend itself to the public at large, this struggle of section with section could scarcely fail to prove disastrous.

Perhaps the greatest single danger in the private ownership of railways is that it tends first to form classes, and then to array class against class. It forms classes in the very nature of the case. First we have the classes in the railway service. About one per cent of those engaged in the service are officers and the rest employees, and the contrasts among these employees in remuneration and in conditions of employment are vast, and, whether they ought to do so or not, do have a tendency to cultivate bitterness and class division.

There is still another way in which the private ownership of railways tends to class formation, and that is through the favoritism shown to individuals in the community, which is largely responsible for the bad features of the trust movement. Everywhere throughout the United States we can find manufacturers and shippers who have been favored, and if there are any favored it is necessarily at the expense of others. We have favored classes, and this tends to promote class formation and to incite one class to hate another.

1. What is stated as the cause that would produce sectionalism?.....

.....

2. Under the present condition of ownership of railways, in what two ways does class formation occur?

.....

.....

3. Which is the supposedly favored class in the railway service?.....

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4. What is stated to have been a main cause of the undesirable results of the replacement of many small manufacturing and selling concerns by a few large ones?

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5. By what means, according to the paragraph, might disaster from sectionalism under public ownership be avoided?

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