

A STUDY OF THE INFLUENCE OF VARIOUS TYPES
OF INCENTIVES UPON LEARNING

by

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INTRODUCTION

In the field of educational psychology there is probably no more important question to be answered than "what are the factors in life which make a person want or be willing to expend effort in order to learn?" A common-sense look at life reveals to even the least philosophical of the human race the part that learning contributes in the development of civilization, or one might go as far as to say, how utterly dependent is the progress of civilization upon man's capacity, willingness and earnest desire to learn. Had our most remote ancestors been incapable or unwilling to "learn from experience" we should either be extinguished from the face of the earth, or if by some miracle we had survived we should still be living in the crude state of savagry.

It is interesting to note in glancing back into the early history of education that even in most primitive times the child learned both from his own experience and from the experience of his parents. His learning was primarily concerned with the necessities of life. A brief glance at the history of mankind shows that with the increasing complexity of life came an increased demand for learning, not merely by experience, but

a deliberate attempt to teach through a created learning situation other than that which an individual would encounter normally in his everyday life. The philosophy of education has varied in keeping with the thinking of the times but its importance to the growth of civilization has gained an increasing recognition.

Concomitant with this steady growth of the importance of education to civilization came the recognition of the need of certain techniques whereby individuals might be incited to exert effort for further learning than that which might be acquired in the ordinary course of life.

The trends in Greek and Roman educational philosophy varied from the welfare of the state as the prime consideration, to the individualistic emphasis wherein the state was disregarded and the happiness and success of the individual were considered paramount. Other than this very little is known of the devices employed by them for stimulating pupils to learning.

Preparation for the second coming of Christ seemed to be the prime motive in early Christian education as over against the "worldly" training of the Greeks and Romans. This was followed by the monastic education of the Middle Ages. The desire of those within

the church for a deeper religious life in contrast to the corruption of the Roman society drove scholars into the monasteries and served as the impetus for their labors.

The church is recognized as the parent of our modern education and up to the time of the Renaissance we find education and learning to be the almost exclusive property of that body. The rewards which came through learning, namely, of being better qualified for the high place one was called upon to fill in the order of the church, the preservation and furtherance of those bits of knowledge which gave further insight into the life and historical background of Jesus, and finally the hope of eternal reward seemed to be sufficient inducement for long hours of tedious mental strain. With the intellectual awakening of the 14th. century, however, the aim of education shifted to the interests of this life and in the centuries following, with the popularization of the education of the masses, the lure of immortal reward ceased to be the effective tool of the teacher, and was supplanted by less edifying techniques, even those as menial as the strap or the dunce's cap.

When one considers the many years in which the trial-by-error method was the sole course employed by educators for detecting and devising techniques whereby

learning might be motivated, one is particularly grateful for the introduction of psychology into the field of education. There still remains much for psychology to contribute before the question of the factors that stimulate and inspire learning is adequately answered for the modern educator, but with the aid of experimental research which is constantly being carried on in both psychology and education our knowledge at this point is being increased daily. It has given us for example some interesting experimental evidence to substantiate the supposition of many who have maintained that most individuals do not accomplish in life that which they have the ability to do, and it may be well to consider briefly at this point the relationship between the accomplishments and abilities of mankind.

RELATION OF A.Q. TO I.Q.

It is rather startling to realize that most of the men and women with whom we work daily are not producing in work, or thought, or in individual contributions to society more than a small portion of that which they have the capacity to produce.

Industry, for example, has discovered that under the influence of external pressure in the nature of an incentive system of wage-paying the output of factory workers can be increased by approximately 30% to 40%.¹

1. W.E. Odom, "Experience with Wage Incentive Yields Many Pointers", Industrial Psychology Monthly, Vol.111 (1928), p.229.

Using the intelligence test as a basis for estimating the mental capacity of a student, we find in the field of intellectual endeavor that there are many pupils whose accomplishment in school falls far short of that for which the intelligence tests would indicate they have the capacity. This would seem to be particularly true of students with the greater ability.

Hornell Hart made a study in which he showed that if children progressed in school at the rate which their ability indicated they were capable of doing, the average age for the completion of the high school work in America would be 15 years and 5 months instead of 17 years and 3 months which facts show it to be.² In other words, the average student in the public schools of America takes one year and 10 months, or 22 months, longer to complete the first 12 years of his education than would be necessary were he able to, or permitted to progress according to the rate at which intelligence tests would indicate he had the capacity to progress.

Rector³ found a correlation of .28 between intelligence test scores and the combined grades for all subjects of 431 tenth grade children.

2. Hornell Hart, "School Progress and Mental Test Ability", School and Society, Vol. 11 (1925), p. 181.

3. W.G. Rector, "A Study in the Prediction of High School Success", Journal of Educational Psychol. Vol. XVI (1925), pp. 28-38.

McCrorry,⁴ in working with students of university age, found a correlation of .465 between the scores made on the Otis Self-Administering Tests and high school grades, and a correlation of .457 between the Otis Tests and university grades.

Rosenow⁵ found a correlation of .44 between the intelligence test scores and the scholarship records of 883 University of Kansas freshmen while May⁶ found a correlation of .60 between the intelligence and grades of 450 Syracuse University freshmen.

Line and Glen⁷ found the following relationships between intelligence and achievement in the public school, using the scores on the National Intelligence Test and the school marks as a basis for correlation:

| Grade | No. of Classes | No. of Pupils | r |
|------------|----------------|---------------|-----|
| Senior 1V | 3 | 124 | .47 |
| Junior 1V | 3 | 91 | .15 |
| Senior 111 | 3 | 119 | .39 |
| Junior 111 | 4 | 129 | .46 |

4. J.A. McCrorry, Education, Admin. and Supervision, Vol. XII (1926), p. 481.

5. C. Rosenow, "Predicting Academic Achievement", Ped. Sem., Vol. XXXI (1925), p.628.

6. M.A. May, "Predicting Academic Success", Journal of Educational Psychology, Vol. XIV (1923), pp. 429-440.

7. W. Line and J.S. Glen, "Some Relationships Between Intelligence and Achievement in the Public School", Journal of Educational Research, Vol. XXVII (1934-35) p.582.

Knight and Remmer⁸ in an effort to determine the cause of the gap between the possible and actual production of college students presented a questionnaire to a large group of students in the third year of their university course. All of them were taking some cultural courses in the Arts College. On this questionnaire the student was asked to "rate" himself by indicating the percentage of time he thought he worked (a) with no attention or a low degree of attention, (b) with passive attention, and (c) with very intense or rapt attention. The results showed that the students credited themselves with working at (c), high, effective attention about 15%-20% of the time; at (b), less attention, about 55%-60% of the time; and at (a), little or no attention, about 15%-20% of the time. The authors attribute this situation to three various causes, namely, the irrelevancy of the subject matter to the purposes of the student, the successful competition of many extra-curricular activities, and the inadequate manipulation of the laws of learning by the teacher and pupil. Finally in summary, they have this to say: "The drift toward effective attention habits is significantly paralleled by a drift in the curricula toward vocational content. This means in the opinion of the writers, nothing more or less

8. F.B. Knight and H.H. Remmers, "Fluctuations in Mental Production when Motivation is the Main Variable", Journal of Applied Psychol., Vol.VII (1923), p. 209.

than conscious motivation causes large fluctuations in mental production."

Although there is no quantitative measure to determine to what extent the A.Q. (or Accomplishment Quotient) can be made equivalent to the I.Q. (or Intelligence Quotient), the fact remains that if some means of unleashing this store-up capacity and of inciting it into productive activity were found the self-realization which comes of increased learning would be greatly magnified. Regardless of whether it be in the field of industry, skill, academic pursuit, or moral behaviour we have all experienced moments of high achievement which indicate latent capacities which are but occasionally drawn into activity. It is psychology's purpose and business to help shed some light on how man can be aided in being so stimulated that a larger portion though perhaps not complete utilization of his capacities might be experienced.

ATTENTION, INTENTION, AND ATTITUDE

Perhaps the primary factor in these discrepancies between ability and achievement as pointed out above might be said to be attention. By attention is meant, as Stout has defined it "the direction of thought to this or that special object in preference to others"⁹ or for the more Gestalt-minded Koffka's definition in which he substitutes Ego for thought and would define it

9. G.F. Stout, Analytic Psychology, Vol. 1 (1909), p.203.

as the direction of the Ego to this or that special object in preference to others.¹⁰

In any case, unless a thing is "attended to" either spontaneously or by conscious effort, there is little likelihood of it becoming a part of our experience. Ribot in his book on the "Psychology of Attention" ¹¹ divides attention into spontaneous or natural attention, and voluntary or artificial attention. Spontaneous attention he conceives to be "as a gift of nature", everywhere and always caused by emotional states such as desires, satisfactions, discontent and jealousy, while the latter, voluntary or artificial attention, he describes as "a result of education and training" and deriving its whole being from spontaneous attention. In other words it is "an apparatus formed by civilization and a product of civilization". It is accompanied, according to Ribot "by a feeling of effort, for the aim is willed, chosen, accepted, or at least submitted to". Voluntary attention then is giving artificial interest to things that do not hold intrinsic interest. To quote further from Ribot:

The same progressive movement that in the order of moral events has caused the individual to pass from the control of instincts to that of interest and duty; in the social order from savagry to the

11. Th. Ribot, Psychology of Attention, p.6.

state of organization; in the political order from the almost absolute individualism to the constitution of a government; this same onward movement in the intellectual world has affected the transition of spontaneous attention to the dominance of voluntary attention. This latter is both the cause and the effect of civilization.¹²

Ribot further maintains that "the birth of voluntary attention, the power of fastening the mind on non-attractive objects, can only be accomplished by force, under the influence of education whether derived from men or things eternal".¹³ He cites for us the example of the child not wanting to learn to read but when he wants to know the meaning of pictures and discovers that if he can read he can find out this meaning for himself, then he is willing to give his attention to the process of learning to read. Ribot divides voluntary attention into three periods. In the first the educator acts only upon simple feelings, fear in all its forms, egotistic tendencies, rewards, tender and sympathetic emotions, and innate curiosity which "seems to be the appetite of intelligence". In the second stage, "feelings of secondary formation" are employed, such as love of self, emulation, ambition, interest in a practical line, and duty, while the third period is that of organization, attention having been aroused and sustained by habit. The above mentioned

12. Ibid, p. 36.

13. Ibid, p. 31.

factors of egotism, ambition, and interest have created by repetition a fixed and lasting habit. Acquired attention has become a thing of second nature and the artificial process is complete. Whether or not the process is as simple a one as Ribot would seem to make it by this arbitrary division into periods is questionable, as is the advisability of such a division for the basis of one's educational technique. The point of particular concern for this present study is the relation of these "feelings" at any period to the problem of voluntary attention.

Spontaneous attention in any individual Ribot believes to reveal his character or at least his fundamental tendencies, while voluntary attention determines in what direction these tendencies may be led. One might have a spontaneous interest in things mechanical but it requires voluntary attention before it results in his being a first-class mechanic.

Regardless of whether or not one can accept fully Ribot's classifications of the kinds of attention, his interpretation of voluntary attention has a direct bearing on the subject of factors affecting the learning process, and should be borne in mind for later considerations.

The experimental work which has been carried on upon attention has for the most part centered about the more mechanistic aspects of the subject, and has been confined to studies of the attention span and related problems. The study of the effect of varying degrees of attention upon learning, and the methods employed for producing attention have been studied comparatively little. The nearest approach we have to experimental evidence along this line are the studies which have been conducted on the relation of the attitude of the learner to the accomplishment of the task.

Attention once having been obtained, its effect may be greatly modified or enhanced by the presence of one or both of two closely allied accompaniments, namely, intention and attitude.

Attitude is something quite distinct in itself, and at the same time an important element of attention. Attitude implies something of an affective quality not necessarily inherent in attention. Attention is a matter primarily of intellectual application while attitude is the affective accompaniment of this application. For example, one may attend to the process of learning to read either with an attitude of pleasure or contempt or any of a number of different emotional accompaniments. The form which the attitude takes is of significant importance

to learning, as has been made clear through the following studies conducted on this subject:

Mayo¹⁴ in a research problem carried on in the field of industrial psychology found that by removing the causes of pessimistic attitudes which in turn caused pessimistic day-dreams on the part of the workers in industry that it was possible to increase their out-put by 70% to 80%.

Miles¹⁵ suggests that it is conducive to greater out-put to "give a man plenty on his plate to be getting on with" but in the same article cites the case of work in a jam factory where girls were given one-half stone of currants with which to work instead of the usual stone and by so doing the out-put was doubled. In either case, it is the attitude created with which we are herein concerned, and regardless of whether a greater out-put is caused by having a full or half-full plate the indication seems to be that the attitude created can affect the amount of work done.

Intention, as the second of these aspects or possible accompaniments of attention, implies a conative factor, or purposive behaviour, and though it may or may not be

14. E. Mayo, "Day-Dreaming and Out-put in a Spinning Mill", Journal of Personality Research, Vol. 1V (1925), pp.73-99.

15. G.H. Miles, "Psychological Aids to Increased Production", Human Factor, Vol. VIlll (1934), p.343.

present in an attention-situation, the following studies seem to indicate its significance to learning in cases where it does exist:

Koffka¹⁶ tells of an experiment conducted by Aal in which two groups of subjects were given material to be remembered, namely, a story and a group of objects. One group was told that they would be tested on the next day while the other group were told they would be tested at a later date but no definite time was given. The first group, instead of being examined on the next day as they expected to be, were told that unfortunately the test would have to be post-poned until a later date. Both groups were tested on the material several weeks later. The results showed that those who had learned the material with the intention of being tested on a later date showed better records in remembering than those who learned the material with the intention of being tested the next day. When the latter group was tested, however, under the same conditions as the other group the difference between the two groups decreased considerably. It should be noted that meaningful material was used. Koffka's comment on this study is as follows:

16. K. Koffka, Principles of Gestalt Psychology, p. 521.

Positively they seem to establish the fact that the trace systems depend upon their relation to the Ego system being influenced by the stresses within it that correspond to the purpose of the learned.¹⁷

Regardless of whether or not one is in accord with Koffka's idea of Ego and trace systems the important thing for us here is that the intention of the learner seems definitely to have affected the learning in this study.

In 1916 Boswell and Foster¹⁸ reported a study dealing with a similar point wherein four observers in the laboratory learned Chinese-English parallels with the intent permanently to retain. It was found that "the intent to learn for permanent retention really brings about the desired end in the case of learning a vocabulary."

Geyer,¹⁹ after making a study of the influence of changing the expected time of recall, concluded: "Within the limits of this investigation when learning takes place with instructions to recall at a given time, a change in the expected time tends to be detrimental to recall".

17. Ibid., p.522.

18. F.P.Boswell and W.S.Foster, "On Memorizing with Intent Permanently to Retain", American Journal of Psychology, Vol. XXVII (1916), p. 420.

19. Miriam Geyer, "Influence of Changing the Expected Time of Recall", Journal of Experimental Psychol., Vol. XIII (1930), pp. 290-292.

Krueger²⁰ carried on a most interesting experiment along these lines and found that in memorizing lists of paired associates, if in order to facilitate the direction of attention to words they were underlined in black and red, this direction of attention brought about more economical learning than did non-directed effort, both in serial and non-serial material. He further experimented with directing attention to various sections of units learned and found that directed attention facilitates learning of material attended irrespective of its serial position within the unit during the learning process.

In 1929 Sanderson²¹ conducted an experiment on intention in motor learning but due to variation in scores gave nothing conclusive in his results.

Jersild²² conducted an experiment on examinations as an aid to learning, primarily to discover the influence which the prospects of examination have on the learner's attitude during the learning process. Although it would seem that his study did not deal with this problem with the thoroughness with which it might, his conclusions are of interest: "We have seen that the mental activity enforced during a brief period of examination by means

20. W.C.F. Krueger, "Learning During Directed Attention", Journal of Experimental Psychol., Vol. XV (1932), pp. 517-527.

21. S.Sanderson, "Intention in Motor Learning", Journal of Experimental Psychol., Vol. XI (1929), pp.463-489.

22. Arthur Jersild, "Examinations As An Aid to Learning", Journal of Educational Psychol., Vol. XX (1929), p.602.

of specific questions is conducive to more effective learning in a subsequent period of study than is mental activity involved in attending to narrative statements contained in a preliminary summary or in a true-false test. It appears from this results that a direct interrogation constitutes a more intense stimulus than does a narrative statement, and will accordingly give rise to a more lively response and that an examination serves as an aid to learning insofar as it puts this principle to a practical account by stimulating the industry of the learner."

Peterson²³ made a study of the effect of attitude of the learner on immediate and delayed reproduction. He gave to his class a list of words and later asked them to reproduce these words. Then they were given a second list and told that they would be asked to reproduce them. This was tried in two sections. In one section 75% made better results and in the other section 83% made better results when told they were going to be asked to reproduce them. Both sections were then asked to reproduce them again after 48 hours and this time 82% and 97% made better results.

²⁴
Meyers gives a brief report of an early and inadequate

23. Joseph Peterson, "The Effect of Attitude on Immediate and Delayed Reproduction", Journal of Educational Psychol., Vol. VII (1916), p. 523.

24. G.C. Meyers, "Learning Against Time", Journal of Educational Psychol., Vol. VI (1915), p.115.

study which he undertook in which two sets of 13 girls were required to learn lists of words, one group being given all the time they needed, the other group being limited to nine minutes. It was found that when the subjects knew they had only a limited time in which to do the task almost half made perfect records in the time in which a perfect record was made by only one of the first group.

Despite the need for further investigations into the subject of attention, intention, and attitude in learning it seems obvious from the work already done that both the intention and the attitude of an individual, the purpose for which he learns, and the emotional accompaniment of this intention, all have an effect upon his results. In other words, his attitude and his intention affect the attention which he gives to the process of learning and hence affects his learning results.

It has been noted that learning is dependent to a degree at least upon the amount of attention, the kind of intention, and the attitude brought to the learning situation. Thus far the material reviewed seems to indicate that these facts are true, or at least as far as present-day experimental work is able to show we may at least assume them to be true. We are however still

left with the problem of how can the quality of attention, intention, and attitude be improved so as to more readily accelerate the learning process. And that in turn raises ~~the~~ many and varied questions for both the psychologist and the educator. How can the latent capacities of the individual be stimulated into activity? What means ~~can~~ be employed to demand voluntary attention for learning when spontaneous attention is not present? How can purposes be "created" in the educational process? Is there a place in the educational process for artificial stimuli to be employed? What are the fundamental driving forces of human nature? What techniques, based upon an understanding of these driving forces of human nature as we know them to be at present, are effective in stimulating the individual to greater activity in learning?

It is with this last question that this study is to be primarily concerned. A summarization of the experimental work already carried on in regard to such techniques will be given; an attempt will be made to understand better the nature of these techniques, and finally several of them will be tested experimentally and comparative results given in an effort to evaluate further their effectiveness in the learning situation.

I should like especially to acknowledge the aid received from the summarization of the work in the field of motivation and incentives, up to the time at which their articles were written, given by Vaughn and Dierens²⁵, Miss Elizabeth Hurlock,²⁶ and A.G. Bills.²⁷ Although in almost every instance the original report of the experimental work has been read, the summaries given by these writer have been helpful and suggestive.

25. James Vaughn and C.M. Dierens, Psychological Bulletin, Vol. XXVlll (1931) pp. 15-65.

26. Elizabeth Hurlock, Journal of Social Psychol. Vol. 11 (1931), pp. 261-290.

27. A.G. Bills, Psychological Bulletin, Vol. XXlV (1927), p.473.

CHAPTER ONE

MOTIVATION OF BEHAVIOUR

The term "motive" is in prevalent use today not only by the psychologist but by the man in the street who through some smattering of psychological knowledge has come to realize that man is directed in many of his actions by some force or forces about which he knows very little except that they may be called "motives".

Leuba¹ and ² defines motives rather generally as "those stimulations which excite the individual as a whole to activity", and thence proceeds to classify them into external and internal motives. By the internal forms he means those forms of motivation which we usually regard as the great drives of human nature, sleep, hunger, thirst, and sex. By external forms he means "those motivating situations which can be used fairly universally and frequently in connection with any activity in progress as spurs to more intense and persistent effort" which in turn he designates as "incentives". He further maintains that such incentives "have largely replaced the great organic drives as the most universal and powerful motivating factors in the life of the

1. Clarence J. Leuba, "A Preliminary Analysis of the Nature and Effect of Incentives", Psychological Review, Vol. XXXVII (1930), pp. 429-440.

2. Clarence J. Leuba, "A Preliminary Experiment to Quantify an Incentive and Its Effects", Journal of Abnormal and Social Psychol., Vol. XXV (1930), pp. 275-288.

individual". The truth of this last quoted statement seems open to question if one's definition of incentives is to differ in any degree from that of Leuba. That matter, however, will be considered later.

According to Troland³ motivation involves "a mental explanation of a physical event". In other words, it is a psycho-physiological problem. Inasmuch as the physical mechanism of the process and the nervous and muscular activity producing the motivation situation cannot be included within this study, it may be said that irrespective of what these may be, we are aware of their existence only through "feelings". Our "feelings" might be classified, according to Troland, into primitive desires and those desires which when they have "become sufficiently complex, definite, or sophisticated we call them purposes, usually characterized by considerable permanence, and by less feeling than our more primitive desires". It should be noted that it was to this last group that Leuba seems to have affixed the title of incentives by his above quoted definition.

McDougall⁴ in his Introduction to Social Psychology has this to say:

3.L.T. Troland, The Fundamentals of Human Motivation, p. 2.

4.William McDougall, Introduction to Social Psychology, p. 19.

The human mind has certain innate or inherited tendencies which are the essential springs or motive powers of all thought and action . . . and are the bases from which the character and will of individuals and nations are gradually developed under the guidance of intellectual facilities.

Hollingsworth⁵ offers the following definition:

"A drive or motive, in any dynamic sense, is that which initiates the process, keeps it going, and disappears when the process ceases". Purposeful activity he claims to be a circular affair, the motive leading to responses which eliminate the motive. He further points out that as long as things are satisfying we have no need for activity, but that our wants, needs, annoyances, discomforts, and cravings demand our activity for removal and thus are the motives for our action. For example, hunger pains lead to eating which removes the discomfort. Thus, the motive was not "to eat" but rather the hunger, the elimination of which was the purpose of the activity. Likewise in learning, "to learn" is not the motive but rather we must discover the underlying needs and cravings which may prompt the action.

To return to Leuba's definition, there seems to remain a question as to his distinction between the "great drives of human nature" and the external forms which he calls "incentives". Leuba states his belief that organic urges in the present day play a subordinate role in the motivation of the individual. This is true if by "or-

5. H. L. Hollingsworth, Psychology, Its Facts and Principles, p. 304.

ganic urges" one limits oneself to the need of food, water, and sleep, but if one is to deal with the problem of motivation one cannot ignore the motivating strength of other basic urges such as sex, the desire for preservation, and self-esteem, which though not necessarily organic needs are definitely biological, or at least, inherent in human nature. Leuba himself apparently does not wish to convey the arbitrary distinction his above definition would suggest, inasmuch as in a later statement he defines "incentives" as "external situations which individuals will exert themselves to bring about or maintain" and "differ from other external motivating conditions chiefly in that they can be introduced as spurs to effort in connection with most activities of life". This later statement indicates that Leuba recognizes "other external motivating conditions" which are neither incentives nor "the great drives of human nature" and it may be that he classifies the innate tendencies of man other than the great drives of human nature in this category, though he does not make it clear.

For use in this present study the distinction drawn by Troland⁶ between our primitive desires and those desires which when they have "become sufficiently complex

6. E.T. Troland, op. cit., p.12

definite, or sophisticated we call them purposes, usually characterized by considerable permanence, and by less feeling than our more primitive desires" seems more pertinent. For the sake of brevity these latter shall be referred to as "purposive desires" in contrast to "primitive desires". Both, however, are to be thought of as "motives" and we shall proceed to a further elucidation of the term "incentive" before it is defined for use in this study.

Hurlock⁷ and⁸ in her interesting and valuable studies on incentives uses the term rather generally, namely to mean "any externally controlled condition which stimulates activity on the part of a human being or animal". In contrast to this she defines "motives" as "those forces from within which stimulate activity on the part of a human being or animal". Hurlock makes little mention of the relationship, if any does exist, between the "externally controlled conditions which stimulate activity" and "those forces from within which stimulate activity". If we assume or maintain, however, that man's behaviour is to be accounted for by the existence of "certain innate or inherited tendencies which are the essential springs or motive powers of all thought and action" then one seems justified in making the

7. Elizabeth Hurlock, "The Psychology of Incentives", Journal of Social Psychol., Vol. 11 (1931), pp.261-290.

8. Elizabeth Hurlock, "The Use of Group Rivalry as an Incentive", Journal of Abnormal and Social Psychol., Vol. XX11 (1927), p. 278.

assumption that whatever external situations are used for the purpose of spurring an individual into activity they must in some degree be related to these internal tendencies, purposes, desires, whatever one wishes to call them. Therefore, in the present study the term "incentive" shall be used to mean "external situations naturally or artificially presented which by their relationship to one's motives stimulate an individual to greater activity for the fulfillment of his fundamental desires".

There are several points in the above definition which might be briefly explained and enlarged upon. The qualification "naturally or artificially presented" is used to make clear the point that incentives may exist for an individual although they have not been planned or controlled by another individual. Natural incentives, or those inherent within the total situation may be stronger than artificially prescribed incentives. A striking illustration of this point was made in one of the experiments to be reported later in this study. The subjects taking part were university students who volunteered to participate in the experiment, and who were very enthusiastic over the work prescribed in the study. Two groups were given "artificially pre-

sented" incentives while the control group was given no further incentives than those concomitant with the situation itself. Contrary to other similar experiments the control group surpassed the artificially stimulated groups. This would seem to indicate that other incentive values were present^{at} though not prescribed which excelled in value the incentive of competition which had been developed within the other two groups.

A second point has to do with the qualification "which by their relationship to one's motives". As was pointed out by Hollingsworth⁹ our motives for action are based upon our wants, needs, annoyances, and cravings which demand activity for their removal. If then, we desire action on the part of the individual it would seem that we must relate the external situation to some internal want or craving in order to achieve the desired end. Therefore those external situations which are not or cannot be so related should be classified in some other manner. For this purpose we shall borrow a phrase used by many previous writers in psychology, namely, facilitating and inhibiting factors. It has been chosen with hesitancy due to the fact that this term has been used by some writers interchangeably with the term "incentives". The distinction between the two, however,

9. H.L. Hollingsworth, loc.cit.

seems obvious. Factors which incite one to greater activity can readily be distinguished from those which facilitate or inhibit it. In other words, praise stirs one to action while rhythm aids one in the production of some types of work by uniting itself with the rhythm of the task and thus perhaps increases speed and lessens fatigue. The one incites, the other facilitates. Therefore factors such as music, fatigue, suggestion, and environmental conditions of light, ventilation, etc. shall not be included within the term "incentive" as used in this study. Although these factors do affect, aid, or hinder performance, they do not have their counterpart in a motivational urge within the individual, and consequently do not fall within the confines of the above definition.

Thirdly and lastly, the phrase "for the fulfilment of his fundamental desires" needs explanation. Leuba¹⁰ maintains that "incentives are external situations which individuals will exert themselves to bring about or maintain". In other words Leuba places the value of the incentive situation to the individual in terms of the external situation. It would seem, however, on closer examination of the situation that it is not the reward itself for its own intrinsic value that the individual desires as much as it is the sense of pos-

10. Clarence J. Leuba, loc. cit.

session or the self-esteem which comes as an accompaniment to social approval or recognition; it is not competition itself which the individual desires to bring about or maintain as much as it is the inward satisfactions resultant from winning in a competitive situation. An incentive which does not find its counterpart in a motivational urge, or innate tendency, would in itself be of little value. Therefore it seems justifiable that the end for which one seeks be defined not only in terms of the maintenance of the incentive situation but in terms of the basic urge which it has stimulated.

Having thus closely united the problem of motivation and incentives by virtue of the definition of "incentives" to be used in this study, it is well that we turn to the consideration of the problem of motivation.

MOTIVATION FOR BEHAVIOUR

It may be helpful at the beginning of our study of motivation for behaviour to make a short survey of the historical development of the idea of motivation, inasmuch as all of our present thinking in regard to it is an outgrowth of this past history.

In the earliest times of which we have knowledge there existed an animistic view of nature, attributing

behaviour to the presence of a spirit, not only in man but in environmental objects as well. This spirit was believed to be the driving force responsible for the action of the object and the individual.

In Greek culture, the pleasure of the whole life was regarded as the highest good and the goal which lured men into action. Aristotle changed the emphasis, making knowledge and virtue the important goals. As early as the time of the Stoics it came to be believed that man possessed a primitive impulse toward self-preservation.

Christianity introduced the idea of altruism as opposed to man's normal egoism and selfishness. Man was regarded as being "born in sin", the sin being selfishness and self-concern. Here then was introduced the idea of "finding one's life by losing it" with a certain amount of emphasis on external rewards.

It was not until considerably later that the mechanistic theory was introduced by Descarte which for the first time separated the physical body from the spiritual forces which the earlier thinkers had believed to account for physical activity. In order to make allowance for the existence of a soul, however, Descarte attributed to it the power of interference in the

mechanistic trend of human behaviour. He further maintained that the most fundamental truths were innate within the soul.

Spinoza and Hobbes again introduced the influence of self-preservation and self-assertion, with a desire toward fulfilment, the realization of which produced happiness. The British Intuitionists followed with insistence upon an inherent sociability in man's nature which overshadowed his selfish inclinations, an interest in one's fellow-men due to one's natural social impulses.

Then followed Hume, Spenser, and J.S. Mills who stressed the pursuit of happiness as the motivating force for all human behaviour or choice, with pleasure or pain as the determining factors.

About this time the German psychologists opened up a new channel of explanation through the introduction of the idea of the sub-conscious mind, thus attributing much of our behaviour to "hidden motives" of which we are unaware.

The scientific formulation of the theory of evolution appeared next introducing the theory of the survival of the fittest, which in the field of motivation meant that only those tendencies to action which brought

about survival would be maintained to be later inherited or discovered by accident by the off-spring of the survivors.

The last really significant discovery which has affected the interpretation of motivation in the field of psychology came as a result of the studies of neuromuscular activity such as those carried on by Pavlow and others, from which theories have been deduced that human behaviour is determined primarily by conditioned reflexes and tongue movement.

This brief review of the development of psychological thought on the subject of motivation up to the present time will serve as a back-ground for the consideration of the motivational theories held by the various schools of psychology of the present day.

PRESENT-DAY SCHOOLS OF PSYCHOLOGY

For the purpose of discovering the existent theories of motivation the ten better known of the "schools" of psychology of the present time will be briefly reviewed. They may be designated as follows: 1) Structuralism, 2) Functionalism, 3) Behaviourism, 4) Physiological Psychology, 5) Hormic Psychology, 6) Psycho-Analysis, 7) Gestalt Psychology, 8) Type Psychology, 9) Individual

Psychology, and 10) "Factor" Psychology.

It must be made clear at the outset that there is a considerable over-lapping of ideas among many of the members of the various schools, as well as differences of opinions within the separate schools, and that this classification does not necessarily stamp any of the men so designated as being identical in thought with all other members of the school. These classifications are made simply in an effort to present a comparatively simple explanation of the trends in the theory of motivational behaviour at the present time. It should also be borne in mind that this review of necessity must be brief, and is in no sense an attempt at giving a clear or adequate explanation of the theories of any of the schools.

The Structuralists have little or no concern for the physical aspects of the problems dealt with in psychology. They deal mainly with ideas and mental processes as real entities. Titchener was perhaps the most outstanding personality of this group. His emphasis was the study of general mental laws as found in the normal human mind, with little or no concern for individual differences. The Structuralists maintain that the consciousness is made up of simple elements,

observable through introspection, and definite enough in their existence to enable cataloguing. Titchener limited his study and research to those sensations and images of which one could be aware in his own consciousness, and refused to concern himself with the relation of the nervous system to them, or the function of the images perceived. As a result, the points at which Structuralism makes any contribution to the problem of motivation and "causes" are almost negligible.

The Functionalist school of psychology differs quite directly from that of Structuralism. The main difference may be summed up in the word "meaning". For while the Structuralist is concerned with the "structure" of mental images and sensations, the Functionalist deals with their "function" or their meaning in relation to the whole. Functionalism differs from Structuralism at both ends. It goes back into the biological and neurological accompaniments of mental processes, with which the Structuralist is not concerned and at the same time goes to the other extreme of including in its considerations the meaning of activity which the Structuralist completely avoids. On the other hand, the Functionalist gives almost no concern for the mental states involved which are the primary interest of the Structuralist.

John Dewey was the first of our modern psychologists to give emphasis to this point of view. In his article on Reflex Arc Action¹¹ he pointed out that the stimulus and sensations are only parts of the entire reflex act and must be considered as such and not as isolated factors mainly responsible for the act. He maintained that the preceding reactions and interpretations were equally important factors in the process, and¹² though each factor was important, none should be considered without relating it to the others.

¹²
Pillsbury defines Functionalism as follows:

A study of those reactions of man or animal which cannot be interpreted in a strictly mechanical way.....
It is a study of the means by which an animal adapts itself.

In other words, Functionalism goes beyond the psychology of Wundt and Titchener and points out the necessity of considering factors in a study of psychology other than the general mental laws and processes. It lays stress upon the biological and the operational aspects of mental life as well as the content or elemental aspect.

Dewey's theory is of particular interest to this study in that he makes an attempt to account for the motives

11. John Dewey, "The Reflex Arc Concept in Psychology" Psychological Review, Vol. lll (1896), p. 357.

12. W. B. Pillsbury, The History of Psychology, p.279.

which prompt behaviour. It would seem that Dewey was in advance of his time in his attempt to explain desires and motives as a part of his reflex-action theory. The basis of will, he maintains, is the sensuous impulse which he defines as "the felt pressure of a state of consciousness arising from some bodily condition to express itself in producing some physical change". He attributes to this sensuous impulse both ~~an~~ internal and external side, a state of feeling, and a tendency toward physical expression. The reflex action arc is the mechanism connecting the two.

Dewey, in other words, attributes motive of action to desire, which he defines as conscious aim toward something already experienced and found satisfying. This then is followed by a conflict of desires, and finally a choice is made among these desires which in turn becomes the motive of the act which follows. Dewey is satisfying as far as he goes in this explanation but fails to make clear what he considers to be the basic desires which survive, as well as completely disregarding the possibility of unconscious motivation.

The importance of introspection as a method of psychological research had grown steadily during the years prior to 1910. Increasingly the mind had become the chief object of concern. The objective study of behaviour for its own sake was, as Flugel has pointed

out, "in the nature of an auxiliary method of but secondary importance, and had led to the tendency to interpret objective observations in terms of consciousness, as though such observations were sufficient in themselves".¹³ Behaviourism sprung up as a protest to this point of view.

There was a positive reaction against introspective methods and the accentuation of the importance of the mind. About the same time, there appeared a new phase in psychological thought and study which was demanding a considerable degree of attention, namely, the study of the behaviour of animals. By 1913 animal psychology had sufficiently come into its own that Yerkes suggested that a new term "comparative psychology" be used to include the study of individual differences in both man and animals. In the same year J.B. Watson proposed that psychology should take as its primary method the purely objective study of behaviour which was being used in animal psychology. This was the beginning of what we have come to think of as Behaviourism. Its main contentions can be quite briefly reviewed. The Behaviourist believes that the psychologist should study man as he studies animals, i.e. on the basis of objective study with complete elimination of introspection. In other

13.J. C. Flugel, 100 Years of Psychology, p.251.

words, no attempt should be made to recruit the interpretation of the thoughts, feelings, or actions from the subject himself. An amazing stroke of good fortune for the Behaviourist came in the timely appearance of the conditioned reflex³-action theory, about the time that the Behaviourist was stating his case before the psychological world. An interesting piece of research had been going on quietly in Russia, and soon were to appear the results of Pavlow's well-known experiments on the conditioning of the behaviour of dogs, which led to the theory of the conditioned reflex. This theory was adopted "part and parcel" by the Behaviourists and the later developments of their psychology have been based upon it.

Watson, who without question has been the most influential expositor of the Behaviourist school, bases his entire theory on conditioned reflexes and tongue movements. He attributes to humans only three innate emotions, fear, anger, and sex and only a few instincts, all else he maintains to be acquired. Emotions are defined as masses of internal muscles in a state of contraction and are the results of the secretion of ductless glands. The existence of consciousness is altogether denied by the Behaviourist. Instincts, Watson defines, as follows:

The student of behaviour has come to look upon instinct as a combination of congenital responses unfolding serially under appropriate stimulation..... Each element in the combination may be looked upon as a reflex. An instinct is thus a series of concatenated reflexes. The order of the unfolding of the separate elements is a strictly heritable character.¹⁴

Watson continues with the listing of eleven of these so-called instincts in animals. He believes that the classification of human instincts is unsatisfactory in that they are affected by habit before they can be studied. Consequently, he makes no effort at any such classification for humans and leaves little basis for the determining of the motivation of behaviour outside the mechanistic tenets of Behaviourism itself.

Closely related to this school, due to their mutual concern for the physical organism and the nervous system, is that comparatively small group of men who have come to be known as the Physiological Psychologists. These men have been primarily concerned with a new interpretation of the function of the brain, and the inter-reaction of reflexes within the nervous system. C.S. Sherrington is perhaps the best known of this group. Although much light has been shed upon the physiological basis of behaviour as modified by experience, there still remains much to be done in this field before the

14. J.B. Watson, Behaviour, An Introduction to Comparative Psychology, p.106.

real nature of the process is understood, and before much help can be given on the problem of motivation.

With the exception of Dewey's discussion of motives almost no light is shed by these various schools of psychology upon the problem of the motives which produce behaviour. As Flugel has pointed out:

It was not until McDougall and Freud that we come to have any real help on understanding the motives that underlie our interests, desires, work and reaction to ourselves and our environment. 15

We shall consider then briefly the psychological teachings of these two outstanding men, Freud and McDougall.

The psycho-analytical school of which Freud might well be called "parent" has found an outstanding place in the field of psychological thought within recent years. Although there has been much divergence of opinion within the school itself and various of its followers have propounded new theories which compete for place in the psycho-analytical explanation of human behaviour, its distinguishing feature is the importance which it places on the unconscious mind.

Freud conceives of the mind as being made up of two clearly separate departments, the conscious and the un-

15. J.C. Flugel, 100 Years of Psychology, p. 286.

conscious. The basis of personality he maintains to be the "libido", commonly referred to as the "id", which is to be found in the sub-conscious sphere of life. This dynamic energy is based upon the sex instinct but because reality imposes restrictions upon the id, Freud contends that the ego is born to help the id avoid pain and get as much pleasure as possible. He attributes to the ego the power of censoring the id. The ego, however, may not be strong enough to control the id, and therefore draws upon the super-ego for assistance, this latter being built up out of the laws, customs, and social regulations, or the moral elements which become the "ideal" in one's life, though it too is an unconscious element. Early in his writings Freud maintained that the sex instinct was the basis for all mental energy but through further study and research he came to modify this somewhat by the introduction of the ego as "censor". He remains, however, consistent throughout in his emphasis on the inherent tendency of human nature to seek the satisfaction of the sex urge, or the libido, and that the restriction superimposed upon this tendency in order that we may live with other people demands a sacrifice of the libido. In other words, he believes man to be inherently self-concerned, and all efforts toward socialization except for one's own satisfaction are actually made against ~~one's~~ will. Of particular interest to this

study of motivation is his attendant theory of repressions into the sub-conscious mind, which he believes to account for much behaviour, although these motives are completely hidden from the consciousness of the individual involved. It is from this point that he advances his theory of analysis, whereby he seeks to release these repressions and thus clear mental conflicts and difficulties of the individual.

Freud has been accused, perhaps quite justly, of inconsistency in much of his work, and rightly criticized for ignoring the physiological accompaniments or foundations for his doctrine. Despite this, he must be recognized as a pioneer in the opening up of a vast area of psychological information, which up to his time had not been within the scope of the field of psychology itself.

Somewhat in contrast, but making perhaps no less a contribution to psychological thought, is the work of McDougall, who at first was classified at the extreme upper division of the behaviourist school, but since, due to the definite contribution of his own theories, has come to be classified as the leader of the Hormic School of Psychology.

McDougall lacks nothing of the behaviourist's under-

standing or appreciation of the neurological bases of human behaviour but adds to it a teleological view of life. In short his Hormic Psychology, as it has come to be known, implies that individual behaviour is determined by man's capacity to seek goals. Behaviour, according to McDougall, is based upon the instincts which he defines as: "inherited or innate psycho-physical dispositions, which determine their possessor to perceive, and to pay attention to objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner, or at least to experience an impulse to such action".¹⁶ Thus he attributed to instincts three distinct elements, the perceptual or cognitive element, the affective or emotional element, and the motor or action element.

The point at which McDougall has made the most valuable contribution for our study, and at which he differs widely from the behaviourists, has to do with the relation of the instincts and reflexes. To McDougall an instinct is something more than the mere result of certain reflexes; to him the instincts are the source of certain primitive desires and purposes which

16. William McDougall, Introduction to Social Psychology, p. 29.

are constantly seeking to express themselves in different ways. Their mode of expression is determined both by past experience and by the present situation. In other words, our behaviour is determined by the various modes of expression or outlets for our fundamental urges, energy, or purposes, whichever we choose to call ~~it~~ them.

To this McDougall adds a conative factor, which is psychic and dynamic, and not dependent upon the physical mechanism of the brain or nervous system. It implies a striving on the part of the individual. Allied with this is the organization of various instincts around particular objects by means of sentiment. Perhaps most significant of these sentiments outlined by McDougall is the self-regarding sentiment, in which a number of the instincts and emotions are centered about the idea of self. One's idea of self may be in part at least determined by previous experience, and its nature and strength at a given time determines one's moral behaviour. If one's self-regarding sentiment is of high order, one's behaviour can by the power of conation be adjusted in such a way that ideal behaviour can supercede behaviour as it would be dictated by our more primitive desires. It is obvious that this introduces factors outside the mechanistic scope of the behaviourist. There is much more that could be said in regard to McDougall's theory and that

of his fellow hormic psychologists but due to the limitations of this paper, it will suffice at this point merely to list McDougall's classification of instincts and emotions:¹⁷

1. The Instinct of Flight and Emotion of Fear.
2. The Instinct of Repulsion and Emotion of Disgust.
3. The Instinct of Curiosity and Emotion of Wonder.
4. The Instinct of Pugnacity and Emotion of Anger.
5. The Instinct of Self-Abasement (Subjection) and of Self-Assertion (or Self-Display) and Emotions of Subjection and Elation.
6. The Parental Instinct and Emotion of Tenderness.

To these major instincts McDougall adds several lesser instincts, which might be designated as "instinct tendencies", namely:

1. The Instinct of Reproduction.
2. The Instinct of Gregariousness.
3. The Instinct of Acquisition.
4. The Instinct of Construction.

It should be noted that McDougall lists the varying emotions as accompaniments of the instincts given, but

17. William McDougall, Introduction to Social Psychology, pp. 39-76.

but some psychologists have questioned the foundations for this classification. The most significant work along this line is that of Drever¹⁸ who^{al} though closely allied to McDougall in many respects draws a distinction of import in regard to the emotions. Drever maintains that not all instinctive activity has an emotional accompaniment, but that in some cases it is merely an interest quality. He further points out, however, that if this instinct-interest is arrested in its expression, emotion results, or a "tension" is set up which serves as a reinforcement of the impulse or interest.

Hormic psychology has contributed much to the understanding of the motivation of behaviour, primarily through giving us some classification of the fundamental instinctive urges or drives upon which our behaviour depends. It has been pointed out above that there are those among the various schools of psychology who deny the existence of instincts, preferring in their place a theory of mechanistic organization, played upon and conditioned by external stimuli. Until such theories, however, can account for the innate tendencies of man's behaviour the theory of instincts shall persist to hold a high place in the explanation of motivation. It is no small wonder that Flugel has this to say:

18. James Drever, Instincts in Man

With McDougall and still more with Freud psychology first began to bear semblance to a science to which men could look for help in unravelling the puzzles presented by their own and other's behaviour. Here were no mere laws of mind, too abstract and remote to be of any use in dealing with practical problems and on the other hand no mere study of isolated reflexes and sensations extracted from their setting. Here at last was some real light on the motives underlying our love and hates, our interests, our languages, our work and play, our difficulties, failures, maladjustments, and general reasonableness. ¹⁹

The Gestalt School founded by W. Kohler and Wertheimer, with Koffka as an early co-worker, considers mental life in its totality. It maintains that the whole is more than the sum of its parts. We see things first as wholes, and analysis comes second, according to the Gestalt theory. Basing its contentions upon the findings in early studies in perception the Gestalt School further maintains that the nervous system is so organized as to perceive whole. Our mental life is an open system tending toward completion. When two sensations combine they are given meaning and are held together not because of any cohesion between them as units, but by the effect of the over-figure of Gestalt. The basic origin of these Gestalten seems not to be made entirely clear but it would seem to be something of an inborn disposition to see a thing as a whole into which the

19. J.C.Flugel, 100 Years of Psychology, p. 286.

sensory element tie in together.

Behaviour according to Gestalt psychology is based upon a theory of tension and release, or strains and stresses within, which seek release in terms of over-Gestalten. The significance of Gestalt Psychology for the educator comes at the point of the importance of the "whole" approach, the necessity of learning things as members of a total situation rather than as separate aspects later to be united into a meaningful whole.

Unfortunately, despite their insistence upon the Gestalten as the determining element in behaviour, the Gestalt psychologists have not as yet defined what these Gestalten are, how many there are, nor how they act. Thus their contribution to the psychology of motivation is limited except to say that all life tends toward completion.

Adler is the father of the school of Individual Psychology. He maintains that there are two sets of biologically conditioned goals in life, namely preservation and procreation, and that all life is directed toward these, primarily because of man's desire for the assertion of his individual self and its superiority over other selves.

Adler maintained that the fundamental urge is the "will to power" and in order to gain this power individuals compensate for personal weaknesses. Sex, love, or sympathy have little place in his scheme, his emphasis being not on the libido as the motivating force in behaviour (as in the case of Freud) but rather as the goal around which behaviour is centered. Other goals in life than those related to procreation and preservation are thought to be private and individual. Thus any generalizations regarding the motivating forces of human life must limit themselves to problems dealing with the procreative and preservative urge.

Jung is responsible for the division within the general field of what has come to be known as Type Psychology. He, in contrast to Adler, extends rather than eliminates much of the psycho-analytical material of Freud. Unlike Freud, however, he is concerned with synthesis as well as with analysis. He extends the unconscious to the inclusion of elements not present in Freud's theory. He upholds the theory that the unconscious contains not only repressions but nascent material as well, that is material not yet "ripe" for conscious realization but in the process of maturation. This he calls the "Collective Unconscious" inasmuch as in it he includes certain racial tendencies, and in it places the "archetypes" which express the primitive concepts,

needs, and aspirations of mankind. Rather than believing the conscious and unconscious to be in conflict he believes the unconscious to be functional and compensatory to the conscious except in psychoses. Jung divides personality into persona or the conscious person, and the anima of the compensatory element. Whichever element is dominant determines to what "type" among Jung's eight type classification the individual belongs. The image holds an important place in Jung's theory as he believes it to be the expression of the total intrinsic situation. When these images become formulated ideas result, when they grow without being formulated they become our ideals. There is something of a mystical element existent in Jung's theory which again denotes belief in the ability "to seek", but at the same time he believes in a kind of pre-determination according to type.

Spearman's Factor School is based on the theory that there exists within each individual various factors which vary in strength from one individual to another. Most important of these is a general ability factor, and subordinate to it are a number of highly specific ability factors. The theory has been made analagous to the case of an engine, the general ability factor being compared to the energy by which the engine as

a whole is driven, the specific ability factors being the various engines, and conation being the engineer who determines when and to what purpose the energy and engines shall be put. Spearman, moreover, has worked out and applied to his "factor analysis" of the individual a highly organized system of mathematical correlations whereby in time it is hoped that the Spearman School shall be able to present a complete analysis of an individual's "factors", mathematically tabulated and correlated. Up to the present time the Factor School seems to have been so much absorbed in the determining of the various factors that almost no attention has been given to the functional aspects of the **problem**. The theory is therefore of little use at present in the study of motivation, although if a complete analysis of an individual's abilities is in time made possible through this theory, it will no doubt follow that much light will be shed upon the various means of motivating individuals to action on the basis of their dominant capabilities.

With this review of the various present-day schools of psychology one is immediately impressed, despite its brevity, by the complexity of the situation at the present time in regard to what are the motivating factors for human behaviour. It is evident that there is much



variance of theory and opinion and it is extremely difficult in view of this to attempt any kind of generalization. It would, on the other hand, limit the scope of the present study of incentives to select the contentions of any one of the schools as a basis for the interpretation of incentive values. It seems wise therefore to take the more generally accepted of the fundamental drives which which might be agreed to by the majority of the schools, although they might differ greatly in opinion as to the relative importance of each. Inasmuch, as has been pointed out, it was not until the time of Freud and McDougall that psychology really began to shed any light on the subject of the motives for man's behaviour, the present consideration will be concerned primarily with the theories of these men, and of those who have followed after them.

The fundamental urges in human nature which account for much of human behaviour, as understood up to the present time, might be summed up in the term "the desire for self-realization". To explain this term it might be well to examine in summary the basic urges held to be existent by the various schools. All seem to agree upon the existence of some kind of instinctive drives, whether they be defined in terms of Freud's sex energy seeking expression and subjecting itself

involuntarily to social pressure, or in terms of McDougall's well-defined list of instincts, or in some other manner. The direct expression of certain biological urges seems to be a driving force in all of human behaviour. The fact remains, however, that society cannot exist when man lives at the animal plane, both because some of the basic instincts and their resultant attitudes are in conflict with one another, and because some of them lead to self-destruction.

Co-existent with the sex urge, the instinct of pugnacity, and other innate tendencies which might over a period of time lead to self-destruction, there does exist also the desire for preservation and procreation as maintained by Adler, McDougall, and others,

In summary one might say then that there appears to exist in man certain biological urges which in and of themselves are strong driving forces in human behaviour but which if given undirected freedom might lead to self-destruction. Concomitant with these exist certain other biologically conditioned goals which run contrary to self-destruction, namely self-preservation, procreation, and the will to power. They too are potent factors determining behaviour. A review of the psychological theories since the appearance of the work of Freud and McDougall shows all apparently have been en-

deavoring to find some scientifically sound answer to the question of how these two seemingly conflicting groups of basic urges are brought into harmony within the individual life.

Empirical evidence seems to indicate that man has the capacity for "seeking goals", or at least of directing his behaviour to some degree in terms of "ideals", "images", or "sentiments". Whether this is a biologically conditioned drive or the results for the urge for self-preservation may be open to question, but the fact remains that the capacity does exist, and whether one wishes to describe it in terms of McDougall's sentiments, the Gestalt desire for completion, or Adler's will to power its potency in determining human behaviour seems undeniable.

It seems evident then that man's conscious behaviour, and perhaps his unconscious as well, is directed by those factors which bring him self-satisfaction, whether it be through the expression of his instinctive desires, through the realization of his goals, sentiments, ideals, or "wholes" or through the securing of power over his fellows. Not everyone may subscribe to the idea of the importance of all of these factors within each individual but most everyone will agree to their existence at least in part, in the lives of the individuals with whom they come in contact.

CHAPTER TWO

INCENTIVES

Perhaps one of the most interesting historical accounts which may be produced in the future will be written upon the naturally and artificially created incentives which through the ages have spurred mankind to action. The biographies of great men reveal the influence of a wise mother or an understanding friend who although perhaps knowing little of the terminology of psychology understood the value of certain incentive techniques which were patiently and kindly administered to a responsive son or friend.

The stocks and gallows which still remain as interesting land-marks on our village commons were in the day of their use definite incentive devices for spurring the erring citizen into mending his ways and conforming his activity to the demands of the social mores of his day.

The dunce's cap, the dunce's stool, the privilege of washing the black-board, the Sunday School badge for perfect attendance, and the strap are all kinds of incentives which have been and still are being used to bring about desired activity. But one need not stop

here in one's search for evidence that incentives are in constant employment in our everyday life. The Nobel Peace Prize, the Honours List of the British Empire, the penal system, and the many and varied literary awards might all be said to be incentive techniques employed for the purpose of spurring men into action.

An attempt has been made in the preceding chapter to discover what some of the possible motives from within which stir men into activity may be. We shall now turn our attention for a time to incentives, or the external situations which serve to stimulate activity, before attempting to deal with the problem of the relationship between the two.

It is important before proceeding to the enumeration of individual incentives to consider some of the general characteristics of incentives taken as a whole.

In the first place it is important to distinguish between the positive and negative aspects of an incentive value which exist in the case of many incentive situations. Some incentives may serve to stimulate activity by setting up desirable goals attainable through increased activity, while others may act as a stimulant through their intrinsic undesirability which causes the individual to increase activity in order to avoid the incentive. For example, there have been cases in which a child

has been punished for slow and inaccurate learning. In such an instance the punishment was aimed to stimulate the subject into greater activity directed toward more speedy and accurate production in order to avoid further punishment. Such a technique would be considered a negative incentive and might be contrasted to the case where a reward was offered for increased speed and accuracy, which would be an incentive of a positive nature as the subject would seek to secure the incentive object rather than to avoid it as in the case of punishment. In other words, ~~if~~ all forms of incentives which through their own undesirability stimulate the subject to greater activity in order to avoid the consequences of the incentive situation are known as negative incentives, while those which through their intrinsic desirability make for greater activity in order to secure the incentive object are known as positive incentives.

The term "incentive object" perhaps needs some explanation. By the incentive object is meant the object or situation created by the existence of an incentive which the individual seeks to obtain or avoid. It is exceedingly difficult in almost every incentive situation to determine exactly what the incentive object may be as there invariably exists an over-lapping of incentive values and a "mixture of motives" in the behaviour of men.

Take for example the case in which a money reward is offered as an incentive. Not only may the incentive object in such a case vary from individual to individual but even in the case of one individual there may be a confusion or at least a co-existence of several incentive objects. The money may be valued for itself as a means of providing for the needs of the individual. It may be regarded as a means of impressing one's fellowmen through the possession of things which the money might buy, or it may be more highly valued for what the securing of the reward might mean in the obtaining of social approval and recognition. Again, it may be valued for the sake of the "power" both financially and socially which it might give to the receiver. The many possibilities of kinds of incentive objects which may exist in a single situation of that kind presents one of the most baffling problems in the study of incentives, namely, the over-lapping and inter-dependence of incentive objects and incentive values in a single instance.

The problem may be somewhat clarified by the distinction between personal and social incentives, which might be made at this point. Here again arbitrary lines are hard to draw. There do seem to be, however, those incentives which stimulate the individual to increased

activity irrespective of the environmental or social situation in which he finds himself, and which may be as effective when one is working entirely alone as when one is deeply involved in a social situation. Such instances are few perhaps, and are becoming increasingly less in number due to the intimacy of life in our present state of civilization, but we cannot ignore the instances in life where a man's chief incentive, even though perhaps not his only one, for an extensive piece of research entailing long hours of tedious labour may be the sheer joy of the activity. Again one might cite the case of a devoted worker in water-colour whose completed sketches might elicit little favorable comment from observers, and who himself might recognize the unlikelihood of his achieving great fame as a painter, but who still may dabble in paint for the joy of creation. Still another illustration might be drawn of a young man who although intensely disliking the learning of a foreign language happily applies himself to the study of Arabic when a position in which he is very much interested and which demands a knowledge of Arabic, is opened to him. Thus there appear to be a number of incentives which although closely allied to the social pattern of which one is a part are nevertheless personal in nature and may be termed personal incentives. It

must be borne in mind, however, that in many of such cases there are other "incentive objects" which may be very closely allied to these personal objectives which may be definitely social in nature. It is difficult to distinguish in the case of a scientist who cuts himself off from civilization to do exploratory research in the African desert, how much he is driven by "love of the work" and how much by his desire to make some contribution to knowledge which will secure for him wide recognition in the world at large, or there may exist for him still other incentives of which we may know nothing.

In summary then it might be said that incentives may be either positive or negative in nature, and may be generally classified as being of a personal or social type. Furthermore, there appears to be a considerable inter-relationship between the various incentives, which makes experimentation and classification exceedingly difficult. It will be noted too that several of the positive incentives have a negative counterpart, as in the case of praise, with its opposite of blame.

PERSONAL INCENTIVES

Those incentives which are personal in nature, meaning that although there may be social incentives involved

at the same time, the dominant element in the situation is a personal one and concerns itself with the effect of the incentive upon the individual's behaviour irrespective of his social situation, may be said to be the following:

1. That aspect of the rivalry situation known as the effect of the knowledge of results, or self-competition. When one speaks of rivalry it is usually assumed that more than one individual is involved and thus the problem becomes a social one. Contrary to this, is self-competition in which an individual is incited to further activity in order to improve upon his own record, even though the results of his progress may never be made known to anyone else. Here again one must constantly bear in mind the possible invasion of other influences which are of a social nature, but it is possible to conceive of situations in which the knowledge of self-progress is sufficiently gratifying in itself to incite activity.

2. The attainment of a goal either for the fulfilling of a need or for the joy of accomplishment may be classified as a personal incentive. The child who will struggle with the intricate processes of the seamstress in order to be able to make clothes for her doll, or the person

who seeks to complete a poem he commenced writing earlier in the week may be cited as examples. In the one case the child seeks the goal of being able to sew in order to meet a need she wishes to fulfill; in the other the poet desires to finish the thing he started for the joy of finishing it. One might cite innumerable instances where activity appears to have been spurred into greater activity for the purpose of attaining a goal. It must be noted, however, that goals need not necessarily be set by the individual himself, and thus the setting of a goal may be an effective tool in the hands of the educator.

3. The desire for power may be said to be an incentive of a personal type. Once again it must be remembered that the intrusion of social factors is presumable but it is possible to conceive of power being desired as a personal tool, not only for the ability it lends for the accomplishment of desired feats but also for the satisfaction to the individual which accrues through the feeling of power over things. The same holds true in the case of power over persons but here the factors of social approval, recognition, and other aspects enter in so much more fully that one is limited in making assumptions as to the personal nature of this incentive.

4. Lastly, idealism may be included within the scope of the personal incentive. The driving power of an ideal may be closely allied to that of the seeking of a goal, its distinguishing feature being the quality of idealism which makes it an ever-extending process whereby as one approaches the attainment of the ideal new ideals have begun to present themselves and the stimulative process continues. In the case of the attainment of a goal, a mark which has been set having been reached a new goal must be set up by the conscious effort of the individual, or be set for him by other individuals. The incentive value of ideals cannot be ignored. Perhaps the best example might be drawn from the Christian religion in which the ideals centered about the way of life as lived by Jesus have for centuries increased the activity and affected the behaviour of his professed followers. Regardless of whether one defines idealism in terms of the Freudian super-ego, McDougall's self-regarding sentiment, or Jung's images the fact remains that in everyday experience ideals have proved to be an effective inciting factor in behaviour.

SOCIAL INCENTIVES

In addition to the above listed personal incentives there are those incentives which may be designated as being social in nature, due to the role played by other

individuals and things before they become effective incentive implements.

1. Praise and blame are definitely of this group, inasmuch as their effect is utterly dependent upon the presence of at least one other individual in the situation. In the case of praise and blame the individual must deal not only with his own opinion of himself, but must also face the problem of other individuals' opinions of him. Thus he must direct his behaviour not only for his own satisfaction in regard to himself and them but for their satisfaction as well.

2. Reward and punishment are closely akin to praise and blame inasmuch as the same factors enter in with the addition of the presence of a material reward or physical suffering or deprivation. One must take care in dealing with the problems of punishment and reward to keep this relationship clearly in mind. For example, in the case of reward both the value of the material reward as well as the social recognition attendant upon it are important aspects of the situation. It has been pointed out frequently that rewards given in private with no ceremony or publicity attached are of much less incentive value than those presented with ceremony and display. On the other hand, the mere ex-

istence of some small object of reward frequently adds great incentive value to a situation in which praise alone would be less effective. Or again the effect of punishment may be greatly increased because of the accompanying social disgrace, but at the same time may be much more effective than the disgrace alone.

3. Cooperative endeavor is an incentive definitely social in character. It is perhaps the most difficult of incentive situations to create artificially. The best existent example might be said to be the early years of the Russian Communist regime wherein individuals were incited to sacrifice and work for the good of the common whole. Both the seeking of goals and considerable idealism are involved in any such cooperative undertaking. Needs which must be met may also be an effective factor. In the school-room cooperative endeavor usually takes the form of a group-project in which each individual makes his or her contribution toward the completion of the whole. An important question enters in at this point as to whether the project shall progress on the basis of a democracy where each individual contributes at the point and to the amount of which he is qualified and capable and reaps the natural results, or on the basis of communism where all contribute and share alike.

4. At the extreme opposite of the idea of cooperative endeavor is that of competition. There are two types of competition other than that of self-competition which has already been mentioned. The first of these is competition with other individuals, in which a person seeks personal attainment, recognition, and superiority over other individuals. The second is competition as a member of a group with other groups and may be illustrated by one's desire for one's favorite team to defeat its opponents in a foot-ball match or on a larger scale a nation's desire to win in an international argument. It is not always the object in question which so much stimulates activity as the competitive element existent between the two groups. In this latter type, cooperation is an important factor and differs from the above mentioned type of incentive in that the basis for cooperation in one case is competition while in the former instance the basis for cooperation is something other than competition, perhaps the completion of a given task or the attainment of a set goal.

GENERAL ATTRIBUTES OF INCENTIVES AND THE
RELATION OF INCENTIVES TO THE PROBLEM OF MOTIVATION

In the preceding chapter the importance of securing the attention of the learner was cited as a significant

factor in the learning process. Closely allied to this was the problem of securing satisfactory attitudes and the proper intention.

If any or all of the above listed incentives were to be analyzed with the purpose of discovering why they were effective determinants in human behaviour, indications seem to point to the fact that it would be found that they arouse a muscular tension which facilitates the activity in progress. Leuba calls this the "incentive attitude"¹; an attitude of more or less mild emotional excitement. An interesting suggestion at this point also comes from Rounds². In a study made by him in which an incentive (a money reward) was placed before a man doing very hard problems in addition, the subject's performance was measured in terms of problems done per unit of time and the metabolic cost per problem. Rounds found that interest in the incentive rose and fell from day to day, and in different parts of a single day's work, and that sometimes the subject increased his score at a greatly reduced cost per problem. Rounds points out that this seems to suggest an inner response which makes performance more efficient. He then raises the question as to whether the inner response is ~~de-~~

1. Clarence J. Leuba, "A Preliminary Analysis on the Nature and Effect of Incentives", Psychological Review, Vol. XXXVII (1930), pp. 429-440.

2. George H. Rounds, "The Influence of Incentives" Psychological Bulletin, Vol. XXXI (1925), p. 57.

dependent upon the incentive or merely accidental. Further experimentation needs to be done on this point but evidence up to the present seems to indicate that incentives do elicit some kind of inner response resulting in an "incentive attitude" which makes for more highly intensified attention and work.

Recognizing the influence of attention and attitude on learning it would seem reasonable to conclude that if incentives do create a more favorable attitude and more rapt attention to the process in question they thus increase the learning. This seems not only to explain in part at least the means by which an incentive produces greater activity but adds to the evidence of their intrinsic value.

It is important then to carry the question a step further. If incentives do create an "incentive attitude" evidencing itself in a more or less mild emotional state the inner response which they elicit is a problem still to be dealt with. It appears that incentives do not act in and of themselves as external agents but rather stimulate some kind of internal needs which having become aroused incite the individual into a state of tension. One might examine any one of the incentives

dealt with above in the light of this procedure. Take praise or blame for a simple example. It has been found through experimentation that usually if a subject is praised for good work he will do even better work. Praise, in itself separated from the praised individual, has no incentive value to that individual. One may be praised by others outside one's own hearing but until word of that praise reaches the individual who has been praised it has no effect whatsoever upon him as an incentive. When he himself is praised or hears or knows of himself having been praised he then responds by increased activity. The question now arises, why does he do this?

The increased activity may express itself and be measured in terms of muscular tension, increased production, less errors, or in other measurable units, but the full answer to the question is dependent upon the discovery of what are the inner responses to the incentive which cause these physical indications of a greater "drive" from within. Here again one may draw the distinction between a facilitating or inhibiting factor and an incentive. A facilitating or inhibiting factor may be totally explained in terms of physical or mental adaptations which it causes while an affective element appears to enter into the incentive situation. For example,

better lighting or ventilation may sufficiently remove physical barriers to one's best activity and thus bring about an increase in production but they in themselves do not incite greater activity. Likewise music, by toning up the physical rhythm of the body and uniting it to the rhythm of one's activity may facilitate but again not incite learning. Thus the relationship between incentives and motives appears as an important factor in the process.

Little attempt has been made to relate individual incentives to any particular basic drives or instinctive impulse, partly perhaps due to the fact that any such relationship could not be empirically proved. The data of experience, however, do point to the possibility of a close relationship between the two. One might draw an example from the time-worn incentive of re^ward. If one were to attempt an explanation of why this incentive is effective it would perhaps be said that one's desire for possession, acquisitiveness, self-display, or social approval were the single or combined elements which made the reward a stimulating factor. In the case of competition one's instinct of pugnacity, or the desire for approval, self-display, superiority, or power might be said to be the underlying basis for its effectiveness.

If this is the case therefore it would follow that the more inclusive was any incentive situation of factors affecting a number of innate responses, the more effective would be the incentive. This perhaps may account for the remarkable effectiveness of rewards when used as incentives. As has been pointed out earlier experience has shown that a reward given in private is less effective than one given in public. The reward given in private would seem mainly to elicit the response of one's acquisitive tendency, a desire to secure the reward for the sake of the reward itself, whereas reward given in public draws in addition to this upon other innate tendencies such as the desire for social-approval, self-esteem etc. Or again take the example of competition as an incentive. In a competitive situation it is usually found that the greater amount of publicity and recognition that is given to the results, the greater will be the strength of the competitive element. Actually what seems to happen is that the basic innate factor, which accounts for the effectiveness of competition and which is probably one's instinct of pugnacity, is strengthened but other tendencies closely allied to it such as self-display, superiority etc. are also recruited into the total situation and strengthen the force of the drive.

This inclusion of one or more innate tendencies in the total incentive situation may account in part at

least for one of the most baffling of problems confronting anyone attempting to experiment with incentives, that factor which has been mentioned previously, namely, their inter-relationship and their complexity. A prerequisite for any kind of experimentation in the field of incentives is a recognition of the difficulty of isolating any single incentive such as praise, cooperation, or punishment. Despite careful effort in the controlling of associated factors during the testing of any single incentive there is always the possibility of other incentives entering in. Although this has been recognized by everyone who has attempted research within this area of psychology, little attempt seems to have been made to explain it. It would seem, however, if the suggestion of the relationship between incentives and one's inner urges and innate tendencies is sound, then the possibility of one incentive arousing more than one innate tendency, or of the same innate tendency being aroused by several of the incentives would appear to account in some measure for the extreme difficulty of isolating a single incentive for objective study.

In addition to the personal and social, and positive and negative aspects of an incentive, there are several other attributes which seem to be applicable in almost

every case. The first of these is the above mentioned inter-relationship both among the incentives themselves and between incentives and motives, while a second has to do with the relationship of any incentive to the total environmental situation of which it is a part. An incentive which under some conditions might be very effective may prove to be totally ineffective in a situation where related conditions are slightly altered. This may be illustrated by a case in which girls threading needles for other girls doing embroidery were offered an increase in wages for improved out-put. This, however, was found to have no incentive value, which was contrary to most instances where increased wages were offered as a reward. Investigations revealed that the majority of these girls were being required to bring their pay-envelopes home to their parents and were therefore themselves not enough interested in the reward to work for it. When the incentive object was changed from a money reward to free time after they had finished a given number, incidentally a far higher number than their normal average out-put, they completed the work in less time than was expected by their over-seers to be possible. Thus it may be seen that the incentive object must be considered in the light of the total situation of which it is a part.

In the same manner a constant application of the same incentive may prove ineffective over a period of time as the novelty wears off. Furthermore, it has been found that the application of the same incentive at various times and in slightly different circumstances may not always yield the same results. This is illustrated by the varying results obtained between some experiments when conducted in the laboratory and in the normal school-room situation.

A final factor which seems important to an understanding of the incentive problem is that the attainment of the incentive goal must be made difficult if the incentive is to secure the best results. Too easily obtained results tend to cause the individual to work only hard enough to obtain them, while difficult incentive goals seem to call forth increased activity. It must be recognized at the same time, however, that if the goal is made too difficult and is recognized by the subject to be beyond the possible range of his ability he may become discouraged and cease trying at all.

In summary then, if an incentive is to be an effective tool for stimulating activity it must relate itself with one or more of one's innate tendencies; it must be satisfactorily related to the total situation of which it is a part; it must be new enough within one's immed-

iate experience as to arouse interest; and its goal must be difficult to obtain but at the same time within the range of the subject's possible achievement.

Approaching the problem of the effect of incentives upon learning from an objective point of view one finds a vast wealth of experimental evidence which points to their effectiveness in varying situations and gives considerable insight into the problem for use at the present time as well as suggesting many avenues of approach for further research. By far the greatest number of studies has been made upon the effect of self-competition or a knowledge of results.

SELF-COMPETITION

The fact that working without any information as to one's progress is likely to be uninspiring and in some cases discouraging is an accepted fact in the realm of human experience. It would seem that this is due not to some magical result of the mere information itself but rather to the situation created by this knowledge into which a competitive element enters and one consciously or unconsciously seeks to improve his own record. In the field of psychology, effort has been made to verify the fact of the effect of knowledge of results with scientific proof, and in some measure to quantify it in relation to other factors in learning.

The earliest reported work in this line was carried on about 1905 by Judd³ who actually experimented with the effect of practice when the subject was unaware of his results. He required that the subject judge the size and length of lines drawn from his sight. The test was conducted with only one subject who was tested for ten successive days. Judd found that the practice brought little if any change when the knowledge of results was not available to the subject, a fact which Judd attributed to the lack of motive for improving.

Spencer⁴ was the next to report and using a test similar to that used by Judd but with four subjects he found that in three out of four cases there was some improvement.

Arps⁵ made several studies on the subject. In a preliminary one he endeavored to measure by curves and by introspective statements the work done under conditions of partial awareness of results with work done under conditions of complete awareness. Although Arps reports much "crossing of 'known' and 'unknown' curves" he concludes that "work carried on under conditions of

3. C.H. Judd, "Practice Without Knowledge of Results", Psychological Review, Monog. Supp., Vol. M (1905), pp. 185-194.

4. L.T. Spencer, "The Effect of Practice Without Knowledge of Results", American Journal of Psychol., Vol. XXXIV (1923), pp. 107-111.

5. G.F. Arps, "Work With Knowledge of Results versus Work Without Knowledge of Results", Psychological Review, Monog. No. 28.

partial awareness of results loses in efficiency, and that such conditions are extremely difficult if not impossible to maintain, when such work is followed or preceded by work of identical character under conditions of complete awareness". In his second report Arps⁶ again deals with the problem with subjects using the Bergstrom Ergograph and makes the following conclusions: "Within the limits operative for the present study both the absolute amount of work and the rate of work done under conditions of knowledge of results exceed that done under conditions of ignorance of results."

Fere⁷ also experimented with the Ergograph and found that when his subjects were blindfolded or when the room was in darkness they did not do as well as they did when it was light enough for them to watch the progress of their work.

Wright⁸ also tested with the Ergograph, dealing especially with the effect of knowledge of results on work and fatigue, and found that more work was accomplished when the results were known to the subject.

Kirby⁹ about 1913 carried on an experiment on the

6. G.F. Arps, "A Preliminary Report on "work With Knowledge of Results versus Work Without Knowledge of Results", Psychological Review, Vol. XXIV (1917), p. 449.

7. C.S. Fere, quoted by Arps, G.F., Psychological Review Monog. 28 (1920), pp. 1-41.

8. W.R. Wright, "Some Effects of Incentives on Work and Fatigue", Psychological Review, Vol. XIII (1906), pp. 23-24.

9. T.J. Kirby, "Practice in the Case of School Children" Teacher's College Contributions, No. 58.

effect of knowledge of results with 135 school children in the actual school-room situation. Addition and division problems were used and the children were informed of their success and failures by use of graphs and other devices. Kirby found that these devices brought about a distinct gain in the work of the students, in fact, a median gain of 48% in addition and 75% in division.

In 1917 Chapman and Feder¹⁰ reported a similar experiment carried on in the Grade 5 A in the Cleveland Observation School with 36 boys and girls. Simple addition, cancellation, and the Digit Symbol Test were used. Extended practice was given to the children who were divided into two groups, one working under the normal conditions of the class-room, the others being given external incentives over and above those which might have entered into the normal situation. A curve of improvement was obtained extending over ten practice periods. The last mentioned group was given the following incentives: 1) each individual's results for the previous day were published; 2) on the sheets presented for the day's work the point reached the last period by that subject was marked in blue pencil; 3) the general improvement of the class was presented in the form of a

10. J.C. Chapman and R.B. Feder, "The Effect of External Incentives on Improvement", Journal of Educational Psychol., Vol. VIII (1917), pp. 469-474.

graph; and 4) credits were given in the form of stars for high scores and for gross improvement.

The other group was stimulated merely by the novelty of the test, the interest in the work, and the fact that the work was done under the conditions of serious school work. The first group had these plus the above listed incentives. Chapman and Feder report that the incentives produced a considerable effect on the amount of production, except in addition.

Coubal¹¹ once a month gave standard tests in reading, writing, arithmetic, and spelling to elementary school children and each time gave the children their previous records, urging them to try to surpass them. He found that "the pupils made on the average a gain in some studies twice as great as that made ordinarily in the course of the school year."

Whiting and English¹² carried on some laboratory tests in cancellation, multiplication, memory of nonsense syllables etc. and during one part of the experiment the subjects were informed of their results while in another part of the experiment they were given no information. They found that knowledge of results de-

11. Coubal, quoted from Hurlock, Journal of Social Psychol., Vol. 11 (1931) p. 262.

12. H.F. Whiting and H.B. English, "Fatigue Tests and Incentives", Journal of Experimental Psychol., Vol. VII (1925), pp. 33-49.

creased the number of errors made but did not increase the amount accomplished on the tests.

de Weerdt¹³ tested the effect of knowledge of results with children in the fifth grade in addition, reading, multiplication etc. Results were shown on graphs and by posting the individual scores. It was found that considerable improvement was made when these devices were used.

Perhaps the best known of all work done on this subject is that carried on by Book and Norvell¹⁴. Their experiments were conducted with university students of the last two years, and four different types of acquisition were selected for testing. The first of these had to do with the improvement of a purely muscular feat, that of making the small letter 'a' as accurately and as rapidly as possible. The second was to cross out certain letters in a uniform list of connected Spanish words, which involved discrimination, skill in eye-movement, and coordination of perceptual and motor responses. The third measured the rapidity with which certain simple sets of psycho-physical habits were formed and the fourth involved the acquisition of a purely mental feat.

13. E.H. de Weerdt, "A Study of the Improvability of 5th. Grade School Children in Certain Mental Functions", Journal of Educational Psychology, Vol. XVIII (1927), p. 547.

14. W.F. Book and Lee Norvell, "The Will to Learn", Ped. Sem., Vol. XXIX (No. 4), p. 305.

A stimulus and a control group were used and the following methods of motivation were employed with the stimulus group: 1) the subjects were required to count their scores after each practice and keep their scores before them while they worked; 2) verbal instructions were given both before and after the practice in order to make each subject feel that he could increase his score if he would try hard enough; 3) both the stimulus and the control groups were told to try to do their best, at the beginning of each practice period; 4) the stimulus group was urged to watch for any methods which might increase their efficiency and to use them, at the same time guarding against hindering factors; and 5) both groups were occasionally told that they should be doing better than they were doing. Each group worked part of the time as a control group and part as a stimulus group in order to study the results of a shift in the two types of motivation and procedure. When the groups were shifted the one was told to forget its scores while the other group was given its scores and urged to improve upon them.

Book and Norvell give in their report of this study the following results, which were true not only for the average of the group but for every individual within the group, as well as for men and women taken separately, and for both absolute and relative amounts of gain in each

type of acquisition studied, namely, that the stimulus section in all experiments made more rapid and continuous gain than did the control group, that the situation changed when the incentive conditions were reversed, and that the uninspired group made rapid and continuous gain when the set was changed. Another interesting finding was that the members of the stimulus group made fewer mistakes than did the control section but when the groups were shifted these same individuals became more or less careless in their work. It was also found that the abler students were influenced most by the incentives. One item especially to be noted is that in Book and Norvell's study, as soon as the incentive-affected members of the stimulus group became members of the control group their scores fell rapidly. The experimenters, in reporting this work, go into considerable detail in explanation of it and its implications for practical educational method.

The next to appear was a study made by Gilleland¹⁵ on the effect of practice with and without knowledge of results in grading hand-writing. Gilleland used three different situations, the first wherein the students worked without a standard and without knowledge of results, secondly, with a standard but without knowledge

15. A.R. Gilleland, "The Effect of Practice with and Without Knowledge of Results in Grading Hand-Writing", Journal of Educational Psychol., Vol. XVI (1925), p. 532.

of results, and thirdly, with both a standard and a knowledge of results. He found that when the subjects did not have an objective standard and when they were not given a knowledge of results they showed only very slight improvement in their grading of hand-writing.

Clay Campbell Ross¹⁶ has made two very valuable contributions to this field of study. The first is the result of an experiment reported in 1927 in which, in working with college students, Ross endeavored to determine the relation between knowledge of progress and achievement in one form of motor learning. Subjects numbering 59 were divided into three sections after an initial test on the basis of which the sections had been matched. They were required to make tally marks (++++) as rapidly as possible and were given a one minute practice period for nine successive days. One section was given only partial knowledge of its results, that is the subjects were told who was above and who below the average, a second section was given full information of their scores on the previous day, and the third section was given no information but was allowed to hear what was said to the other two groups. Special care was given to this group in that sheets of varying sizes were used each day in order that they could not easily

16. C.C. Ross, "An Experiment in Motivation", Journal of Educational Psychol., Vol. XVIII (1927), p. 337.

recall where they had stopped on the previous day.

On the eleventh day the procedure was reversed and the two groups with little or no information were given their results and those who had been given results previously were now kept unaware of them. Ross' general findings were that "even in highly motivated groups the addition of a single motivating factor, namely knowledge of results, was sufficient to give the pupils with knowledge of results distinct superiority over the others, and the degree of superiority is roughly proportional to the amount of information possessed." Indistinct figures with less than five lines were not counted, so the test was one for both accuracy and speed. It is interesting to note in this study that in the first two practices the progress for all three groups was practical identical but after that, according to Ross, the effect of the novelty wore off and the section with knowledge of results advanced steadily ahead while there was but little progress in either the group with the partial or the group with no information,^{al} though in general the section with no knowledge was behind the other. One of the most interesting results of this study is the point at which it differs with the findings of Book and Norvell, in that in Ross' study when the conditions of the groups were

reversed, the incentive stimulated group after nine practice periods with incentives was able to transfer their incentive power into the last two practice periods when they were not given knowledge of results. This is, of course, in direct contrast to the sudden falling off of Book's subjects after the incentive was removed. Ross believes this to have been due to Book's admonishing his students to "banish all thought and desire of improvement from your minds". Ross concludes, "however, such a letting-down need not occur and the motivating force so generated may be measurably self-sustaining." Ross found only a very slight correlation between general intelligence and motor ability of this particular type.

Inasmuch as his earlier experiments had been carried on in the laboratory, in 1932 Ross¹⁷ undertook a similar study in the normal school-room situation, with his regular class in psychology. This time, on the basis of a preliminary test, he paired his subjects into four groups. All four were given objective tests on the text they were using in their regular class work. The first group was given no information regarding results, the second vague information such as 'good', 'fair' and 'poor', the third was given partial information in that

17. C.C. Ross, "The Influence Upon Achievement of a Knowledge of Progress", Journal of Educational Psychology, Vol. XXIV (1933), p. 609.

the subjects were each told their point score, and the fourth section was kept after class, shown their papers and given full information. Seven tests were given. This experiment showed no statistically significant difference among the four groups. The largest difference was not between the group with no information and the group with full information but rather between the group with partial knowledge and the group with full knowledge. These results, it is quite evident, are not in accord with the previous findings in this field and Ross maintains that there are explanatory reasons why the laboratory and class-room situations showed such differing results. It is his belief that it is impossible to eliminate the subjective impression of the student regarding his progress in the normal class-room situation. He also believes that a single additional factor such as knowledge of results is an important event in the monotonous laboratory situation but as Ross puts it "only a trivial incident in the already highly motivated life situation in school". He also believes that knowledge and suspense in the laboratory are not the same as knowledge and suspense in the class-room. Ross repeated this experiment with two other classes and asked another professor to carry it out in his class. In all three additional studies the same statistically insignificant results

were found. There are a number of questions which might be raised in regard to these findings but their variance with the results of the laboratory findings are the most valuable point for discussion and shall be considered in a later portion of this study.

Sims¹⁸ conducted an experiment on the relative influence of two types of motivation on improvement. A portion of this study is relevant to a discussion of the effect of knowledge of results. Actually Sims was endeavoring to compare the effect of knowledge of results by which an individual endeavored to improve his records as one of a non-competitive group with the results in situations where the individuals competed with others individually and as a member of a group.

The findings which deal with section one in which the subjects were given no motivation other than that of seeing their own progress and that of their neighbors is the only point at which it affects a discussion of knowledge of results as the other two sections involved competition. The first test involved the making of substitutions which was practiced for three times a week for twelve practice periods of two minutes length. ~~With~~

18. V.M. Sims, "The Relative Influence of Two Types of Motivation on Improvement", Journal of Educational Psychol., Vol. XIX (1928), p. 480-484.

With section one no attempt was made to prevent the subjects from watching their progress nor to encourage them to improve. It was found, however, that over the period of practice this group improved 102.2%. Unfortunately there was no group from which the knowledge of results was withheld and consequently it is impossible to determine how much of this improvement was due to practice and how much to a knowledge of results.

Deputy¹⁹ conducted an experiment the title of which would imply that it had to do with this question. His subjects consisted of his philosophy class which he divided into three sections. To one section he gave a ten-minute written test each day, to another a twenty minute written test once a week, and to the third a ten minute oral review at each meeting of the class. The scores of the written tests were put on the blackboard at each meeting of the class. Deputy's findings are a little difficult to make clear, probably because the experiment was a combination of the relative values of written and oral reviews as well as the effect of a knowledge of results. He did find, however, that the daily written test increased the mean score "provided the attitude on the part of the student toward the work was favorable".

19. E.C. Deputy, "Knowledge of Success as a Motivating Influence in College Work", Journal of Educational Research, Vol. XX (1929), p. 327.

Panlasigini and Knight²⁰ made a very interesting study in this line with 4th. grade children in arithmetic. The one group had a set of standards by which to judge their work and progress charts were used for each individual and for the class records. The other group was a control group which was given no information. The experiment continued one day a week for twenty weeks and consisted of fifteen examples of the mixed type. The normal school-room situation was maintained as nearly as possible. A clear advantage resulted from the use of individual and class progress charts, the most advantage accruing to the abler pupils, but no significant disadvantage was evident in the case of the slower pupils. The writers state that " a beneficial effect of awareness of success thus was substantially in proportion to the amount of success available for motivation". The lowest quarter of the stimulus group did not suffer, however, from a knowledge of their failure, for they did as well but no better than the lowest quarter of the control group.

Brown²¹ carried on an experiment with 138 boys and girls in a large public school system. In his first experiment 7A grade children were studied and selected on the basis of their Terman score and their teacher's

20. I. Panlasigini and F.B. Knight, "The Effect of Awareness of Success or Failure", Nat. Soc. Stud. Ed., 29th. Year-book, Part 2 (1930), p. 611.

21. F.J. Brown, "Knowledge of Results as an Incentive in School-room Practice", Journal of Educational Psychol., Vol. XXIII (1932), p. 532.

estimate of their ability. In the second experiment grade 5A children were tested and they were selected on the basis of their grades and their teacher's estimate. The experiments extended over a period of twenty days. There was a ten-minute drill period for ten days on already learned types of arithmetic problems, and then after an interval of ten days the groups were shifted, inasmuch as one group had been given a knowledge of its results during these ten periods and the others had not. The experimenter was not present while the tests were being given. The regular class-room teacher took charge in order to maintain as nearly as possible the regular school situation. Brown reports that in comparing the stimulus and control groups during the same stage of the experiment, the stimulus sections made more continuous gain than the control sections.

Within recent times Manzer²² has made a study of the effect of knowledge of results on the out-put of muscular work. Manzer's findings throw an interesting light on the subject. In his experiments he used the two-handed Smedly dynameters. Manzer found that the knowledge of results or out-put is not only followed by a prompt upward turn in the curve of muscular work,

22. C.W. Manzer, "The Effect of Knowledge of Out-put on Muscular Work", Journal of Experimental Psychol. Vol. XVII (1935), p. 177.

but that telling the subject that he is going to receive knowledge before his work score begins, results in a prompt upward turn. Manzer maintains that this cannot be due to the knowledge of results but rather to the effect of expectation that such knowledge is about to be received. Manzer states: "Since the expectation of knowledge of results alters the trend of the work curve, it may be inferred that the effectiveness of an incentive such as knowledge of out-put depends in part at least upon the subject's understanding of its significance". Moreover Manzer found in his experiments that when the knowledge of results was discontinued suddenly there was no abrupt fall in the work curve. Manzer attributes this to the carry-over effect of the incentive. It was also found that when the subjects were urged to do one more "last and best" contraction a greater increase in mean out-put was realized when that suggestion was added to an already developed incentive than when there had been no preceding incentive.

Another comparatively recent study has been made by Craft and Gilbert²³ in which they worked with 50 men students of university age which they divided into two groups. The groups were thought to be comparable

23. L.W. Crafts and R.W. Gilbert, "The Effect of Knowledge of Results on Maze Learning and Retention", Journal of Educational Psychol., Vol. XXVI (1935), pp. 177-187.

in age, college class, intelligence and scholarship. One group, the control, learned the McGeoch and Melton Medium Maze first. Some months later the experimental or stimulus group learned the same maze with the following incentives: on a typed sheet they were given the average score of the control group and urged to try to do better than this average. They were told that they should know their results after every trial. The mean standard deviations showed for both learning and retention no difference between the control and stimulus groups. Crafts and Gilbert account for this with several reasons, namely, that probably most university students have some idea of the quality of work they are doing, that the students herein involved were interested in this experiment and tried very hard to do well regardless of controlled incentives, that the standard might have been emotionally disturbing, the absence of rewards, and the fact that the students worked alone without the presence of rivals, and lastly, that perhaps the triple criterion might have meant divided interest on the part of the participants. It would seem wise to add to this list of possible reasons for the varying of these results with those of similar experiments, that fact that it was only thought that the groups were comparable in age, college class, intelligence and

scholarship, as there was no effort made to scientifically equate the two groups. This may have meant that vast differences existed which might have favored the Control group. It would seem at first glance that this experiment brought little light to the subject at hand, but Crafts and Gilbert's own conclusions are worthy of note: "Our results, however, do suggest that the value of merely giving knowledge of results and defining the standards of achievement can easily be exaggerated, and that these are not incentives which can be expected to bring about significant improvement in learning without regard to the conditions under which they are employed".

Fay²⁴ reports an experiment conducted with a psychology class of 196 students on the effect of knowledge of results on the subsequent achievement of college students. The class was divided into two groups which had been equated on the basis of intelligence and their scores on an initial test of a psychological nature. Those in the experimental group were given their monthly grades in psychology in terms of letters, A, B, C, D, etc. and a decile rank. Those in the control group were given no grades except 'satisfactory', 'unsatisfactory', and 'failing'.

24. P.J. Fay, "The Effect of Knowledge of Results on the Subsequent Achievement of College Students", Psychological Bulletin, Vol. XXX (1933), p. 710.

The subsequent achievements of the two groups were compared in various ways. Scores on the first test were correlated with final examination scores, and intelligence percentiles were correlated with grades on the final examinations. It was found that students who received an 'A', or the highest attainable grade, at the end of the first month achieved much more throughout the semester if they were told their grades than if they were not, while 'B' students achieved considerably less. Students of lower intelligence achieved considerably more in the experimental group than the students of lower intelligence in the control group.

Waters²⁵ reports a similar study in which various groups were given different degrees of information concerning their success and failures. In one experiment the task was judging lengths of strips of card-board. In the second test the task was the estimation of a 12 second time interval. In the first experiment there appeared no relation between improvement and degree of information. In the second, improvement was roughly proportional to the degree of information given. Waters points out that this may indicate that the efficacy of knowledge of results as a factor making for improve-

25. R.H. Waters, "The Specificity of Knowledge of Results and Improvement", Psychological Bulletin, Vol. XXX (1933), p. 673.

ment is dependent in part upon the complexity of the task. There seems to be need for additional research upon this aspect of the problem.

Along this same line Smith²⁶ conducted two series of experiments on learning, the task being the estimation of the length of a line without knowledge of results. In these studies repetition alone proved to be an effective factor in learning.

If one endeavors to summarize the findings of the experimental work done on the effect of knowledge of results on learning, one seems justified in drawing the following conclusions: 1) All experiments whether for muscular skill or mental achievement, except that of Crafts and Gilbert, have dealt with the immediate results in learning, in terms of amount produced, time required or errors made. Little attempt was made to test the retention of learning, nor any comparisons made of the retention and recall of material learned under the incentive of knowledge of results with material learned without this incentive. This raises two interesting questions: a) Is learning which is accomplished under the influence of externally applied incentives retained and recalled more or less readily

26.F.O. Smith, "Repetition without Knowledge of Results as a Factor in Learning", Psychological Bulletin, Vol. XXX (1933), pp. 673-674.

than learning achieved without this incentive? and
b) do externally applied incentives continue to increase activity for future learning, or are they merely devices for immediate learning?

2) The failure of some of the experiments which were carried on in the actual school-room situation to show as positive results as those carried on in the laboratory, in many cases with psychologically trained subjects interested in the experiment, seems to warrant a repetition of Craft and Gilbert's statement: "²⁷...the value of merely giving knowledge of results and defining the standards of achievement can easily be exaggerated, and these are not incentives which can be expected to bring about significant improvement in learning without regard to the conditions under which they are employed". Manzer adds a point to this argument when he indicates in his study that the mere fact of telling the subject he would receive a knowledge of his results caused a prompt upward turn in the curve of muscular work, which gives evidence that knowledge of results in itself is not necessarily the inciting factor but the increase may be due to other incentives which are aided by a knowledge of results, such as the desire for praise or social-approval. It would be

27. L.W. Crafts and R.W. Gilbert, loc. cit.

valuable if this "awareness of being about to receive knowledge of results" were tested in the field of mental activity as well as muscular skill.

3) The possibilities of these additional factors entering into the situation raises the question of the place played by self-competition as an incentive, in any study of knowledge of results. No one would question the fact that possibility of this factor being present is very real. How much the improvement is due to a mere knowledge of results per se, and how much to the self-competitive impulse created or stimulated by the knowledge of results situation is not easy to determine. Some studies might be made, however, which would throw light upon this important factor of the existence and strength of the competitive drive within the individual.

It seems that considerable study has been done on the immediate effect of knowledge of results upon learning. The more fundamental problem of the basis or the contributive factors which cause the knowledge of results to affect the average improvement in learning seems not yet to have been investigated, unquestionably because of the difficulty in securing scientific evidence. Likewise, there seems to be a lack of experimental work on the

effect of knowledge of results on retention and recall. As one reviews the general field the way seems open for experiments dealing with the following as well as other possible avenues of research:

1) the retention and recall of material learned under the influence of knowledge of results as compared with that of material learned without a knowledge of results.

2) the effect of knowledge of one's being about to be informed of one's results as compared with learning minus such expectation.

3) the effect of mere knowledge of results as compared with a knowledge of results plus the urging to compete with one's own record.

4) a comparison of a group with no information and no incentives with a group urged to improve over previous performances without being given a knowledge of results; and these in turn compared with those of 3. above. Thus it might be possible to obtain some information on the value of self-competition in itself, and when aided by a knowledge of results.

5) almost nothing has been done in the way of study of the effect of knowledge of results upon various age groups, sex differences, and varying levels of mental capacity. Here again there is need for experimentation and new knowledge.

Despite the numerous experiments which have been carried on in this particular portion of the field of incentives there is still need for much further research in order to secure a better understanding of the incentive value of knowledge of results in all of its varying aspects.

GOALS AS INCENTIVES

It is amazing to note that within the field of personal incentives, self-competition is the only one of these personal incentives as defined earlier which has been subjected to any degree of experimental testing. The "seeking of a goal" as an incentive for increased activity is one of these unexplored areas. The satisfactions and stimulations contingent upon the seeking of goals are important aspects of the general problem of motivation. Their existence has been largely responsible for the inability of many eminent psychologists to agree with the behaviouristic interpretation of life as upheld by Watson or the sex-driven behaviour of the Freudian school.

Both the introspective and objective approach to behaviour seems to point to the almost universal tendency of mankind to seek goals. In other words, the value of goals in practically every phase of human behaviour seems to be a casually accepted belief, yet there appears

to be no scientific experimentation either in psychology or education which sheds light on the significance of this factor in the learning process. The way seems to be open for innumerable interesting and valuable studies in this line, and although again as in the case of almost all other incentives isolation of single factors and control of the entire situation are difficult to obtain, the possibilities for research are many. The setting of goals in learning may be a valuable incentive, but experimental evidence of it is lacking. The following might serve as suggestions of lines of approach to the testing of the value of goals in learning:

- 1) Studies might be made in which a control group with a knowledge of results but no set goals might be compared with an experimental group also given knowledge of results but in addition having set for them goals several points higher than that of which the average performance of the group might indicate they were capable under normal conditions of production. Within the scope of such a study might be included research on the various aspects of the problem from the point of view of the individual's performance as an individual, and again as a member of a group, seeking

group goals rather than individual goals. Further studies might then be made upon the effect of this incentive on varying age groups, differences of sexes, and the various levels of mental capacity, as well as on retention and recall of material learned under such conditions.

2) The above mentioned studies approach the problem primarily from the point of view of the seeking of goals for the joy of achieving them. There remains still another approach to the problem from the point of view of a goal which arises from a sense of immediate and environmental need. This might be illustrated by the case of a boy who wishing to make for himself a kite will first be stimulated to master the technique of kite-making and certain scientific laws regarding the flying of kites, in order to make one which will work successfully when completed. This type of goal-seeking is unquestionably much more difficult to test than that previously referred to, but its value is perhaps no less significant. The project method in education frequently employs the principle herein involved but little attempt seems yet to have been made to test the value of this incentive from a scientific point of view.

OTHER PERSONAL INCENTIVES

The remaining of the above listed personal incentives namely cooperative endeavor, power, and idealism are in

a similar state of having been little tested in the field of experimental research.

Cooperative enterprise seems to offer a vast field for study. Increasingly public opinion and social philosophy in many parts of the world are stressing the importance of the cooperative approach to the economic, social, and political problems of the day. There are at the same time loyal supporters of the capitalistic system who maintain that competition is the well-spring of all progress, and without it individual effort would become so thwarted as to seriously affect all advancement in every field of human activity. The value then of the scientific studies which might be made on the relative effects of the cooperative and competitive approach, although it be done in the field of learning, would be of great significance to the trend of modern thought. The question remains to date unanswered as to whether or not cooperative endeavor can be made to stimulate and produce as great results in the field of learning as can be obtained through a competitive situation. Unfortunately, the cooperative situation is the more difficult to "create" for the purpose of scientific study than is one of competition but it might be obtained with careful planning and supervision, and does offer to the psychologist and to the educator the opportunity not only

of contributing to the knowledge of their own fields but of clarifying by the production of scientific evidence, a controversy in political, economic and social thinking which at present is being upheld on both sides by mere opinion and chance observations and conclusions.

The effect of power and idealism as incentives in learning are much more difficult to test experimentally and scientifically than any incentives heretofore reviewed. Their close affiliation with other driving forces in human nature may account for this in some measure. The stimulating power of an ideal may be due to many causes, one's desire of praise for having obtained one's ideal, the accompanying sense of achievement and power, the competitive element of surpassing one's fellows, or any other of a number of factors. In other words idealism may be merely the result of a few or many other factors combining themselves and producing the ideal as a stimulating factor in itself. The difficulty of artificially creating ideals and applying them for experimental testing places the problem of idealism almost beyond the scope of an experimental study of incentives.

The effect of the desire for power is also a difficult aspect of the problem to isolate for experimentation, perhaps not so much because of its inherent quali-

ties which render isolation and artificial creation impossible as because of the fact that due to fear of undesirable concomitant results little or no testing has been done in which power over other individuals and things has been given to individuals in order to test its effect scientifically.

The influence of the desire for power seems obvious in everyday life. One need only to glance at the development of dictatorial governments within the twentieth century to see the driving force of the desire for power on the parts of those men who have become the leaders in such political regimes. To what degree this is a universal characteristic possessed of all mankind, or merely one of many means of expression which may or may not become dominant in the life of an individual seems still to be open to question, as does the fact of how much learning activity can be stimulated by the effect of power which such learning gives to an individual. Much experimentation needs to be done before any authentic light can be shed upon this problem, and even then one must not ignore the relationship of the securing of power as an incentive with the effect of rewards. Superficially at least it would seem that there is a close relationship between these two aspects of the incentive problem. Rewards may be effective due to a sense of power that might accompany them, or again the desire for power might

be classed as a reward or goal to be sought for its own sake or for the joy and satisfaction of seeking it. At present the problem between the desire for power as a motive and the desire for power as an incentive appears to be so inextricably bound up with one another that a definite classification of power as being one or the other would seem unwise.

SOCIAL INCENTIVES

Consideration may now be turned to those more obvious and generally accepted types of incentives which have been designated as social incentives, or those incentives in which persons or things outside one's own self form a necessary part of the total situation.

Foremost among these is rivalry and competition. As has been pointed out above competition has long been accepted as perhaps the strongest single force in human history which has spurred man into activity. More and more its desirability as the important element in stimulating social activity is being called into question and the problem not only becomes one for the psychologist and educator but for politicians, statesmen, and philosophers as well. One might venture to say that centered around the problem of competition as an undeniable driving force in man lies the future destiny of the governments

and civilization of the world. Is the lure of participation in a cooperative enterprise strong enough an incentive that individuals, classes, groups, nations, and governments will abandon the laissez faire policies of the past generations and unite in a cooperative plan for world economy, or is the strength of the competitive impulse so strong that individuals, classes, and nations will refuse to relinquish it? Will advancement in science politics, and culture be stultified were cooperation to displace competition as the keystone of social philosophy? The psychological implications involved in this problem are worthy of study and consideration.

Despite considerable discussion on the effect of rivalry and competition upon learning the amount of actual experimentation upon the subject is somewhat limited.

Among the earliest of such studies was that of Triplett²⁸ who as early as 1897 experimented in his laboratory on pace-making and the turning of fish-reels at maximum speed, after which experiments he concluded as follows: "the bodily presence of another contestant participating simultaneously in the race serves to liberate energy not ordinarily available".

28. N. Triplett, "The Dynamogenic Factors in Pace-making and Competition", American Journal of Psychol., Vol. 1X (1897-98), pp. 507-533.

English²⁹ used a series of laboratory tests with four subjects of university age. Part of the experiment was carried out without any incentive and part when the subjects were divided into two competing groups. There was no objective proof of increased work, but the subjects reported that they thought they must have done better because they worked harder.

Hand-printing was the medium used by Whittmore³⁰ in his laboratory tests with 12 university students. An improvement in the work of all of his subjects was found when they were divided into groups which competed against one another. He found, however, that the quality of work was poor when competition was introduced. His subjects were divided into three groups, the first being given the following instructions: each individual was told to "try to beat your fellow-workers". Another group was urged "to try to get as much done as possible in order to beat the competing group"; while a third group was simply told to try to get as much done as possible. Whittmore concluded from his study that all of the subjects turned out more work in a competitive situation; that the homogeneity of the group with respect to speed of performance was the same for competition as for non-competition; and thirdly, that the slowest subjects profit most from

29. H.F. Whiting and H.B. English, "Fatigue Tests and Incentives", Journal of Experimental Psychol., Vol. VIII (1925), p. 349.

30. I.C. Whittmore, "The Influence of Competition Upon Performance", Journal of Abnormal and Social Psychol. Vol. XLX (1924-25), p. 236.

competition. In a subsequent study he found that competition begins with a period of adjustment during which the competition increases, and that there is less rivalry with the group as a whole than with particular individuals within the group, or with one's self. As a result of questioning his subjects he found that half of them preferred non-competitive work, suggesting that competition produced a worry and strain which hindered efficiency.

Sims³¹ experimented with 126 second and third year university students, using substitution and rate of reading tests. He employed in his study both individual and group competition. On the basis of an initial test Sims divided his subjects into three groups which were tested three times a week for twelve practice periods. The first section was given no information other than that which comes naturally in an artificially produced classroom situation such as that created for this study. The second section was divided into two groups which competed against one another. Before beginning practice the average score for each group for the preceding period was read to these subjects and a graph presented to show the standing of each group. The members of each of the groups were then urged to work as hard as

31. V.M. Sims, "The Relative Influence of Two Types of Motivation on Improvement", Journal of Educational Psychol., Vol. XIX (1928), pp. 480-484.

possible to increase the score of their own group and improve its standing. In the third section the members were divided into pairs. Before beginning practice each individual's score was called out and as this was done each member entered on a graph his own and his opponent's scores. The three highest and the three lowest, the three making the most and the three making the least improvement had their names read before the class with praise or blame as was deserved, and then all were urged to work harder to surpass their respective opponent's score. In the portion of the experiment dealing with substitution Sims obtained the following results:

Section I- Control Group- improved from 36 substitutions per minute to 72.8, or an improvement of 102.2%.

Section II-Group Competition- improved from 36.1 substitutions per minute to 75.8, or an improvement of 109.9%.

Section III-Individual Competition- improved from 36.2 substitutions per minute to 93.3 or an improvement of 157.7%.

In other words those subjects participating in group competition improved 7.7 points in per cent over and above practice effects, while the individually-paired competitors improved 55.5 points in per cent over and above practice effects. Sims concludes that "to the extent that reading and substitution are typical of learning in general,

one may say that the groups here concerned show individual motivation to be the superior form". Or again "individual motivation is vastly superior to group motivation and group motivation is but slightly superior to no motivation other than that which comes incidentally to learning".

Fere³² used the ergograph with his subjects and found that when a person looks at another making the same movements as he was, his efficiency is increased, or more explicitly that the amount of work accomplished is increased.

Among those experimenters who have worked in the actual school-room situation rather than in the laboratory or in created school-room situations is Hurlock³³ who conducted an experiment with 155 Fourth and Sixth grade children. She used a modified Curtis Arithmetic Test. The children were divided into control and rivalry groups. The purpose was to test the influence of group rivalry. The experiment was carried out daily for one week and conducted within the normal school-room situation of the subjects. On every day the average score of the rivalry group exceeded that of the control group. Final results showed that the gain of the

32. C.S. Fere, See W.H. Burnham, "The Group As A Stimulus to Mental Activity", Science, Vol. XXXI (1910), p. 761³/₄767.

33. Elizabeth Hurlock, "The Use of Group Rivalry As an Incentive", Journal of Abnormal and Social Psychol., Vol. XXII (1927), p. 278.

rivalry group over the control group, over and above practice effects, was 41%. Hurlock also found that the use of rivalry increased accuracy. In her own words she concludes: "rivalry is an effective incentive with school children".

Maller³⁴ made a very significant study with 1538 school children in which he endeavored to measure the influence of competition as opposed to cooperation. According to his findings "work done under competition was consistently and significantly higher than under cooperation". The pupils of average intelligence were found to be more cooperative than those of very high or very low intelligence.

In 1903 Mayer³⁵ reported an experimental study in which he endeavored to compare the influence of work in isolation and that in group situations in which spontaneous rivalry developed. He used written and mental arithmetic tests, writing from dictation, learning nonsense syllables, and completing of sentences. His subjects were fourteen year old boys. Both individual and group testing stressed speed and quality, then speed alone, and then quality alone. When testing speed and quality together competition caused an increase in scores

34. J. B. Maller, "Cooperation and Competition", Teacher's College Contrib. to Educ., 1929, No. 384, pp.176

35. A. Mayer, "Ueber Einzel-und Gesamtleistung des Schulkindes", Arch. f.d. Ges. Psychol., Vol. 1 (1903), p. 276.

over those made in isolation by from 30% and 50% while errors decreased and individual uniformity increased in the group performance.

Moede³⁶ in 1914 reported a study on the effect of rivalry on speed of tapping and strength of hand grips with individual and group rivalry. He worked with seventeen 12-14 year old boys. He found that the boys made better records in group competition than in individual competition while both kinds of competition produced better records than when the work was done in solitary tests. He found that the more rapid tappers suffered reduction of speed when in competition with others while in the hand grip tests the rivalry attitude was wiped out by the superior opponent's will to conquer.

About ten years later another German, Müller³⁷ carried on some experimentation with children both in arithmetic and paper cutting. His aim was to compare the effect of competition as an incentive with that of practical utility and altruism. He found that competition always brought about increased work, especially among the younger children of the group.

Hetzer³⁸ in a study of popular and folk play of chil-

36. W. Moede, See F.H. Allport, Journal of Experimental Psychol., Vol. 111 (1920), p. 280.

37. J. Müller, "Versuche über die Einwirkung von Motiven auf Körperliche und geistige Leistungen bei Schülkindern", Zeitschrift f. angew. Psychol., Vol. XXIV (1924) p. 81.

38. H. Hetzer, quoted by P.J. Greenberg-see following page

dren found that before the age of three years rivalry and competition in play are absent. Between 3 years and 6 years 8% of all children's play she found to be of a competitive nature.

Buhler³⁹ also made a study with young children, concerned primarily with despotism and rivalry in babies. She reported the following findings:

1. The child of the first half year does not yet enter into a relationship of despotism and rivalry.
2. In the second half year rivalry and despotism are found vigorously developed.
3. Age relationship plays a very definite part in the stages of development of rivalry and despotism. Only children of approximately the same age (maximum difference being $2\frac{1}{2}$ months) rival each other, and the older child is almost always the despot.

Although these studies are concerned not so much with the effect of rivalry upon learning, they do aid in throwing light upon the question of the development of the rivalry spirit within the individual. In this same classification a study by Greenberg⁴⁰ may also be included.

39. Charlotte Buhler, H. Hetzer, and B. Tudor-Hart, also quoted by P.J. Greenberg. See below.

40. P.J. Greenberg, "Competition in Children-An Experimental Study", American Journal of Psychol., Vol. XLIV (1932), p.221.

Greenberg worked with children from 2-7 years of age. The children were asked to build with blocks, and then by effort on the part of the experimenter a competitive spirit was sought by judging which building was "the prettier" and then building again with the aim to build "prettier than the other child this time". Greenberg judged the presence of the competitive impulse by the following criteria:

1. an understanding of the problem
2. interest shown in the problem through:
 - a. physical signs of interest
 - b. attention
 - c. remarks showing interest
 - d. technique in building
3. a competitive attitude toward the other child
 - a. such as, watching or copying, grabbing, offering help etc.

On this basis she drew the following conclusions:

1. Competition in building with blocks is not found in children of all ages, nor in all children of any one age.
2. There appear to be four fundamental factors affecting the display of competition in building with blocks:
 - a. the degree of the child's understanding of

the idea of excelling.

b. the degree of the child's ability to dominate the material.

c. the educational factor in the situation.

d. the individual temperament as a competitive factor.

3. The growth of the competitive impulse in the use of building stones seems to follow a well-defined and orderly course on somewhat the following lines:

a. Age group 2-3 years: no competition; child primarily interested in material.

b. Age group 3-4 years: some competition; a little better understanding of the idea of excelling, but still more interested in the social relationship than in the competitive situation.

c. Age group 4-6 years: competition; child manifests his desire to excel.

d. Age group 6-7 years: competition with increased critical judgment.

4. In the use of building stones, no competition was seen at all in children of two years of age.

Greenberg concludes that "at least 90% of six year olds have it (the competitive impulse) well developed. It can be said to make its appearance at the age of four". In

other words, rivalry begins to show effect upon the child's performance at about the age of three or four, usually resulting in a decrease in out-put of work until about the age of five when the child begins to make very positive effort to out-do his fellow-worker, with the results that his efficiency is usually increased.

Closely allied to the problem of rivalry and competition is that of the effect of working with other individuals although no effort is made to develop competition within the group. It is thought, however, that the presence of other individuals creates a spirit of competition which may account for the results obtained in studies made upon the subject. Several of these studies have already been mentioned. A few others deserve recognition. Most significant of these is the study made by Allport⁴¹ who in working with college students found that in association tests the speed was greater when the subjects worked as a group, while in thought tests the amount of work was increased by the presence of a co-working group but the quality of the work was lower than when the subjects worked alone. Allport also found that the effect of the group was greatest in mechanical activities.

Meumann⁴² found that the presence of a spectator in-

41. F. H. Allport, "The Influence of the Group Upon Association and Thought", Journal of Experimental Psychol., Vol. III (1920) p. 280.

42. Meumann, quoted by E. Hurlock, Journal of Social Psychol., Vol. II (1931), pp. 277.

creased the muscular performance of a subject. In the case of his study with seven 13-14 year old pupils performing on the ergograph and dynamometer better performances were made in the presence of spectators than when the subjects worked alone.

A summarization of the findings of the experimental work carried on in relation to the problem of competition and rivalry will be attempted at this point.

It has been suggested that there are probably as many incentives affecting the quality and quantity of mental work as there are kinds of likes and dislikes in human life. Rivalry is perhaps the most evident of all of these incentives. Despite this fact some writers have found it very difficult to summarize or interpret their results even after careful experimentation on the subject. Irrespective of this situation we shall endeavor to summarize the findings of those investigators who have experimented with the problem of rivalry and who have ventured to draw some conclusions from their findings.

Triplett, English, Whittmore, Pere, and Moede worked almost exclusively with tests of skill, pace-making, hand-printing, ergograph, tapping and similar tests in-

volving bodily skill and coordination. All except English concluded that his subjects turned out more work in a competitive situation. English found no objective evidence of this result, but subjective reports from his subjects indicated that they thought they had worked harder under competitive influences. It should be noted that Triplett and Fere based their conclusions more upon the effect of the presence of a fellow-worker than upon the positive creation of a competitive situation.

Whittmore and Moede found opposite results in their studies in regard to the effect of group versus individual competition. Whittmore found that group competition caused a lesser out-put of work than individual competition but Moede found that group competition made for better results than individual competition. Whittmore found quality poorer under competition and speed unaffected by it, with the slowest subjects profiting most from competitive influences. Moede found that the more rapid tappers did poorer work in a competitive situation but in the case of the better subjects in the hand grip tests this was not true.

Sims, Hurlock, Maller, Mayer, and Müller all worked with material involving mental operations. All found competition to have a positive effect upon learning to

a more or less degree. Mayer like Triplett and Fere was concerned primarily with the presence of a fellow-worker, judging his findings on the basis of the effect of spontaneous rivalry rather than on a positive planned competitive situation. Both Hurlock and Müller found that the younger children within their respective groups responded more to the influence of rivalry than did the older children. It should be noted that the average ages of the two groups compared by Miss Hurlock were 12.03 years and 9.03 years. On the basis of Greenberg's study and that of Hurlock one might venture to say that from experimental evidence thus far produced competition seems to be an effective factor especially between the ages of 5 and 9 years.

Sims is the only investigator who worked with problems of mental ability with subjects of adult or university age. He found that individual competition greatly increased the work done by his subjects. It would seem, however, that much of the value of Sim's findings at this point is lost when one considers the extraneous incentives other than competition which were introduced in his motivation of this experiment. It will be noted that in addition to creating a rivalry situation by announcing the scores of all of the members of the rivalry group Sims read off the names of the people holding the three highest

and the three lowest scores, as well as the three making the most and three making the least amount of improvement, accompanying them with the deserved praise or blame. In this way it would seem that the factor of praise and blame in a public situation might possibly have been strong enough to greatly alter the effect of competition alone.

In the light of these results a number of possible investigations seem to present themselves to the research worker, among them being the following:

1) It will readily be noticed that all results of the above experiments had to do with immediate effects upon learning. No attempt seems to have been made to establish to what degree "forced" learning under the stimulus of a competitive situation is effective over a period of time. There is definite need for research at this point.

2) Buhler, Hetzer, and Greenberg have brought to light an interesting aspect of the problem in attempting to ascertain the strength of the competitive impulse in the early stages of childhood and experimental evidence, to a degree at least, is available for children up to the ages of 7 years. Hurlock dealt with children of 9 and 12 years of age and further experimentation with this age

group seems advisable to definitely establish by comparison with her results the effect of competition on older and younger children. The determination of the effect of competition and rivalry at various ages beyond those studied by Hetzer, Buhler, and Greenberg would be of value in the field of psychology and education.

3) Various other aspects of the problem need further study. Among them the comparison of the effect of competition when two individuals are competing against one another, when one individual is competing with a number of other individuals, and when one is competing as a member of a group with another group. Comparative studies of the relationship between competitive effort and cooperative undertakings, between competition and goal-seeking, or between competition and any of the other commonly accepted incentives are all possible channels of research which would be of great value.

PRAISE AND BLAME

In the study of praise and blame and their relationship to the learning process once again common experience enters in and attempts to determine one's attitude in regard to their respective merits. Confusion appears early in one's thinking however, as it immediately becomes obvious during a process of introspection that both

praise and blame may have one or the other of two effects. In the case of praise it may be so definitely pleasing as to stimulate one to further and much greater activity, or it may on the other hand be so definitely reassuring and satisfying that one begins to feel that he can "rest upon his reputation" and consequently expends less rather than more effort in the learning process. Likewise blame may so discourage one that he assumes an attitude of resignation and defeat, which rather than acting as a stimulus, may have a dampening effect which deters activity, or again it may give one a sense of shame so great that in order to avoid a continuance or recurrence of its causes, the individual will try much harder than before to please, and by so doing improve his performance.

According to the recorded experiments on this subject not all of the above assumptions have been experimentally proved, nor found to be true. A brief review of these studies will, however, present some interesting facts.

In a number of the studies dealing with knowledge of results the factor of praise or blame entered in, as in the case of Kirby's experiment where children were urged to do better and praised for improving their scores, and likewise in the studies of Book and Norvell and others. Some experimental work has been carried on, how-

ever, dealing directly and specifically with the problem of the effect of praise and blame. Scott⁴⁴ reported an experiment undertaken by a college foot-ball coach who used encouragement as a means of securing greater exertion on the part of his athletes and found that "ordinarily the increase was marked, sometimes as much as fifty per cent".

Gilchrist⁴⁵ made a study in which he endeavored to evaluate the use of praise and reproof with university students. Two groups of subjects were tested over a period of time, one receiving reproof, the other praise. He found that the reproved group did not improve even from practice, while the praised group improved 79 %.

Gates and Rissland⁴⁶ give us some light on this subject through an interesting study which they conducted with 74 college students on motor-coordination and colour-naming tests. The subjects were divided into three groups, one section of which received praise for its work, a second was given unfavorable comment and asked to repeat, while the third section was given no comment. The experimenters found very slight differences in the average improvement or in the percentage of individuals within

44. W.D. Scott, "Increasing Human Efficiency in Business", New York: Macmillan and Co., 1923, p.10.

45. E.P. Gilchrist, "The Extent to which Praise and Reproof Affect a Pupil's Work", School and Society, Vol. 1V (1916), pp. 870-874.

46. G.S. Gates and L.Q. Rissland, "The Effect Of Encouragement and Discouragement upon Performance", Journal of Educational Psychol., Vol. XIV (1923), pp. 21-27.

the three groups who improved. The external factor of praise, reproof, and no comment seemed to have little effect, but such difference as there was seemed to be in favor of encouragement or discouragement rather than in repetition without either. From these results the experimenters ventured the suggestion that to make some comment was better than to make none, and that it is a little better to make an encouraging than a discouraging remark. They also found that the relatively poorer students were more likely to be affected unfavorably by discouragement than the relatively proficient persons.

Hurlock⁴⁷ conducted two very interesting experiments in this connection. In the first of these she found that by the use of praise, intelligence test scores were raised while the control group, which had only the continued practice, made very slight improvement. The average I.Q. score was raised 7 points with praise and less than one point by practice alone. Her second study was for the purpose of comparing the effects of praise and reproof, and to determine what effect if any, hearing another group praised or reproofed had upon a group which received neither praise nor blame, but which was actually ignored.

47. Elizabeth Hurlock, "The Value of Praise and Reproof as Incentives for Children", Arch. Psychol., No. 71 (1924), pp. 1-78.

106 school children of average ages of 9 and 11 years were given modifications of the Courtis Research Test in Arithmetic. Fifteen minute practice periods were given for five consecutive days with every attempt made to maintain the normal school-room situation. The three groups were tested in the same room and a fourth, the control group, was tested in a separate room. The children were divided into these four equated groups upon the basis of their scores on an initial test. The control group was given the test without comment of any kind, for the purpose of discovering the effect of mere practice. Of the other three groups, one was known as a praised group, the members of which were called forward at the beginning of each practice period, and praised before the other students for the work done on the previous day, and were then urged to do better on the test about to be given. The second group was known as the reproof group, and likewise each day ^{as} were reproofed before the other students for their ~~ir~~ previous day's work and urged to try to do better. Both the praise and the reproof was given individually, not to the group as a whole. The third group known as the ignored group received no recognition whatsoever. In this experiment it was found that the greatest amount of average improvement was made by the praised group, with less in the reproofed group, and none in the ignored group. Ages

of the children did not seem to affect the value of praise or reproof. In fact, Hurlock quite emphatically concludes that "regardless of age, sex, initial ability, or accuracy, praise is decidedly the most effective of the three incentives here investigated".

Cohen⁴⁸ conducted a very similar experiment with children except that the tests were administered by the regular class teacher rather than by an experimenter to eliminate the incentive factor of an outsider coming into the situation. She reported "that although the use of incentives does not make a tremendous difference in the work of the class as a whole, yet incentives do seem conducive to somewhat more accurate work".

Laird⁴⁹ and ⁵⁰ conducted some introspective tests with both high school and college students and found from their reports that they were of the opinion that public reproof decreased the amount of work they did while public praise increased it.

In addition to these studies on praise and reproof two interesting investigations have been made on the effect of ridicule and 'razzing'. Briggs⁵¹ made a study

48. A. Cohen, "A Study of Incentives Under School-room Conditions", M.A. Thesis, Columbia University, 1927, quoted by E. Hurlock, Journal of Social Psychol., Vol. II (1931)

49. D.A. Laird, "How Some High School Students Respond to Different Incentives", Ped. Sem., Vol. XXX (1923), p. 358.

50. D. A. Laird, "How the College Student Responds to Different Incentives of Work", Ped. Sem., Vol. XXX (1923), p. 366

51. T.H. Briggs, "Praise and Censure As Incentives", School and Society, Vol. XXVI (1926), p. 596.

with high school students in which he found in a group of 152 subjects that 64.5 % did poorer work when sarcasm was used by their teachers in front of other students, 40.7 % did poorer work when sarcasm was used in private, and 17.9 % when students heard it directed to other students.

Laird⁵² in a study with fraternity pledges found that in motor tests, steadiness was lessened, motor coordination less accurate, and fatigue greater when the subjects were ridiculed.

Thus it is obvious that comparatively little experimentation has been done on this subject. The evidence in favor of reproof or blame seems to be even less than that available for praise. This may be due in part to the dangers involved in the use of the former. Increasingly teachers are becoming aware of the dangers involved in scolding children for failure in work without first ~~making~~ making a careful investigation of the underlying causes of the failure. This would seem to be particularly true in the case of individual reproof. The development of the psychological-analytic point of view has brought to light manifold dangers inherent in a single unhappy situation which may seat themselves in the unconscious and reappear in a new form to cause great

52. D.A. Laird, "Changes in Motor Control and Individual Variations under the Influence of 'Razzing'." Journal of Experimental Psychol. Vol. VI (1923), p. 236.

difficulties in later life. The popularization of the 'inferiority complex', the significance of children's bad dreams, and other general psychological knowledge have made those in a position to use praise and reproof as incentives to learning rather hesitant in using them permiscuously. In any experimentation it would seem wise to insist upon reproof being used in relation to a specific failure or a particular piece of work done badly, and never in the manner used by some teachers of accusations such as "you're stupid", or "you're a nuisance".

The findings of these experiments which have been made might be summed up as follows, mindful however of the limited number which makes too inclusive generalizations unsound. In cases where an ignoring of the pupil was included within the experiment results seemed to indicate that either praise or blame is better than a complete ignoring of the subject, and that praise is somewhat more effective than reproof. There remains much investigating to be done on the subject of the effect of praise and blame at varying ages, upon individuals of varying degrees of ability etc. Some aid is given by the work done on the effect of punishment and reward, for the close relationship of these two aspects of the incentive problem with that of praise and blame is obvious.

Praise may in many instances be a more effective reward than money, and there are many children who would rather be "whipped than scolded". Consequently the study of the problem of punishment and reward may be helpful in shedding further light on the subject of praise and blame.

PUNISHMENT AND REWARD

The problem of the effect of punishment and reward is closely allied to the general problem of how one learns. The question as to whether motivation (striving) produces learning (strengthening of the bonds) or the learning produces the motivation, or whether some third and still more basic process enters in and produces both is one that has been a source of debate since the beginning of psychological research. Closely related to it has been the problem of the positive or negative stamping-in effect of a punished response. Consequently much work has been carried on under the title of research on punishment and reward and which although closely allied to the problem of incentives has actually dealt with the problem more from the point of view of their contribution to the explanation of the mechanism of the learning process than as incentives. The principal personalities within this field have been Thorndike, Lorge, Meunzinger, Eisenson, Epstein and others. Their findings, although of much importance are not intimately enough related to the problem of this study to be included here. Rather

the subject matter herein will be restricted to those studies dealing with punishment and reward when and as they are used primarily as incentives in learning. Unfortunately the amount of available material is limited.

In the case of punishment most experiments have dealt with the effect of disagreeable stimuli such as the electric shock or a strong light on simple motor functions. Typical of such studies is that of Craft and Gilbert⁵³ in which they set out to compare the retention of a maze learned by human subjects under two different degrees of motivation, the first being merely the normal laboratory situation, the other that plus the addition of an electric shock for error. They found in working with 110 university students that the experimental group (receiving shocks for errors) learned more easily. In retention there was no significant difference between the groups but in re-learning the male experimental group was slightly superior to the control group and the female markedly superior to the control group. Craft and Gilbert conclude "that an act learned under more motivated conditions will be better retained and so presumably better fixated than one learned under less motivation, and this in spite of the fact that the greater incentive makes possible the attainment of the learning criterion with a less amount of practice and so with decreased frequency

53. L.W. Craft and R.W. Gilbert, "The Effect of Punishment During Learning upon Retention", Journal of Experimental Psychol., Vol. XVII (1934), pp. 73-84.

of responses". One might assume from this that punishment can be a contributing factor in learning, at least in some cases. It is also perhaps permissible to assume that the more rapid learning may have been due to the unpleasantness of the punishment which created within the subjects the desire to avoid this result and consequently increased the speed with which they learned. It would be interesting to know how a third group rewarded for correct choices might have compared with the punished group. In a second study made by these men they concluded that a signal for error may serve not only as a punishment but as a guide as well.

Bunch and McTeer⁵⁴ carried out an experiment along similar lines in which they administered electric shock as punishment for errors in human maze learning. They found that "administering punishment for errors during the mastery of a stylus maze resulted in decidedly quicker learning by all criteria (reduction in amount of time, number of errors, and number of trials)." At the end of six weeks they measured retention by the relearning method and found that those who had received punishment for errors during learning showed greater retention but in recall those who learned the maze without punishment received higher scores.

54. M.E. Bunch and F.D. McTeer, "The Influence of Punishment During Learning upon Retroactive Inhibition", Journal of Experimental Psychol., Vol. XV (1932), p. 473.

Violent stimuli of light, sound, and electric shock have been found to increase muscular contraction and thus increase speed of production. Johanson⁵⁵ compared the effects of knowledge of previous reaction times with the effect of an electric shock for punishment in slow reactions, and found that both produced acceleration but the electric shock produced a greater increase by 8.8%.

Bunch⁵⁶ found that the use of an electric shock for punishment in human maze learning caused an increase in efficiency regardless of criteria with the exception of the amount of time required per trial.

Jensen⁵⁷ studied the effect of punishment by electric shock on a raised finger maze performance and concluded "This study has shown marked influence of punishment by electric shock upon errors and trials and possibly upon rate of movement under conditions described".

Vaughn⁵⁸ in a study of the value of various types of instruction concluded that the most effective was ~~in~~

55. A.M. Johanson, "The Influence of Incentive and Punishment on Reaction Time", Arch. Psychol., No. 54 (1922), p.54.

56. Marion Bunch, "The Effect of Electric Shock as Punishment for Errors in Human Maze Learning", Journal of Comp. Psychol., Vol. VIII (1928), p. 340.

57. M.B. Jensen, "Punishment by Electric Shock as Affecting Performance on a Raised Finger Maze", Journal of Experimental Psychol., Vol. XVII (1934), p. 65.

58. J. Vaughn,, "Positive vs. Negativ Instruction" N.Y.: National Bureau of Casu~~ality~~ and Surety Underwriters, 1928. pp. VIII ± 172.

instruction accompanied by punishment actually administered, and that the more certainty there was attached to it the more effective was the punishment, and that instruction unaccompanied by punishment rapidly loses its effect.

On the other hand Hamilton⁵⁹ in an experiment on discrimination found that punishment and reward had very little difference of effect.

Vaughn and Diserens⁶⁰ in a study of the comparative effects of three intensities of electrical punishment on learning and efficiency found that the average reaction time was reduced as the intensity of the punishment increased. This they believed to be due to the additional attention given by the subject to the task at hand in order to avoid the punishment.

In contrast to Johanson who gave electric shock for slowness in reaction time Rexroad⁶¹ did a similar test but shocked for inaccuracy rather than slowness. He discovered that in this experiment punishment acted as

59. H.C. Hamilton, quoted by J. Vaughn and C.M. Diserens, Psychological Bulletin, Vol. XXVI:11 (1931), pp. 15-65.

60. J. Vaughn and C.M. Diserens, "The Relative Effects of Various Intensities of Punishment on Learning and Efficiency", Journal of Comp. Psychol. Vol. X (1930), pp. 55-66

61. Carl N. Rexroad, "Administering Electric Shock for Inaccuracy in Continuous Multiple Choice Reaction", Journal of Experimental Psychol., Vol. IX (1926), pp. 1-19.

as an incentive for discovering a method of procedure that was more efficient. All but one of his punished subjects reported having selected a method by which to work. Punishment therefore in this study had the effect of increasing performance.

Dodson⁶² attempted to determine the relative values of satisfying and annoying situations as motives in the learning process by first conducting a study with white rats and later taking the problem into the field of human behaviour. His subjects in the latter case were university students from an elementary psychology class who were required to work with a multiple-choice apparatus. 20 subjects were trained with satisfying and 20 with annoying stimuli, while 16 who were to be used as a control group were trained with no special incentive. The group working under the conditions of satisfaction were told they would receive a piece of chocolate candy for each correct choice, and if they completed it all as quickly as the average of a group doing it with electric shock for errors they would receive a five pound box of assorted chocolates. Individuals were told that if they did as well as the best in the electric shocked group they would get an 'A' or the highest possible grade in the course for the term. Finally the instructor told

62. J.D. Dodson, "The Relative Value of Satisfying and Annoying Situations as Motives in the Learning Process", Journal of Comparative Psychol., Vol. XLV (1932), p. 147.

them: "I assure you that you are just as capable as the other subjects".

The group working under conditions of annoyance ^{as} were given the following instructions: "For each wrong choice you will receive an electric shock which will be rather unpleasant but below the point of danger".

The control group ^{as} were told: "This is no mental test. We are trying out these problems to see if they will be appropriate to use in an experiment on learning. We shall think just as much of your ability whether you do these problems in a short time, or take a long time".

The electric shock group finished 10 problems with an average of 116 trials; those working with satisfying conditions and the lure of reward took 131.7 trials to finish 10 problems; and the group working without incentive needed 172 trials for the same 10 problems. In all cases the number of errors corresponded very closely to the number of trials. Dodson suggests that the experiment is unsatisfactory due to the fact that some of the subjects memorized the series. It should be noted also that the element of competition entered into the work of the group working under satisfying conditions and not in the other two groups.

In a similar test using the same types of motivation

but having his subjects work with a blinded maze, Dodson found that the annoyed group finished on the average of 18.44 trials, the satisfied group in 24 trials, and the control group with 38.77, with 64.11, 85., and 164.55 errors respectively. Dodson found no basis for the rate of learning in the capacity of the individual as determined by the Army tests. He also found that the results do not differ radically with the results he secured in testing white rats. He concludes: "If I am correct in my interpretation, the most satisfying situation will not result in so rapid a learning process as the most favorable annoying situation. The response to be conditioned under a satisfying situation is tied up with no drive so definite as the 'fear drive'." For education this means "If the native drive is strong and definite the new response may be readily conditioned; if not, the process of conditioning will be slower." In accord with the earlier statement regarding the use of punishment and blame Dodson has this to say: "In spite of the effectiveness of the fear drive as a motivating response with which to link up a response to be conditioned, it should be used in education only when it is a part of the life situation because when it is dropped out of the set the desired response is no longer assured*.

It will be noted that practically all of these studies

have dealt with the use of the electric shock as punishment. How reliable would be these findings if the form of punishment were changed to some other type of physical punishment cannot be ascertained. On the effect of other forms of punishment there is very little published experimental work.

Barnes⁶³ in a study whereby he obtained from 4000 school children their reactions to punishment through written themes on the subject found that punishment involving bodily pain was longest remembered by the children.

Hazard⁶⁴ made a study of 42 women prisoners at the N.Y. State Reformatory for Women and found that only 10 of the 42 women refrained from a repetition of law-breaking because of fear of punishment.

The question of the use of punishment in education is still a debatable one and many opportunities for research lie open to the investigator. If other types of punishment can be found to stimulate learning to the same remarkable degree as has been found in the case of the use of electric shock the wise use of effective punishment may have something important to contribute

63. E. Barnes, "Punishment As Seen by Children", Ped. Sem., Vol. 111 (1894-96), p. 235.

64. H.H. Hazard, quoted by E.B. Hurlock, Journal of Social Psychology, Vol. 11 (1931), p. 277.

to educational technique even in a period when the progressive trend is away from it. One cannot ignore, however, the psychological implications with which one becomes involved when resorting to punishment. The correct balance and the proper use of punishment seems not yet to have been definitely established, and the administration of punishment at the present time seems to depend almost entirely upon the personal opinion of the teacher rather than upon a scientific understanding of its effective use. For this reason the application of punishment should be made with the greatest caution and understanding, and every effort should be made to (scientifically) determine its effects ^{on} learning and its after-effects on the affective life of the individual. The question seems to remain open: Can one by other incentive techniques, secure results equal or superior to those secured through the use of punishment, or are there cases where punishment is the most effective means of obtaining desired results? If so, what are effective and desirable types of punishment? and if not, what techniques can be used in its place?

Very little systematic experimentation seems to have been carried out on the effect of reward outside the field of industry. In everyday experience the use of rewards

is a common occurrence, and this fact alone would seem to warrant some scientific investigation to verify the wisdom of its use. Surprisingly few studies have been made.

Crawford⁶⁵ in a study of scholarship awards at Yale University found that the applicants for scholarships excelled the average of the class in grades. How much of this may be due to the incentives of the reward and how much to the ability and natural aptitude for good work on the part of the scholarship applicants cannot be defined.

Knight and Remmers⁶⁶ took a group of fraternity pledges who had been undergoing rather severe mental and physical harassing and another group of third year university students outside the fraternity and tested both groups with simple addition tests. The pledges were made to believe that their test results would affect the possibilities of their initiation into the fraternity. Thus motivated this group added an average of 21. columns per person over against an average of 11. columns by the non-motivated group. Knight and Remmers conclude by saying: "The difference between a genuine motivation such as the Freshmen had and the kind of motiva-

65. A.B. Crawford, "Effect of Scholarship: A Study in Motivation", Personality Research, Vol. 1V (1925-26), p. 391.

66. F.B. Knight and H. Remmers, "Fluctuations in Mental Production when Motivation is the Variable*", Journal of Applied Psychology, Vol. VII (1923), p. 209.

tion a college class contains, is a difference which not only off-sets extreme fatigue, but further off-sets Freshmen vs. Junior ability, and in addition produces twice as much work per unit of time with equal accuracy."

Most significant of the studies dealing with the effect of reward is that conducted by Leuba in which he attempted to determine how much subjects will exert themselves rather than do without the reward. His subjects were 35 children of the 5 A grade in one of the public schools in Syracuse, N.Y. Their average age was 11.3 years. The material used consisted of simple 2-place multiplication problems of uniform difficulty, given to the subjects in twenty-one 10 minute work periods extending over two months time. The definite object of the experiment was to compare the average performance of a group of children when incentives were excluded from their work setting with that which they would do if necessary to obtain a known amount of an objective incentive such as a 5 cent chocolate bar.

The first two of the work periods were of a preliminary nature for purpose of adaptation to the general setting. Then followed four work periods without incentives, in which no one counted the problems he had done or even looked at them. In the next 5 trials the

67. Clarence J. Leuba, "The Measurement of Incentives and their Effect: A Contribution to methodology and Orientation Resulting from the Experimental Use of Incentives", Journal of Social Psychol., Vol. 111 (1932), p. 107.

experimenter told the subjects that those who did at least the number of problems marked on their sheets would receive a bar at the end of the ten minute period. Each subject's number differed according to his previous record. The first requirements were easy but they increased in difficulty as the experiment progressed. Then followed a set of three trials without incentives. Then chocolate bars were given in the order of decreasing rather than increasing difficulty until nearly everyone obtained one. This again was followed by a set of no-incentive trials and on the last two trials the experimenter used every type of incentive he could think of, rivalry, praise etc. as well as the chocolate. For each subject there was then calculated a chocolate performance index equal to the average of his highest output when the requirement for the chocolate was increasing to a maximum, and of his highest out-put when the requirement was decreasing from that maximum. This index indicated the number of problems the subject would do if necessary to secure a bar.

The average chocolate performance index for the lowest quartile showed a gain of 92% over their level of work when incentives were absent. For the highest quartile the gain was 32% and the average gain for the group

taken as a whole was 52. %. Though the slow multipliers gained the most proportionately (in terms of %) they tended to gain the least absolutely (in terms of number of problems).

The average for each no-incentive set, even after the incentives had been applied, varied by only one-half problem from 23.4 problems. There seemed to be a low and fairly constant no-incentive level of work for the group. There was no reliable difference between the performances of the boys and girls. The boys averaged slightly fewer problems during the no-incentive trials but had slightly higher chocolate performance indices. One phase of the problem which Leuba made not attempt to evaluate was the effect of setting goals. The comparison of a group working with set goals with one working without any specific goals would be interesting to determine the value of the goals, as well as their relationships to reward situations.

As in the other aspects of the incentive problem here too remains room and need for a great amount of further research to determine the effect of various types of rewards, and the incentive effect of a reward for its own sake by comparing reward situations with situations in which honor, praise, social recognition, and other

factors usually accompanying rewards are present but no rewards offered.

Industry is much in advance in the study of the effect of rewards, and its contribution to the subject will be dealt with in the section on incentives in industry.

Several studies have been conducted dealing with a combination of incentives or with allied aspects of the incentive problem. The first has to do with the effect of various combinations of incentives and was conducted by Chapman and Feder⁶⁸. The combined effects of competition, reward and praise were tested in this study. The method employed was to give extended practice in three types of tests to two similar groups of children, one working in the normal conditions of the class-room while the other was motivated by additional incentives. 36 children from the 5 A grade of a Cleveland Observation School were the subjects and the tests used were the Simple Addition Test as used by Thorndike, a Cancellation Test, and a Digit Symbol Test. On the basis of their initial scores on the Addition Test the subjects were divided into two equated groups. Each day for nine successive days after the preliminary tests they practiced

68. J.C. Chapman and R.B. Feder, "The Effect of External Incentives on Improvement", Journal of Educational Psychol., Vol. Vlll (1917), p. 469.

for 10 minutes on addition, one minute on cancellation, and five minutes on substitution. The motivated group was given additional incentives in that each individual's results for the previous day were published, the point reached the previous day was marked with pencil on each day's new sheet, graphs were made of the general improvement of the class, and credits were given in the form of stars to those in the upper 50% of the class, and ^{to} those who in the amount of gross improvement were in the upper 50%, and finally prizes were to be given at the end to the 50% of the group who had gained the most stars.

The results of this experiment have already been referred to under the effect of a knowledge of results but more detailed findings will be given as the study is now being considered for other incentives as well. As has been pointed out the incentives were found to produce a considerable effect on the amount of production. The motivated group made the greatest amount of improvement over the non-motivated group in the addition test where the practice period was the longest, less in substitution where the periods were shorter, and still less in cancellation. These findings are significant in regard to the problem of the length of periods during which children are asked to maintain interest in the normal

school-room situation.

A second study dealt with the problem of practice vs. motivation and was conducted by Symonds and Chase.⁶⁹ The experimenters worked with sixth grade children and using the Charters Diagnostic Language Tests, by a scheme of test, practice, and re-test they attempted to determine the respective influences of practice and motivation on learning.

In the first part of the experiment the children were given no motivation other than that of the normal school-room situation. They were given one practice on the first test, three on the second test, five on the third, and ten on the fourth test, in order to determine the effect of practice with no motivation. In the second part of the experiment the test results were used to stimulate the children into attempting to improve their scores. In the third part, an attempt was made to create intrinsic motivation by interesting the children directly in improving their own English usage.

The experimenters concluded that the most important single factor in learning in the case of repetition and the types of motivation used in this experiment is the amount of repetition. 10 repetitions in the non-moti-

69. P.M. Symonds and D.H. Chase, "Practice vs. Motivation", Journal of Educational Psychol., Vol. XX (1929), p. 19.

vated group caused more learning than any combination of three repetitions with more powerful types of motivation. Secondly, that intrinsic motivation such as that manufactured in the second part of the experiment caused no learning in addition to the practice carried on at the same time. It may be, however, that experienced situations are stronger in motivating influence than described situations such as had to be used in this experiment. The motivation in which the subjects were given their results and urged to try to improve upon them caused learning over and above that which could be explained by practice.

Symonds and Chase conclude further that the most effective device that can be applied to learning is to increase the amount of practice or drill, the prime function of motivation being to make this practice more palatable. The most effective means of extrinsic motivation the authors believe to be the offering of prizes, the stimulating of competition, and informing the learner of his progress. Finally, the situation that best provides for learning is one in which every pupil has abundant opportunity to practice under stimulations to which he is sensitive and in a situation containing as many elements as possible like those in which the learning will be used. Some compromise must be made as it is prac-

tically impossible to include or obtain a maximum of these three factors in the ordinary school practice.

A third study within this group is that of Warden and Cohen⁷⁰ who tested 38 nine to thirteen year old children on addition problems over a period of nine weeks. Every effort was made to maintain the regular school environment and the tests were given by the regular class teacher. Various incentives were used on different days with intervening days when tests were given but no incentives applied. The incentives used included the promise of a story which would be read to the class, the playing of a game as a reward for good work, praise and reproof. During the course of the experiment great stress was laid upon accuracy during the giving of directions. As a result the subjects showed greater improvement in accuracy than in speed. The authors conclude from their results that "these commonly used incentives are not as effective as might be supposed, at least insofar as the type of task investigated is concerned, when applied under school-room conditions".

Another study to be included within this group of allied subjects is Lehman's⁷¹ investigation on motiva-

70. C.J. Warden and A. Cohen, "A Study of Certain Incentives Applied Under School-room Conditions", Journal of Genet. Psychol., Vol. XXXIX (1931), pp. 320-327.

vation: College Marks and the Fraternity Pledge in which he attempts to discover the sustained effect of artificially stimulated learning. He made a detailed study of the average grades of Ohio State University first year students using both fraternity and non-fraternity students. He found that during the first semester at the university the students, both men and women, who in order to be eligible for initiation into their fraternities were required to make a certain standard of grades, did a better quality of work than was done by them during any succeeding semester for six semesters during which the study was made for men, and four semesters during which it was made for women. Only the non-fraternity men were studied but it was discovered that they did the poorest work of any that they did during the first six semesters of their university work, during the first semester. Lehman points out that this is indicative of the fact that the external motivation of fraternity scholastic requirements serves as a temporary impetus but does not produce a greater "love of learning" for an extended period of time.

Lastly, in any study of incentives the contributions made by animal psychology to the subject must not be overlooked. Many experiments have been conducted in this field but having been confined by the limitations of

the subjects they have dealt primarily with the incentive values of food, thirst, and sex as incentive objects stimulating the subject to activity for the satisfaction of inner drives and urges aroused by these incentive objects. The higher complexity of human life introduces individual and social incentives which are not present in animal life as we know it. Moreover, the fact that hunger, sex and thirst in humans as "pure" drives are difficult to control, as well as the fact that the needs of man in our present civilization are comparatively well-met in regard to these basic drives, the problems of incentives for human behaviour takes one into less positive and more complicated areas where concept formation, interpretations, and other factors attendant upon man's higher intellectual capacities enter in, in addition to simple physical needs. Detailed reviews of the work done on motivation in animal psychology are given by Shepard, Vincent, Washburn, Watson, and others and are of interest and value for specific details.

INCENTIVES IN INDUSTRY

Industry is far in advance of education and psychology in experimental projects to determine the effect of various types of incentives upon the out-put of workers in practical situations. This may be due to many reasons

the most obvious being that conditions in a factory or shop simplify the control of experimental elements and are easier to define than those in the class-room. Or again it may be said that the mercenary demands of our time have superceded our intellectual and social demands and men have been more concerned with techniques that make more money than they have been with devices that stimulate the acquiring of knowledge. In any case, when one considers the comparative youth of industrial psychology one must recognize the great strides which have been made in it. Foremost among its concerns has been the problem of incentives.

Industry has some theoretical as well as experimental evidence to give to this problem. Most significant perhaps is the pointing out that no single incentive continues to be steadily and increasingly stimulating in industry. Some incentives may be effective for a time but when the novelty is worn off their effect diminishes.

The two important elements in an industrial situation are the relief of monotony and the creation of the "will to work". In order to achieve either of these there must be present in the situation novelty, a happy state of mind within each individual, and the existence of a good "esprit de corps" among the workers. The two latter are dependent upon many factors, the health of the workers,

satisfactory and pleasant working conditions including good lighting, ventilation, etc., and a feeling of fair play among the workers themselves and between employer and employees. These in themselves will do much to create an attentive attitude towards one's work but if the work is of a monotonous type the worker is often inclined to work at a level lower than that of which he is capable. For that reason various devices for stimulating the worker have been inaugurated with the factory situation and their effects recorded for evidence of their incentive value.

Investigations thus far, not considering those dealing with facilitating and inhibiting factors such as light, ventilation, music, etc., seem to group themselves under three types of incentives, those of reward, cooperation, and goals.

Odom⁷² as a result of a study with 600 membershops of the National Trades Association stated that "it would appear that there is somewhere between 30% and 40% difference between production and earning under a straight time or day method of wage payment and under an incentive plan".

The Boots Drug Company Ltd.⁷³ have reduced their work

72. W.E. Odom. "Report on 600 Shops of the National Metal Trades Association", Industrial Psychol., Vol. 111 (1928), pp. 228-229.

73. Margaret Horsey, "A 5-Day Week At Boots, Ltd.", Human Factor, Vol. 1X (1935).

week to five days with full six-day salary without decreasing the out-put.

Miss Margaret Horsey⁷⁴ reports "an attempt to investigate scientifically by close observations of a small group of workers for a period of rather more than a year, the effect of different methods of payment under industrial conditions". It was found that bonus payments brought an increase in output of 46% and a change to piece-rate brought an additional 30% increase, over the time-rate payment which was found to be comparatively ineffective as an incentive to work.

Lee⁷⁵ reports a study in which reward and the setting of a goal were combined as an incentive. The findings of this study are particularly significant. Girls threading needles for older girls doing embroidery were found to average 96 dozen needles a day per girl. An experiment was undertaken whereby the girls were to be paid by piece-rate rather than by straight time. This seemed to have little effect of the workers, in fact the output fell off rather than increasing. It was found that inasmuch as the majority of the girls were obliged to take home their pay envelopes to their parents, the wrong incentive was being used. Next the investigators tried setting a limit

74. Margaret Horsey, "Incentives in Repetitive Work", Human Factor, Vol. VIII (1934), p. 163.

75. C.A. Lee, "Some Notes on Incentives in Industry", Human Factor, Vol. VI (1932), pp. 180-182.

of 100 dozen per day with the understanding that when this amount was finished the girls might go home. On the second day at 2:30 p.m. all of the girls had completed their 100 dozen. The regulation has now been made that if a girl does her quota each day of the week she is allowed Saturday morning off, and the present record stands at 300 dozen per day.

Despite the seeming advantages obtained by the use of wages as a reward for greater output in industry, industrial psychologists are quick to point out that over a period of time the effectiveness of these incentives tends to become static, and to induce an undesirable attitude on the part of the worker. This is due to the fact, it is thought, that under such a system the workers violently resist change when business conditions demand it, and secondly because it appeals to only one side of a worker's nature, and develops an individualistic attitude which in time may become anti-social. A combination of financial and non-financial incentives has been suggested as a more desirable alternative.

The cooperative approach has begun to be used more extensively in place of rewards as a stimulating factor for the worker. Among its various types of expression is the "wall-newspaper" in which the accomplishments of the various departments, the accomplishment of the firm

itself, the complaints of the workers, and all aspects of the employer and employee problems may be "aired" and thus create a feeling of cooperation. The mere idea of being a part of a rapidly growing concern may in itself serve as an incentive. Giving workers the opportunity of purchasing shares of the stock of the company frequently creates this same feeling of working in cooperation with others for something which is in part one's own.

The most interesting development of cooperation in industry has probably been that made in Russia, and Miles⁷⁶ has dealt with this in a paper in which he points out: "The chief incentive to effort (in Russia) is the young worker's sense of being united in a struggle against nature for the common advantage". Miles suggests however, that the most difficult period will come when the force of this incentive has subsided. It has been kept alive as long as it has by several dominant factors the foremost being the fear of starvation and the desire for food and shelter, the hatred of previous conditions which is kept alive by propaganda against the church, royalty, the old army etc., ideals held and worked for by such groups as the Young Communist Movement, and lastly, the feeling of ownership in national and municipal possessions.

76. G.H. Miles, "Incentives in Russian Industry", Human Factor, Vol. VI (1932), p. 281.

Moreover, Miles points out that in most highly industrialized countries the process of mechanization has taken several generations to reach its peak, and the incentive to submit to it has rested until recent times largely in the lure of higher wages and the comparative security of employment in times of good trade. Within recent years this security has faltered and increasingly we are coming to look for other incentives for man's activity.

There are many other studies which have been made in the field of industry which have not been discussed here. This is particularly true of those investigations dealing with facilitating and inhibiting factors such as fatigue, light, ventilation, music etc. The above, however will suffice to show the importance of the help which is being given to the general problem of incentives by the industrial psychologist.

CHAPTER THREE

EXPERIMENTAL STUDIES

Before any new experimentation is to be undertaken in the field of incentives and motives there are several questions which must be dealt with and decided upon. It would seem that too often there has been confusion in the value of the findings of much of the experimentation done, due to the insufficient definition of terms. The following questions seem to present themselves for answering before actual experimentation is decided upon:

1. Is the testing to be done with new material to be learned? or with the execution of previously learned material, or with both?

This is an important question, the choice of which determines the value of the findings for application in educational psychology. Experimentation is needed to determine whether identical incentives affect both types of learning in identical ways. It is important in experimenting on incentives to determine and to distinguish between the effect of an incentive on the subject's ability and capacity for achieving new learning and its effect on his execution of or improvement in the execution of already learned tasks. Take for example the difference between a group of children working on an arithmetic test of problems similar to those which they have

previously learned in the regular school program as compared with, let us say, a substitution test of a type which they have never before been given. Are not the results likely to be quite distinctly different? Testing is needed to show whether or not they are, and the value of an experiment must be considered in light of this possibility of variation in types of learning.

2. Is the testing to be done for speed, accuracy, or quality, or a combination of any or all?

It will be noted that in some of the experiments on rivalry and competition the emphasis has been put solely upon speed, while in others errors have affected the final scores. One must decide before commencing an experiment which of these factors is to be the object of each new study.

3. Is the testing to be done for mental achievement or physical skill?

In previous experimentation some workers have endeavored to study the effect of incentives on physical skills, such as hand-printing, finger-movements, strength of hand grips etc. Others have tested with mental tasks such as addition, substitution etc. The distinction between the two types is important.

4. Is the testing to be done in the normal school-room situation, in the laboratory, or in a life situation such as is the case in industry?

It has been found that results may differ in the use of the same incentive in the laboratory as compared with its use in the class-room. Evidence seems to point to the fact that environmental factors and contingent elements in the total situation alter the effect of the incentive. It is important that this be borne in mind in all studies and that as detailed an account of the complete situation be given as is possible, as well as a consideration of these factors in the drawing of conclusions.

5. With what age group is the experimentation to be done?

Here again the same incentive has been found to have varying effects when used with different age groups. Conclusions regarding the effect of an incentive should be made only to include subjects of the age with which the experimenting has been done.

6. What incentive is to be tested, and how much do other incentives enter in?

The inter-relation and inter-dependence of incentives has already been pointed out. The importance of this fact being recognized in all experimental work is important, and results should take into consideration

how far complete isolation of the tested incentive was able to be secured.

7. What techniques are to be employed to create the incentive situation?

It is evident that there is an almost unlimited area of experimentation open to one interested in research in this field. Some choice must be made within a limited section for a study of the nature and proportion of the present one. It was therefore decided that due to the importance of the question of competition in the world at large, and because of the need for further work to verify some of the findings and hypotheses of others who have contributed to the subject several studies would be undertaken as a part of this paper in an attempt to add to the experimental material already accumulated. To adequately cover the subject it would be necessary to test all types of competitive activity, self-competition, competition with other single individuals, competition with other individuals in a group, and competition as a member of a group with another group, both on the learning of new material, and on the execution of already learned material. Moreover it would be necessary to test its effect on speed and accuracy each individually and then in com-

ination with one another; on both mental achievement and physical skill; both in the laboratory and the classroom with adults and children of varying ages; and finally with various techniques for the creation of the competitive spirit and in comparison with other incentives. This is a task too great for this thesis. Therefore it has been necessary to limit experimentation to certain specific avenues of study.

Three experiments have been made. All three were similar in that they all tested with improvement in an already learned mental task, both speed and accuracy were taken into account in all three tests, and practically the same technique was used in all three for creating a competitive spirit.

The experiments differed in that one was conducted in a laboratory type of situation while the other two were conducted in the class-room. Each experiment tested subjects of a different age. In the last two experiments the subjects were tested not only for the immediate effects of an incentive upon learning but also for its effect on permanent learning, one after a lapse of one month, the other after a three month interval. Detailed accounts of each of the three experiments follow with the accompanying conclusions based on the findings of these studies.

EXPERIMENT ONE

The first experiment studied the problem of the effect of competition on learning. The material used was in the field of mathematics and dealt with a type of problem the technique of which had already been mastered. In other words, the subjects were required to work simple short division problems, assuming that they had been familiar with the process of short division for some years.

The subjects were students from the general psychology class of Edinburgh University who had volunteered to participate in the experiment. The total group included 20 men and 36 women, or a total of 56 who fully completed the experiment. Of this number 19 were grouped in the Control Group, 17 in the Individual Competition Group, and 20 in the Group Competition Group. It should be noted that a few of the students participating were also members of a class in statistics in the university in which they were called upon to do considerable amounts of mathematical calculation. This fact may have raised their initial scores but should not have altered their later results except insofar as any practice they might have gained preparing work for their statistics class may have been over and above the casual use of short division in every day life which the other students encountered.

On the first day the entire group was given an initial test, being required to work as well and as quickly as they were able for a period of five minutes or until told "Stop". On the basis of their scores on this initial test they were matched into three groups. The differences in the initial scores for each of the three groups in the final records is due to the fact that several students in the Control and Individual Competition Groups failed to complete all of the tests and therefore were dropped from the final records.

One group was to be known as the Control Group, the second as the Individual Competition Group, and the third as the Group Competition Group. On five successive occasions following the initial test, and extending over a period of two weeks, each group was given a new test, or practice period, using the same form of test as that used in the initial test but with varying figures. These practice periods lasted for five minutes.

The following incentives were given to each of the three groups:

Section 1: The Control Group was given no information as to ^{its} ~~their~~ progress but told each day to work as best ^{it} ~~they~~ could. The general outline of the experiment had been explained to the entire group at the initial

test period so that this group knew something of the general proceedings of the experiment, and inasmuch as they were students enough interested in experimental work to volunteer to participate, it might be justifiable to suggest that despite efforts to keep them from watching their own progress daily, they perhaps did so rather inaccurately by gauging how far down on the papers they had progressed each day.

Section 11: The Individual Competition Group was given full information of ^{its} their results. Each day the names of all members of the group were read off, giving their scores and then their ranking within the group on the previous day's test. They were then urged to work very hard in an effort to raise their scores and improve their ranks in the test about to be given.

It should be noted that although this section is referred to as an individual competition group there is an element of group competition present as well, for the individual is competing not only with another individual but with all the individuals in his group. The distinction lies, however, between this type of competition and a situation such as existed in the third section where individuals competed as members of a group rather than as individuals within a group.

Section III: The Group Competition Group was divided into two sections whose initial scores were approximately equal. One group was to be known as the Scottish, the other as the American team. Prior to each new test the subjects were given the average score for each team, and the amount of improvement shown by each. The members were then urged to work harder than ever to bring up, or keep up their respective team's record. The fact that the examiner was an American giving tests to a group of Scottish students seemed to give a fair amount of congenial interest and pride in the scores of the respective groups, although it was felt by the examiner that it was very difficult to "create" a competitive spirit with the subjects of this age group.

The accompanying charts and graphs serve to show some of the more interesting aspects of the experimental results. Table I and II show the total scores for each group and the per cent of increase for each, while Graph I plots the progress for each of the three groups. Tables III and IV record the Standard Deviation and P.E. Averages respectively. It will be noted from these charts that the Group Competition Group did the poorest work, being excelled by both the Individual Competition and Control Groups. The Individual Competition Group exceeded the Group Competition Group in average score at the completion

of the test by 10.7 and the Control Group by 13.2. In other words, in absolute production both competitive groups excelled over the Control Group. In terms of per cent, however, the results differ, as the per centage of gain for each of the three groups was as follows:

| | |
|------------------|--------|
| Control | 71.6 % |
| Ind. Competition | 60.8 % |
| Grp. Competition | 59.1 % |

It will be noted by the charts that the statistical reliability of the differences was then computed for the first, third, and last tests between the control and each of the competitive groups, and between the competitive groups themselves. It will be noted that in few instances are the differences great enough that they may be regarded as true differences.

ANALYSIS OF RESULTS

These findings may be somewhat baffling at first reading inasmuch as they are not in keeping with the findings of similar experiments which have been carried on by other investigators. A further study of the results and an analysis of the situation may help in accounting for some of these discrepancies. It must be borne in mind throughout this entire analysis that this is not attempt at a definition of conclusive results. The limited num-

ber of subjects and the rather unusual situation under which the experiment was conducted, along with many other contributory factors make these findings of value only as they are considered in light of these facts, and any conclusions which may be drawn are in terms of this specific situation.

It should be noted that in the case of the experiments conducted both by Sims and Hurlock (which are the only two recorded experiments of which we know using the same type of motivation in a similar type of learning) the differences of the average scores of the competing and control groups were somewhat larger than the results of the present study. There are several factors which may account for these differences between the findings of Hurlock and Sims and our own. In the first place it must be noted that Hurlock's differences were greater than those found by Sims, and Sims' differences only slightly greater than our own. Hurlock found that a group working under the incentive of group competition improved 41.7% over and above practice effects while Sims' group competition subjects improved only 7.7 points in per cent over and above practice effects while the present study showed a slightly negative relationship. It must be remembered, however, that Hurlock was working with children of the fourth and sixth grades while Sims' study and the pre-

sent experiment were carried on with people of university age. Hurlock in her summarization points out that rivalry seemed to be a greater incentive for younger children than for older, which may account for the greater differences between competing and non-competing groups as found by Hurlock, and those of Sim's and the present study.

A second factor which has already been mentioned but which deserves further recognition and which may account in some measure for the findings of the present experiment is the completely voluntary action on the part of the subjects to take part in this experiment. There was nothing in any way compulsory about people participating, and every one who did so was enough interested in taking part that he or she was willing to come to the Psychology Laboratory for extra time in order to take part. The experimenter was not a member of the staff, and there was apparently no other possible reward for participation than the sheer pleasure and experience of having a part in a study of this nature. This being the case, it would seem reasonable to conclude that the subjects were highly motivated by sheer personal interest which may in some degree account for the exceptional performance of all three groups, most especially the control group.

There are several points of special interest to be found in the results. The first has to do with the scores

of the two groups participating in the Group Competition Group. Hurlock found that the competing group which took the lead the first day of testing maintained that lead throughout the experiment, and concluded that defeat had a bad psychological effect on the losing group which caused them to continue to lag behind. She further suggested that this might not be the case in work with older children. Our results show a different reaction.

The first day Group B. exceeded Group A. but the following day Group A. went ahead of Group B., the following day Group B. again took the lead, held it for a day, and on the last day was again surpassed by Group A. Rather than having the bad psychological effect which Hurlock found in the case of the children with whom she worked, defeat seemed to act as a definite spur to activity, and brought about an alternating of the groups holding the leading position.

Another interesting point deals with the third day's test after the initial test. It will be found both from the scores and the graph that the Control and Group Competition Groups slumped in scores on this test. On first appearance there seemed to be no particular reason to account for this decline as the conditions of the test were not obviously different from the other tests given. An informal inquiry was made among the subjects of the

Group Competition Group to determine if they knew what reason might account for the decline in their scores. They reported that they thought the test was harder. Investigation revealed that although there were an equal number of divisors ranging from 2 to 9 on all of the test papers in the first thirty problems of the test in question there were 4 eights and 6 nines as compared to a 3-3, 3-4, and 3-3 combination in the other tests. If this were the reason for the slump in scores it is interesting to note that the two groups not showing this decline were the Individual Competition Group and Group B. of the Group Competition Group. It is of interest to note that Group B. had been defeated by Group A. in the previous day's test and this may have served as additional incentive sufficiently forceful to overcome the difficulty of the problems. Likewise, the motivation of individual competition which proved to be the most significant in this study may have been the incentive which caused the increase rather than a decrease in the scores of this group. In any case, whatever may have been the incentive which caused the Control Group to show so remarkable a record throughout the experiment apparently was not of sufficient strength to carry them over in a more difficult situation.

The performance of the Control Group in this parti-

cular study seems worthy of special attention. It will be recalled that in the majority, ^{of} though not in all of the experiments conducted under the heading of the effect of the knowledge of results it was found that having a knowledge of one's results had a positive effect for good upon future work. In our study the Individual Competition and Group Competition Groups were given some information of their previous day's record, more particularly the Individual Competition Group which was given individual scores, but the Control Group was given no information, and despite this lack as well as that of the urging to do better which was more dominant in the competitive groups the Control Group was able to slightly exceed in score the scores of both of the other groups. It seems to indicate that in a learning situation other incentive factors may exist which may have to do neither with a knowledge of results or a competitive situation but which may have a positive spurring effect upon activity. Furthermore it seems to emphasize the point made by previous investigators that a mere knowledge of results may not be as important as it would sometimes seem, and that the importance of other factors in the situation must not and cannot be ignored.

Table No. ~~VII~~^X shows the per cent of gain for the various groups both as a whole and according to different

grades of ability. The subjects were divided into Superior, Average, and Inferior on the basis of their scores on the initial test. The greatest per cent of gain was made by the subjects of inferior ability within the Control Group, due probably to the exceptional record made by one of the inferior subjects in this group. The least per cent of gain was made by the superior students within the Group Competition Group and the second lowest percentage was made by the superior students in the Control Group.

Among the superior students in this study individual competition was most effective and group competition least so. With the inferior subjects individual competition was least stimulating and the control situation the most. With the average student group competition seemed to be more effective than the other two incentive situations.

To approach the problem from a somewhat different angle an attempt was made to determine the general ability of the subjects within each of the three groups. Although it was not possible to obtain the I.Q. rating of the subjects an attempt was made to secure some indication of their general ability in order to determine whether or not the superior score of the Control Group could be accounted for by superior ability on the part of the sub-

jects placed within this group. Table No. XI. shows the number of subjects in each group that ranked in the first, second, and third divisions in their final grades in the psychology course which they were studying at the time. On the basis of giving three points for first rank, two for second and one for third the average point score for the three groups was as follows:

| | |
|------------------|-----|
| Control | 1.7 |
| Ind. Competition | 1.2 |
| Grp. Competition | 1.6 |

On the basis of this rather inaccurate gauge the Control Group should have done the best work as was the case, the Group Competition next, and the Individual Competition poorest. Actually the Individual Competition Group did slightly better than the Group Competition Group which may have been due to the more effective incentive value of individual over group competition for subjects of this age group.

Due to the limited number of subjects it is difficult to ascertain how much the accuracy of the subjects was affected by the use of incentives. The percentage of ~~errors~~^{accuracy} on the initial, last, and total number of tests as listed in Table XII. would indicate that there is little variation in accuracy which might or might not be attributed to the incentive employed.

From Table No. ~~XIII~~ it will be seen that as a whole the women made a greater per centage of gain in the course of the experiment than did the men. This is true not only for all groups taken together but in each of the three groups taken separately. It is interesting to note that the greatest difference occurs within the Control Group in which the women made 81.8 % increase over against 53.3 % made by the men. Within this group there happened to be three women subjects who although ranking first in the course in psychology for the year, two of them were among the inferior students on the initial test and one among the average. All three of these subjects made very significant gains throughout the experiment and one made a gain of 278 %, which accounts in part at least for the exceptionally high percentage made by the women students of the Control Group, and by the Control Group as a whole.

It is an exceedingly difficult task to attempt to draw any conclusions from the results of this study. In the first place the number of participants was small. Secondly, the conditions under which the experiment was conducted were unusual, and the extraneous factors entering in may easily account for some of the unusual results. No attempt therefore will be made to draw conclusions on the effect of competition on learning. One

does seem warranted however in pointing out several salient points in connection with the study and its relationship to the problem of the effect of competition as a whole.

1. It appears that with subjects of an adult age the task of 'creating' an artificial competitive situation is difficult. The susceptibility of the adult subject to ally himself with a group and readily to feel a sense of group loyalty seems not to be as great as that same factor in children. Hence it would seem that the success of any such study is determined in part at least by what degree of success has been attained in creating an artificial group loyalty.

11. Adult subjects appear to be more aware of their individual capacities for achievement, or to have a standard of achievement for themselves, and appear to work more on the basis of an understanding of their own ability rather than on the basis of an externally applied incentives, at least in some cases. It seems that subjects within the Control Group, being aware that they did not do as well as they might have done on the initial test set out to work harder and do better on the succeeding tests despite the lack of artificially applied incentives.

111. The fact that the Control Group made so remarkable a record seems to indicate that other incentives

than those which were created for the other groups had entered in and stimulated the subjects into activity. The existence of these extraneous elements within the total situation cannot be ignored and must be recognized as possibilities which may enter into any learning situation, at least with subjects of this age group.

IV. This particular study also seems to call into question the value of a knowledge of results in learning. In this case, despite a lack of the incentives given the other groups and in spite of a lack of knowledge of results the Control Group was able to excel both other groups in per cent of average increase. This seems to justify the point raised by earlier investigators that a knowledge of results per se is not always the important element in a learning situation that some educators and psychologists have attempted to show.

V. Finally, it should be noted that this experiment extended over only six practice periods. The criticism that in so limited a number of tests one has opportunity to secure little more than practice effects seems justifiable. For that reason the remaining studies of this thesis have extended over ten rather than six tests.

Whatever may be the significance of these results, the point seems to be clear that the use of artificially

created competitive situations with adult subjects does not in every case yield results in favor of competition, and that other factors may enter in which are equally or more stimulating to production than is competition.

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TABLE III

AVERAGE SCORES

| GROUP | TUESDAY | WED. DAY | THUR. DAY | FRI. DAY | SAT. DAY | AVERAGE |
|--------------------------------|---------|----------|-----------|----------|----------|---------|
| CONTROL | 182.5 | 182.5 | 180.0 | 185.0 | 185.0 | 185.0 |
| INDIVIDUAL COMPETITION 100% | 188.5 | 188.5 | 185.0 | 185.0 | 185.0 | 188.5 |
| GROUP COMPETITIVE | 187.5 | 187.5 | 185.0 | 185.0 | 185.0 | 187.5 |
| GROUP A-100% | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 |
| GROUP B-100% | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 |
| GROUP C-100% | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 | 185.0 |

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TABLE NO. I

AVERAGE SCORES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|---------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | 95.2 | 122.0 | 130.9 | 126.0 | 144.2 | 163.4 |
| INDIVIDUAL COMPETITION | 109.8 | 138.6 | 143.5 | 150.1 | 169.7 | 176.6 |
| GROUP COMPETITION | | | | | | |
| GROUP A. | 104.4 | 124.3 | 138.5 | 135.1 | 159.7 | 166.2 |
| GROUP B. | 104.3 | 130.6 | 137.5 | 138.4 | 164.9 | 165.6 |
| TOTAL | 104.3 | 127.4 | 138. | 136.8 | 162.3 | 165.9 |

TABLE NO. II

PER CENT OF AVERAGE INCREASE

| GROUP | FIRST OVER INITIAL | SECOND OVER INITIAL | THIRD OVER INITIAL | FOURTH OVER INITIAL | FIFTH OVER INITIAL |
|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| CONTROL | 28. % | 37.5 % | 32.3 % | 51.4 % | 71.6 % |
| INDIVIDUAL COMPETITION | 26.2 | 30.6 | 36.7 | 54.5 | 60.8 |
| GROUP COMPETITION | 22.1 | 32.3 | 31.1 | 55.6 | 59. |

TABLE NO. III

STANDARD DEVIATIONS

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|---------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | 41.1 | 37. | 46. | 33.1 | 47. | 51.2 |
| INDIVIDUAL COMPETITION | 35.4 | 49.7 | 43.7 | 60.3 | 46.8 | 42.7 |
| GROUP COMPETITION | 50.1 | 59.2 | 61. | 42.6 | 59.6 | 58.1 |

TABLE NO. IV
P. E. AVERAGES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|---------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | 6.3 | 5.6 | 7. | 5.1 | 7.2 | 7.8 |
| INDIVIDUAL COMPETITION | 5.8 | 8.2 | 7.1 | 8.9 | 7.7 | 7. |
| GROUP COMPETITION | 7.5 | 8.8 | 9.1 | 6.4 | 8.9 | 8.7 |

TABLE NO. V

RELIABILITY OF DIFFERENCES

| GROUPS | ACTUAL DIFFERENCE | P.E. DIFFERENCE | DIFFERENCE IN P.E. UNITS |
|--|----------------------|--------------------|--------------------------------|
| Between Control and Individual competition | | | |
| 1st. Test | 14.6 | 8.6 | 1.7 |
| 3rd. Test | 24.1 | 10.2 | 2.4 |
| 5th. Test | 13.2 | 10.5 | 1.3 |
| Between Control and Group Competition | | | |
| 1st. Test | 19.1 | 9.7 | .09 |
| 3rd. Test | 10.8 | 8.2 | 1.3 |
| 5th. Test | 2.5 | 11.7 | .21 |
| Between Individual Competition and Group Competition | | | |
| 1st. Test | 5.5 | 9.5 | .58 |
| 3rd. Test | 13.3 | 8.2 | 1.6 |
| 5th. Test | 10.7 | 11.7 | .91 |

TABLE NO. VI

AVERAGE SCORES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | |
| Superior | 135.6 | 158.5 | 177.0 | 157.6 | 208.8 | 208.8 |
| Average | 102.0 | 130.1 | 143.0 | 134.6 | 174.0 | 174.0 |
| Inferior | 47.0 | 61.0 | 70.7 | 84.3 | 105.7 | 105.7 |
| INDIVIDUAL COMPETITION | | | | | | |
| Superior | 146.2 | 185.3 | 186.7 | 203.7 | 227.4 | 227.2 |
| Average | 109.6 | 133.2 | 143.8 | 143.0 | 166.6 | 177.4 |
| Inferior | 73.7 | 96.3 | 100.2 | 102.5 | 108.8 | 125.3 |
| GROUP COMPETITION | | | | | | |
| Superior | 161.4 | 186.9 | 200.5 | 188.5 | 215.2 | 217.4 |
| Average | 92.7 | 120.1 | 134.2 | 131.5 | 166.2 | 175.8 |
| Inferior | 51.1 | 68.3 | 69.3 | 82.3 | 95.8 | 93.8 |

TABLE NO. VII

PER CENT OF AVERAGE INCREASE

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | FIRST OVER INITIAL | SECOND OVER INITIAL | THIRD OVER INITIAL | FOURTH OVER INITIAL | FIFTH OVER INITIAL |
|-----------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| CONTROL | | | | | |
| Superior | 16.7 % | 30.5 % | 16.1 % | 35.3 % | 53.9 % |
| Average | 27.5 | 40.1 | 31.9 | 58.5 | 70.5 |
| Inferior | 29.7 | 50.4 | 79.3 | 78.2 | 124.0 |
| INDIVIDUAL COMPETITION | | | | | |
| Superior | 26.0 | 27.7 | 39.3 | 55.5 | 55.4 |
| Average | 21.5 | 31.2 | 30.4 | 52.0 | 61.8 |
| Inferior | 30.6 | 35.9 | 39.0 | 47.6 | 70.0 |
| GROUP COMPETITION | | | | | |
| Superior | 15.7 | 24.2 | 16.7 | 33.3 | 34.6 |
| Average | 29.5 | 44.7 | 41.8 | 79.2 | 89.6 |
| Inferior | 33.6 | 35.6 | 61. | 87.4 | 83.5 |

TABLE NO. VIII.

STANDARD DEVIATIONS

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | |
| Superior | 23. | 16.9 | 17.4 | 15.9 | 22.5 | 35.3 |
| Average | 11.3 | 11.2 | 17.2 | 9.6 | 8.0 | 19.5 |
| Inferior | 15.0 | 19.4 | 24.1 | 24.0 | 30.9 | 27.0 |
| INDIVIDUAL COMPETITION | | | | | | |
| Superior | 22.5 | 46.3 | 83.9 | 49.0 | 61.5 | 67.5 |
| Average | 12.9 | 21.3 | 6.0 | 16.8 | 26.3 | 27.7 |
| Inferior | 16.3 | 19.1 | 18.8 | 20.3 | 28.3 | 27.3 |
| GROUP COMPETITION | | | | | | |
| Superior | 26.5 | 21.4 | 36.2 | 34.0 | 38.9 | 39.2 |
| Average | 19.6 | 22.3 | 27.5 | 27.5 | 49.3 | 30.9 |
| Inferior | 13.3 | 11.7 | 24.9 | 21.9 | 22.6 | 18.6 |

TABLE NO. IX

P. E. AVERAGES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | |
| Superior | 6.5 | 4.7 | 4.9 | 4.4 | 6.3 | 9.9 |
| Average | 3.1 | 2.8 | 4.4 | 2.5 | 2.1 | 5.0 |
| Inferior | 4.2 | 5.4 | 6.7 | 6.7 | 8.6 | 7.5 |
| INDIVIDUAL COMPETITION | | | | | | |
| Superior | 6.3 | 12.9 | 23.5 | 13.7 | 17.2 | 18.9 |
| Average | 3.9 | 6.5 | 1.8 | 5.1 | 7.9 | 8.5 |
| Inferior | 4.6 | 5.4 | 5.3 | 5.7 | 7.9 | 7.6 |
| GROUP COMPETITION | | | | | | |
| Superior | 6.9 | 5.5 | 8.4 | 8.8 | 10.0 | 10.1 |
| Average | 5.5 | 6.3 | 7.7 | 7.7 | 13.8 | 8.7 |
| Inferior | 2.4 | 3.0 | 6.5 | 5.7 | 5.9 | 4.8 |

TABLE NO. X
 AVERAGE PER CENT OF GAIN
 BETWEEN INITIAL AND LAST TEST

| GROUP | PER CENT |
|---------------------------|----------|
| CONTROL | 71.6 % |
| Superior | 53.9 |
| Average | 70.5 |
| Inferior | 124.7 |
| INDIVIDUAL COMPETITION | 60.8 |
| Superior | 55.4 |
| Average | 61.8 |
| Inferior | 70.0 |
| GROUP COMPETITION | 59.1 |
| Superior | 34.7 |
| Average | 89.6 |
| Inferior | 83.6 |

TABLE NO. XI

RANKING OF THE SUBJECTS IN THE FINAL
GRADES OF THE PSYCHOLOGY COURSE FOR THE YEAR

| GROUP | NUMBER IN FIRST RANKING | NUMBER IN SECOND RANKING | NUMBER IN THIRD RANKING | AVERAGE POINT SCORE |
|---------------------------|-------------------------------|--------------------------------|-------------------------------|---------------------------|
| CONTROL | 5 | 4 | 10 | 1.7 |
| INDIVIDUAL COMPETITION | 0 | 4 | 13 | 1.2 |
| GROUP COMPETITION | 5 | 3 | 12 | 1.65 |

TABLE NO. XII

PER CENT OF ACCURACY

| GROUP | INITIAL TEST | LAST TEST | TOTAL PER CENT |
|---------------------------|--------------|-----------|----------------|
| CONTROL | 96. % | 98.2 % | 97.4 % |
| INDIVIDUAL COMPETITION | 97.3 | 97.9 | 97.6 |
| GROUP COMPETITION | 96.5 | 97.8 | 97.7 |

TABLE NO. XIII

PER CENT OF GAIN BETWEEN FIRST
AND LAST TEST

COMPARISON BETWEEN MEN AND WOMEN

| SEX | CONTROL GROUP | INDIVIDUAL COMPETITION | GROUP COMPETITION | TOTAL |
|-------|---------------|---------------------------|----------------------|--------|
| MEN | 53.3 % | 60.8 % | 56.0 % | 56.7 % |
| WOMEN | 81.8 | 67.8 | 60.7 | 70.1 |

TABLE NO. XIV.

AVERAGE SCORES

COMPARISON BETWEEN MEN AND WOMEN

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|---------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | |
| Men | 129.4 | 144.0 | 151.6 | 140.0 | 182.0 | 198.4 |
| Women | 83.0 | 114.0 | 123.5 | 121.0 | 130.7 | 150.9 |
| INDIVIDUAL COMPETITION | | | | | | |
| Men | 104.9 | 133.1 | 144.2 | 149.8 | 163.8 | 171.6 |
| Women | 116.9 | 150.1 | 152.2 | 161.5 | 184.6 | 190.2 |
| GROUP COMPETITION | | | | | | |
| Men | 135.5 | 158.0 | 186.0 | 176.5 | 205.3 | 211.5 |
| Women | 91.0 | 114.3 | 117.8 | 119.7 | 143.8 | 146.3 |

TABLE NO. XV.

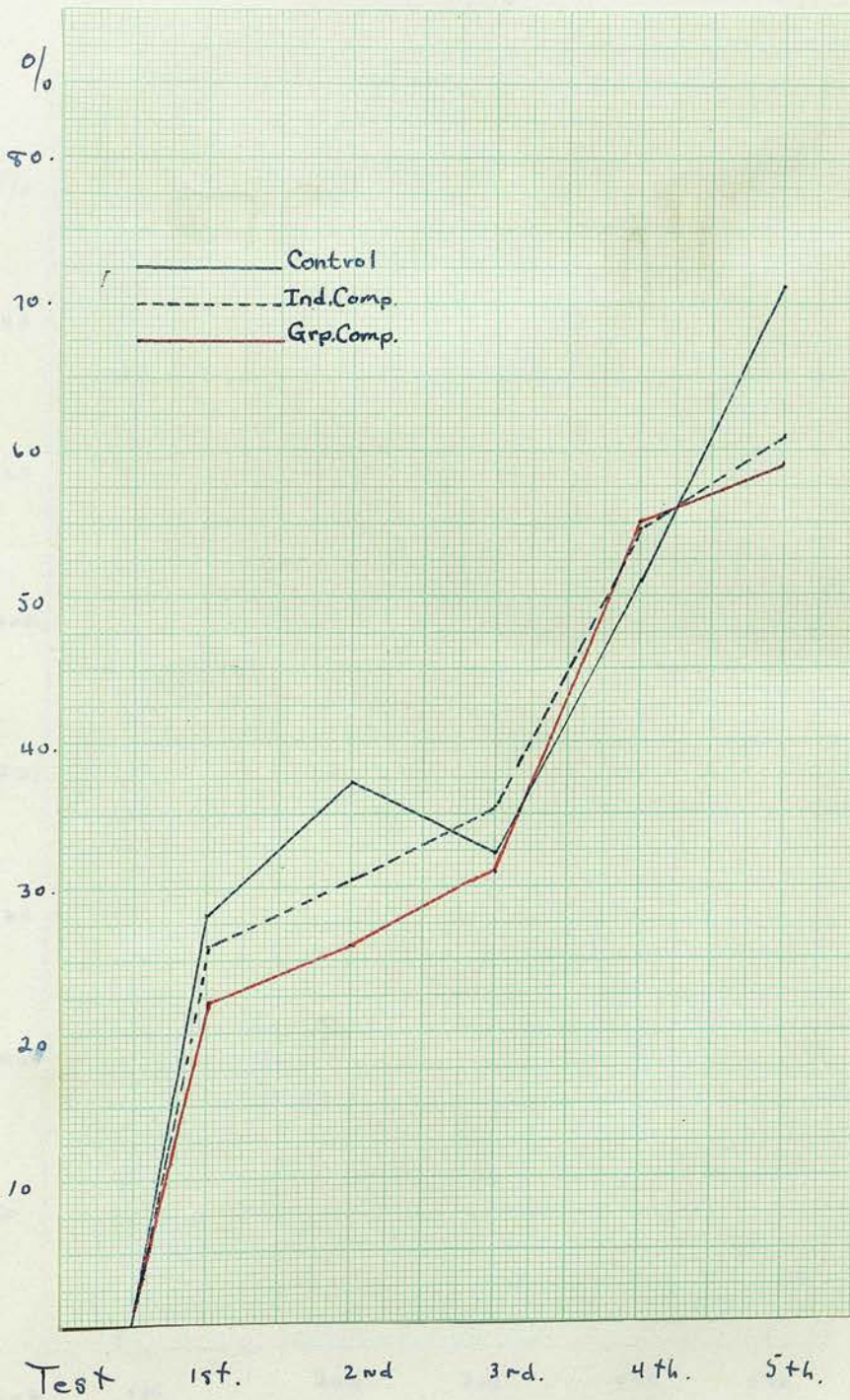
STANDARD DEVIATIONS

COMPARISON BETWEEN MEN AND WOMEN

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY |
|------------------------|---------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | |
| Men | 30.6 | 27.4 | 31.3 | 17.7 | 28.7 | 39.1 |
| Women | 36.3 | 35.2 | 50.9, | 36.8 | 48.9 | 46.3 |
| INDIVIDUAL COMPETITION | | | | | | |
| Men | 32.7 | 37.4 | 37.4 | 33.3 | 48.1 | 40.4 |
| Women | 37.7 | 58.9 | 59.8 | 91.0 | 75.7 | 77.5 |
| GROUP COMPETITION | | | | | | |
| Men | 48.1 | 41.9 | 54.4 | 47.1 | 54.6 | 48.0 |
| Women | 42.8 | 49.6 | 45.0 | 44.7 | 55.5 | 53.9 |

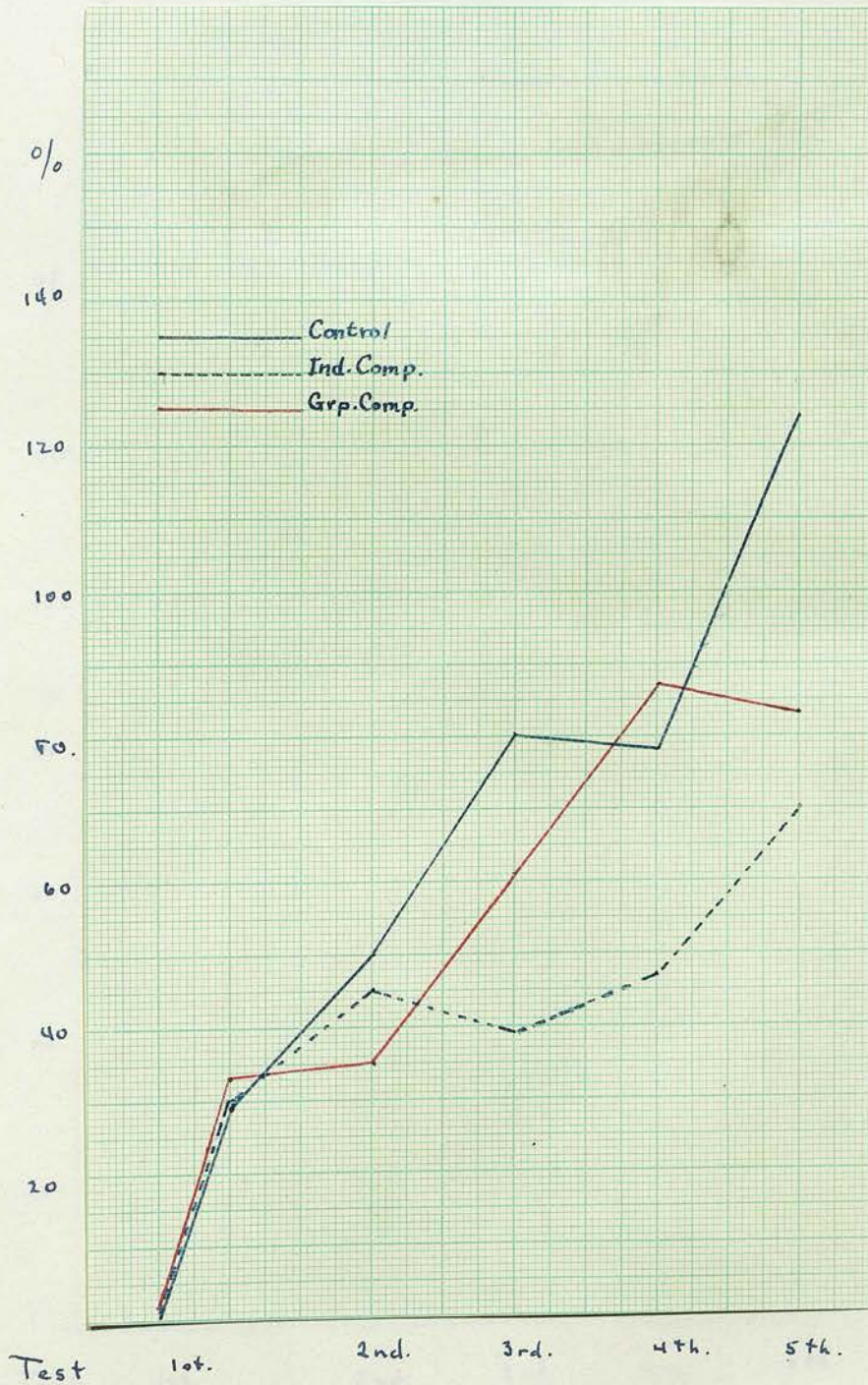
GRAPH NO. I

A GRAPH SHOWING THE PROGRESS
IN PER CENT OF EACH OF
THE THREE GROUPS



GRAPH NO. II

A GRAPH SHOWING THE PER CENT OF
GAIN OF THE INFERIOR SUBJECTS
IN EACH GROUP



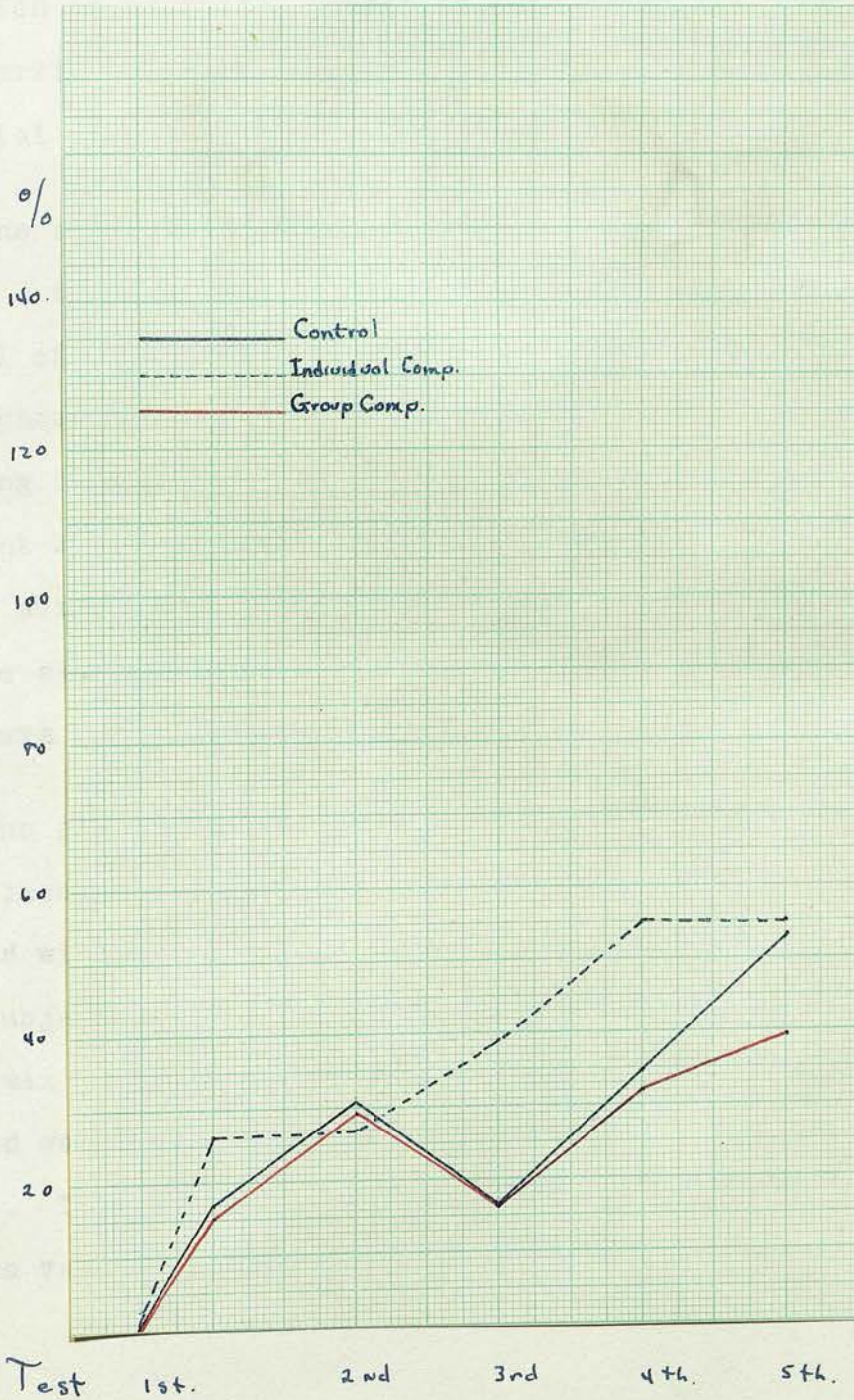
GRAPH NO. III.

A GRAPH SHOWING THE PER CENT
OF GAIN OF THE AVERAGE
STUDENTS IN EACH GROUP



GRAPH NO. IV.

A GRAPH SHOWING THE PER CENT
OF GAIN OF THE SUPERIOR
SUBJECTS IN EACH GROUP



EXPERIMENT TWO

The second experiment dealt with the same problem as did the first experiment, namely the effect of competition on learning, except in this study the work was carried on with a younger group of subjects. The material used was identical to that of Experiment I.

The subjects were pupils in the grades I B 4, I C 3, and I A 5 of the James Clark Technical and Vocational School of Edinburgh. The entire group which participated throughout the experiment consisted of 98 pupils, including 55 girls and 43 boys. All three groups were thought by the school authorities to be of approximately equal ability and were enrolled in this particular school at the same time. The average age of the subjects was 12 years and 6 months.

The procedure was identical with that of the first experiment except for the fact that this study was conducted within the normal school-room situation, and that the subjects were tested over a period of ten rather than six practice periods. Each of the three groups tested ~~were~~^{was} already established units before the study began. They are normally instructed by different teachers in the various subjects which they study and are also

accustomed to having practice teachers from the training school so that the novelty of the situation whereby the experimenter was a stranger to them was not as great as it might have been in some situations.

In regard to Section III, namely the Group Competition Group, it should be noted that the two competing groups were asked to choose names for their respective groups. The result was that Group A. came to be known as "The Thunderbolts", and Group B. as "The Lions". The fact that a considerable amount of competitive spirit was aroused seemed very evident. There was great anxiety each day the moment the experimenter entered the room to inquire who had won on the previous day, and much display of enthusiasm and disgust was noticeable on the part of the winning and losing teams respectively. The teachers reported that they daily received reports on who had won, and stated that the subjects were as enthusiastic over the project as ever they had seen them. It would seem therefore that a genuine group-competitive situation did exist.

The following charts will indicate the progress of the various groups within this study, and the comparative results with those of the first experiment.

TABLE NO. I
AVERAGE SCORES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 43.1 | 61.8 | 65.5 | 57. | 66.6 | 74.5 | 83.8 | 69.4 | 77. | 72.3 |
| INDIVIDUAL COMPETITION | 46.9 | 65.8 | 79.8 | 73.5 | 76.1 | 75.8 | 72.8 | 93.9 | 74.4 | 85.8 |
| GROUP COMPETITION | | | | | | | | | | |
| Group A. | 39.2 | 64.2 | 62.4 | 56.8 | 63.6 | 64.4 | 70.8 | 75.6 | 75.6 | 68.2 |
| Group B. | 39.2 | 62.4 | 68.4 | 51.6 | 63.2 | 65.2 | 72.8 | 78.4 | 79.2 | 71.6 |
| TOTAL | 39.2 | 63.2 | 65.4 | 54.2 | 63.4 | 64.8 | 71.8 | 77.0 | 77.4 | 69.8 |

TABLE NO. II

PER CENT OF AVERAGE INCREASE

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH OVER INITIAL |
|---------------------------|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|
| CONTROL | 43.3 % | 32.3 % | 72.8 % | 61.0 % | 67.7 % |
| INDIVIDUAL COMPETITION | 40.3 | 56.5 | 61.6 | 100.0 | 82.9 |
| GROUP COMPETITION | | | | | |
| Group A. | 63.7 | 44.9 | 63.7 | 92.8 | 73.9 |
| Group B. | 59.2 | 31.6 | 66.3 | 102.0 | 82.6 |
| TOTAL | 61.2 | 38.2 | 65.3 | 97.4 | 78.0 |

TABLE NO. III

STANDARD DEVIATIONS

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 16.1 | 23.1 | 22.0 | 19.0 | 25.1 | 22.3 | 21.8 | 22.1 | 22.9 | 24.0 |
| INDIVIDUAL COMPETITION | 10.8 | 16.6 | 21.1 | 20.0 | 18.4 | 20.5 | 23.4 | 23.3 | 23.2 | 28.1 |
| GROUP COMPETITION | 13.7 | 16.5 | 19.2 | 14.8 | 17.1 | 18.7 | 18.8 | 17.5 | 23.7 | 19.7 |

TABLE NO. IV

P. E. AVERAGES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 2.0 | 2.8 | 2.8 | 2.4 | 2.1 | 2.7 | 2.7 | 2.8 | 2.8 | 2.9 |
| INDIVIDUAL COMPETITION | 1.3 | 2.1 | 2.6 | 2.6 | 2.5 | 2.6 | 2.9 | 2.9 | 2.9 | 3.6 |
| GROUP COMPETITION | 1.5 | 1.8 | 2.1 | 1.7 | 2.0 | 2.1, | 2.1 | 1.9 | 2.8 | 2.3 |

TABLE NO. V

RELIABILITY OF DIFFERENCES

| GROUPS | ACTUAL DIFFERENCE | P.E. DIFFERENCE | DIFFERENCE IN P.E. UNITS |
|--|-------------------|-----------------|--------------------------|
| Between Control and Individual Competition | | | |
| 1st. Test | 3.8 | 2.4 | 1.6 |
| 5th. Test | 1.3 | 3.5 | .37 |
| 10th. Test | 13.5 | 4.3 | 3.1 |
| Between Control and Group Competition | | | |
| 1st. Test | -3.9 | 2.5 | 1.6 |
| 5th. Test | -9.7 | 3.4 | 2.8 |
| 10th. Test | -2.5 | 3.7 | .67 |
| Between Individual Competition and Group Competition | | | |
| 1st. Test | 7.7 | 1.9 | 4.1 |
| 5th. Test | 11.0 | 3.3 | 3.3 |
| 10th. Test | 16.0 | 4.3 | 3.7 |

TABLE NO. VI
AVERAGE PER CENT OF GAIN

| GROUP | BETWEEN INITIAL AND FIFTH TEST | BETWEEN INITIAL AND LAST TEST |
|---------------------------|--------------------------------------|-------------------------------------|
| CONTROL | 72.8 % | 67.7 % |
| INDIVIDUAL COMPETITION | 62.2 | 82.9 |
| GROUP COMPETITION | 65.3 | 78.0 |

TABLE NO. VII
COMPARISON OF PER CENT OF GAIN AT
THE END OF THE FIFTH TEST
BETWEEN THE GROUPS OF
EXPERIMENT I AND II

| GROUP | EXPERIMENT I | EXPERIMENT II |
|---------------------------|--------------|---------------|
| CONTROL | 70.5 % | 72.8 % |
| INDIVIDUAL COMPETITION | 63.9 % | 62.2 |
| GROUP COMPETITION | 59.1 | 65.3 |

TABLE NO. VIII

AVERAGE SCORES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Superior | 65.4 | 83.8 | 87.2 | 76.6 | 92.2 | 96.1 | 103.8 | 89.1 | 98.4 | 89.9 |
| Average | 41.8 | 61.1 | 66.1 | 57.7 | 66.0 | 74.2 | 84.8 | 72.4 | 78.2 | 78.6 |
| Inferior | 24.3 | 40.0 | 40.6 | 39.6 | 43.8 | 53.4 | 63.0 | 48.7 | 57.6 | 48.5 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | 59.7 | 80.1 | 97.0 | 89.4 | 91.3 | 92.4 | 92.7 | 109.9 | 108.9 | 107.3 |
| Average | 47.1 | 65.2 | 78.3 | 71.4 | 72.3 | 76.7 | 78.0 | 100.6 | 88.7 | 86.4 |
| Inferior | 34.5 | 50.3 | 64.0 | 56.5 | 63.2 | 58.2 | 58.4 | 71.0 | 67.7 | 64.9 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | 53.4 | 83.3 | 79.4 | 64.7 | 77.8 | 84.3 | 89.2 | 93.7 | 99.4 | 87.1 |
| Average | 38.1 | 66.3 | 64.3 | 54.3 | 67.0 | 63.3 | 71.7 | 77.4 | 75.0 | 65.2 |
| Inferior | 25.9 | 52.1 | 50.3 | 44.1 | 48.1 | 51.5 | 57.3 | 62.6 | 58.0 | 57.2 |

TABLE NO. IX

PER CENT OF AVERAGE INCREASE

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH OVER INITIAL |
|-----------------------------------|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|
| CONTROL | | | | | |
| Superior | 28.1 | 16.9 | 46.9 | 36.2 | 37.4 |
| Average | 46.1 | 58.1 | 77.5 | 73.2 | 88.0 |
| Inferior | 64.6 | 62.9 | 119.0 | 106.0 | 99.6 |
| INDIVIDUAL COMPETITION | | | | | |
| Superior | 34.0 | 49.7 | 54.7 | 84.0 | 79.7 |
| Average | 38.4 | 66.2 | 62.8 | 113.5 | 83.4 |
| Inferior | 45.8 | 63.7 | 68.6 | 105.7 | 88.1 |
| GROUP COMPETITION | | | | | |
| Superior | 56.0 | 21.1 | 57.8 | 75.4 | 63.1 |
| Average | 74.0 | 42.5 | 66.1 | 103.1 | 71.1 |
| Inferior | 101.1 | 70.2 | 97.2 | 141.2 | 120.8 |

TABLE NO. X.

STANDARD DEVIATIONS

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Superior | 11.8 | 17.0 | 16.0 | 14.0 | 14.3 | 16.1 | 16.6 | 21.5 | 17.3 | 17.2 |
| Average | 5.2 | 12.6 | 7.7 | 10.1 | 10.0 | 13.8 | 10.3 | 17.0 | 17.2 | 13.7 |
| Inferior | 5.2 | 12.0 | 12.2 | 13.3 | 13.0 | 12.2 | 14.5 | 15.1 | 16.2 | 17.3 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | 4.1 | 8.9 | 19.0 | 24.2 | 17.9 | 14.5 | 20.9 | 21.3 | 22.3 | 23.5 |
| Average | 3.1 | 12.9 | 14.3 | 10.1 | 9.5 | 8.7 | 19.5 | 13.7 | 13.1 | 16.1 |
| Inferior | 5.6 | 10.3 | 9.8 | 13.9 | 15.5 | 16.2 | 13.9 | 11.7 | 18.4 | 19.9 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | 10.6 | 15.1 | 16.1 | 12.5 | 12.0 | 15.3 | 20.2 | 13.4 | 21.5 | 18.2 |
| Average | 4.0 | 9.7 | 10.9 | 7.5 | 7.3 | 12.8 | 8.1 | 11.8 | 13.2 | 12.1 |
| Inferior | 6.5 | 10.9 | 10.9 | 12.0 | 14.5 | 11.9 | 12.4 | 13.7 | 11.7 | 13.7 |

TABLE NO. XI
P. E. AVERAGES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-------------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Superior | 2.5 | 5.6 | 3.4 | 2.1 | 3.2 | 3.4 | 3.4 | 4.8 | 3.6 | 3.8 |
| Average | .1 | 2.6 | 1.6 | 2.4 | 2.2 | 2.9 | 2.1 | 3.6 | 3.6 | 2.8 |
| Inferior | .1 | 2.3 | 2.8 | 2.8 | 2.6 | 2.6 | 3.0 | 3.2 | 3.3 | 3.6 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | .9 | 1.9 | 3.9 | 5.0 | 3.9 | 3.0 | 4.4 | 4.4 | 4.6 | 4.9 |
| Average | .7 | 2.9 | 3.3 | 2.2 | 2.3 | 1.9 | 4.4 | 2.1 | 2.9 | 3.6 |
| Inferior | 1.1 | 2.3 | 2.2 | 2.8 | 3.7 | 3.4 | 2.9 | 2.4 | 3.8 | 4.4 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | 1.9 | 2.8 | 2.9 | 2.4 | 2.5 | 3.2 | 4.1 | 2.8 | 4.4 | 3.7 |
| Average | .7 | 1.9 | 2.2 | 1.5 | 1.4 | 2.4 | 1.6 | 2.3 | 2.6 | 2.4 |
| Inferior | 1.2 | 2.2 | 2.2 | 2.4 | 2.3 | 2.2 | 2.3 | 2.5 | 2.4 | 2.8 |

TABLE NO. XII

AVERAGE PER CENT OF GAIN
BETWEEN INITIAL AND LAST TEST

| GROUP | PER CENT |
|---------------------------|----------|
| CONTROL | 71.6 % |
| Superior | 53.9 |
| Average | 70.5 |
| Inferior | 124.7 |
| INDIVIDUAL COMPETITION | 60.8 |
| Superior | 55.4 |
| Average | 61.8 |
| Inferior | 70.0 |
| GROUP COMPETITION | 59.1 |
| Superior | 34.7 |
| Average | 89.6 |
| Inferior | 83.6 |

TABLE NO. XIII

AVERAGE SCORES IN GROUP COMPETITION GROUP ACCORDING

TO SEXES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| BOYS | 43.3 | 73.2 | 70.0 | 59.5 | 73.3 | 67.5 | 78.1 | 90.9 | 82.6 | 75.2 |
| GIRLS | 36.7 | 49.4 | 62.8 | 51.4 | 57.7 | 59.0 | 68.3 | 70.9 | 74.2 | 66.3 |

PER CENT OF GAIN

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH OVER INITIAL |
|-------|--------------------|--------------------|--------------------|----------------------|--------------------|
| BOYS | 69.0 % | 37.4 % | 55.9 % | 109.9 % | 73.6 % |
| GIRLS | 34.6 | 40.0 | 60.7 | 93.1 | 80.6 |

TABLE NO. XIV.

STANDARD DEVIATION IN GROUP COMPETITION GROUP
ACCORDING TO SEXES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| BOYS | 15.7 | 14.6 | 20.7 | 13.6 | 11.2 | 16.6 | 18.5 | 17.4 | 24.8 | 21.1 |
| GIRLS | 12.0 | 15.0 | 16.4 | 13.9 | 17.4 | 17.6 | 14.3 | 14.8 | 20.7 | 15.6 |

TABLE NO. XV.

P. E. AVERAGES IN GROUP COMPETITION
GROUP ACCORDING TO SEXES

| | | | | | | | | | | |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| BOYS | 2.8 | 2.6 | 3.6 | 2.6 | 2.1 | 3.2 | 3.4 | 2.6 | 4.6 | 3.9 |
| GIRLS | 1.7 | 2.2 | 2.4 | 2.0 | 2.6 | 2.4 | 1.9 | 2.1 | 3.0 | 2.3 |

TABLE NO. XVI

PER CENT OF ACCURACY
(PER CENT CORRECT)

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 95.4 % | 97.2 % | 97. % | 97.4% | 96.2% | 97.8% | 98.4% | 98. % | 98.1% | 96.8% |
| INDIVIDUAL COMPETITION | 94.6 | 96.3 | 97.8 | 97.7 | 98.0 | 97.7 | 98.5 | 98.0 | 98.5 | 98. |
| GROUP COMPETITION | 95.3 | 97.0 | 96.3 | 96.3 | 96.8 | 96.7 | 98.4 | 97.9 | 97.7 | 96.9 |

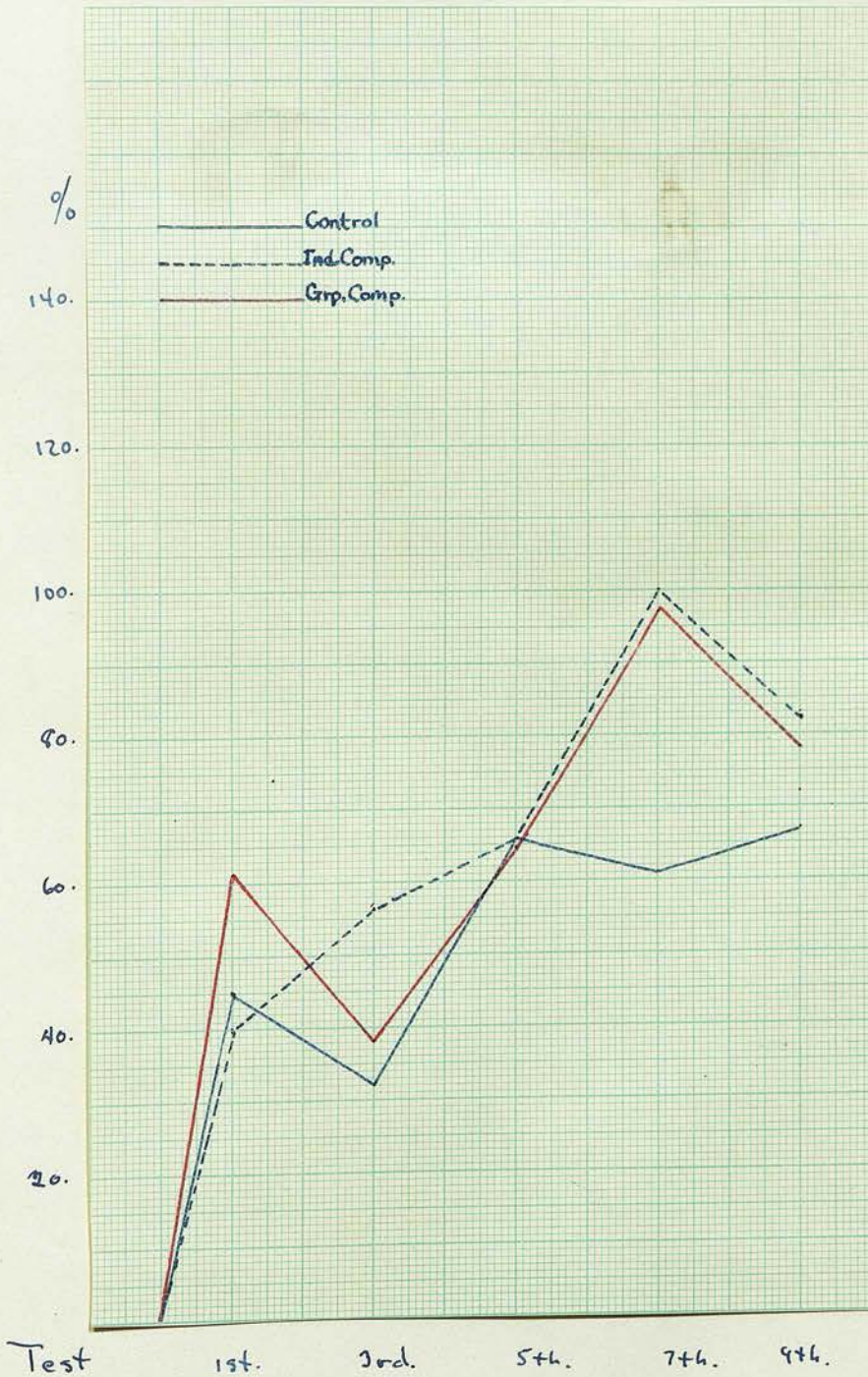
TABLE NO. XVII

RESULTS OF RE-TEST

| GROUP | % IMPROVEMENT OVER INITIAL TEST | % IMPROVEMENT OVER LAST TEST | STAND. DEV. | P. E. AV. |
|---------------------------|---------------------------------------|------------------------------------|-------------|-----------|
| CONTROL | 49. % | -10. % | 26.3 | 3.2 |
| INDIVIDUAL COMPETITION | 76. | -3. | 26.7 | 3.5 |
| GROUP COMPETITION | 69. | -5. | 19.1 | 2.3 |

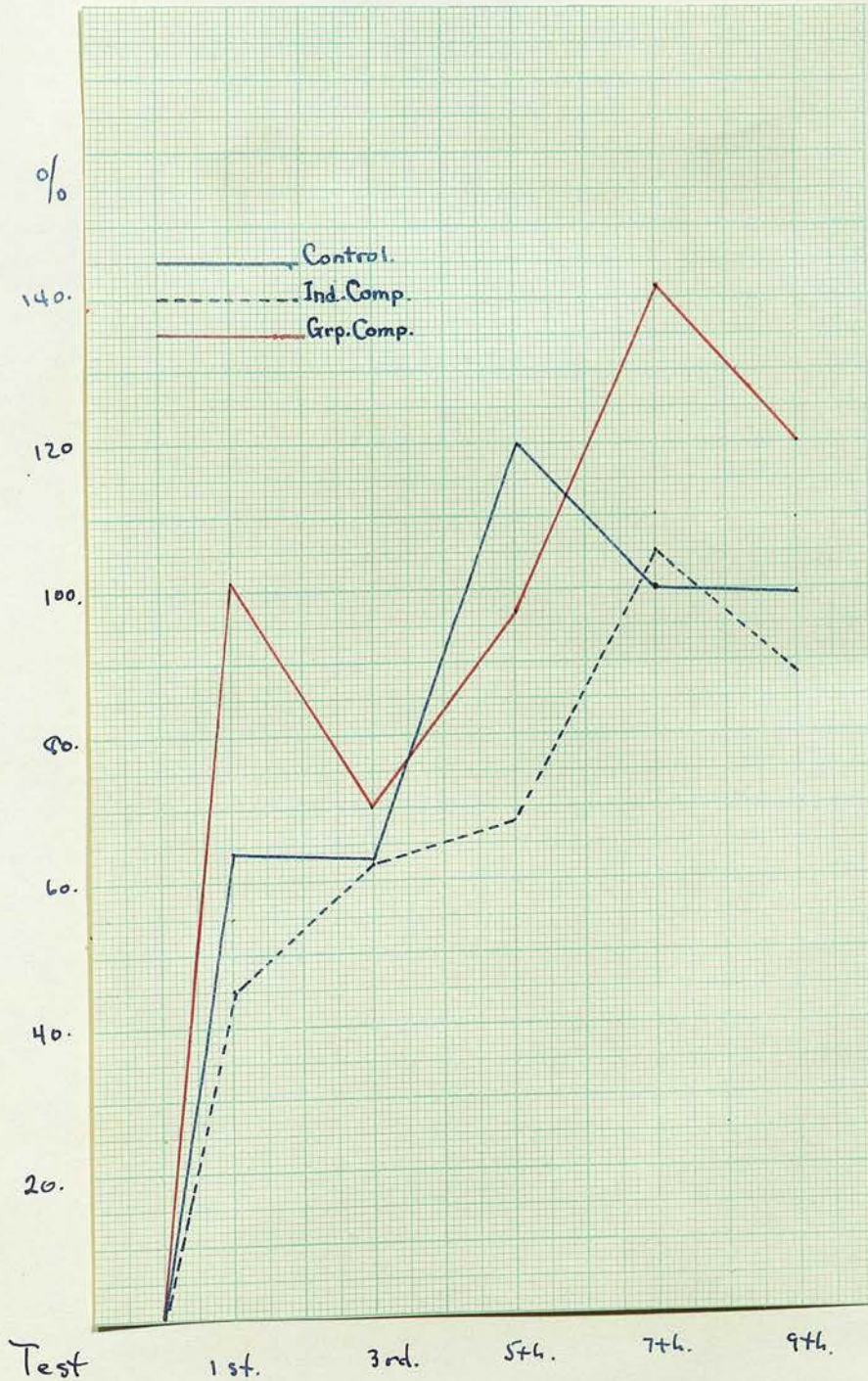
GRAPH NO. I.

A GRAPH SHOWING THE PROGRESS
IN PER CENT OF EACH OF
THE THREE GROUPS



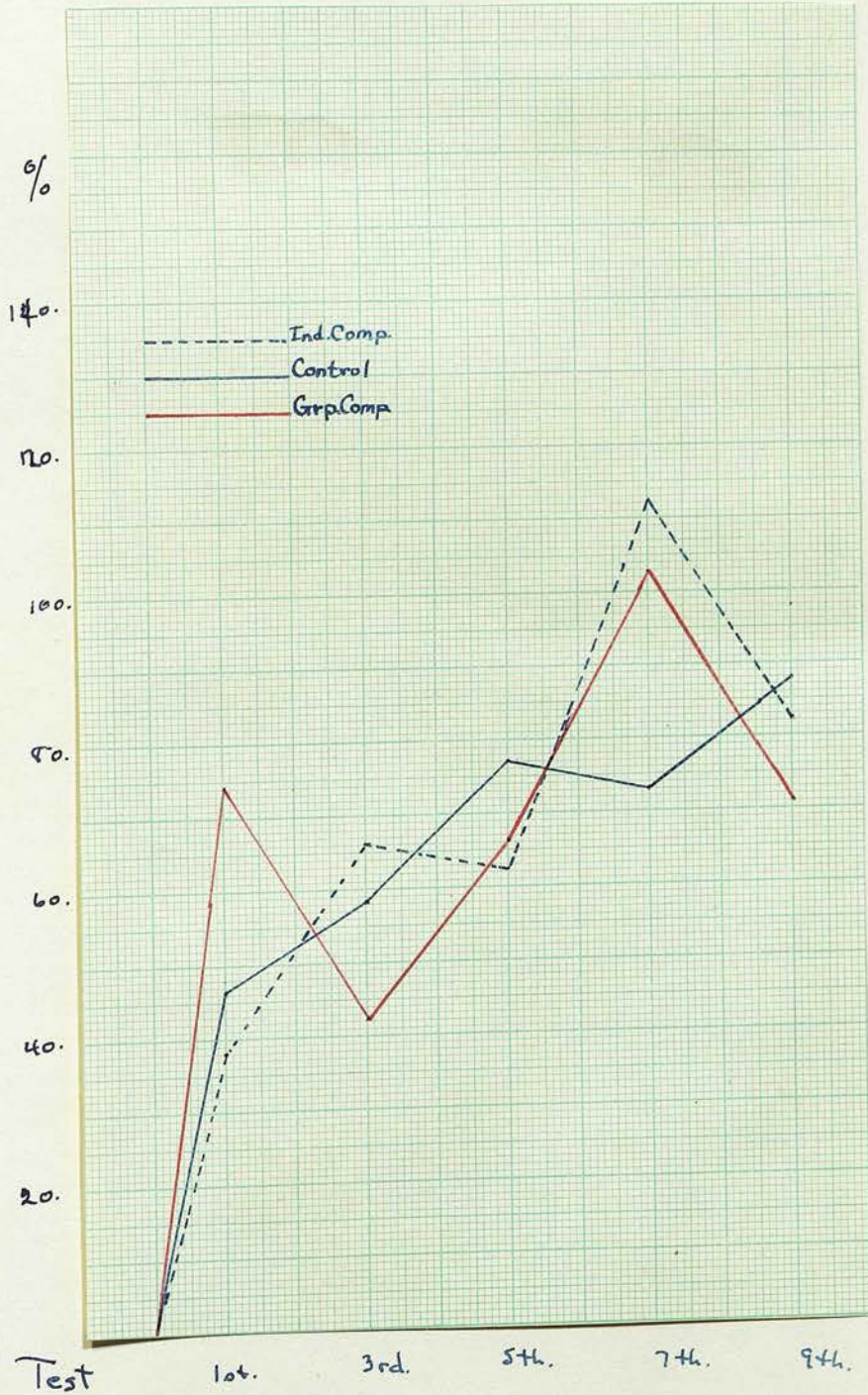
GRAPH NO. II

A GRAPH SHOWING THE PER CENT OF
GAIN OF THE INFERIOR SUBJECTS
IN EACH GROUP



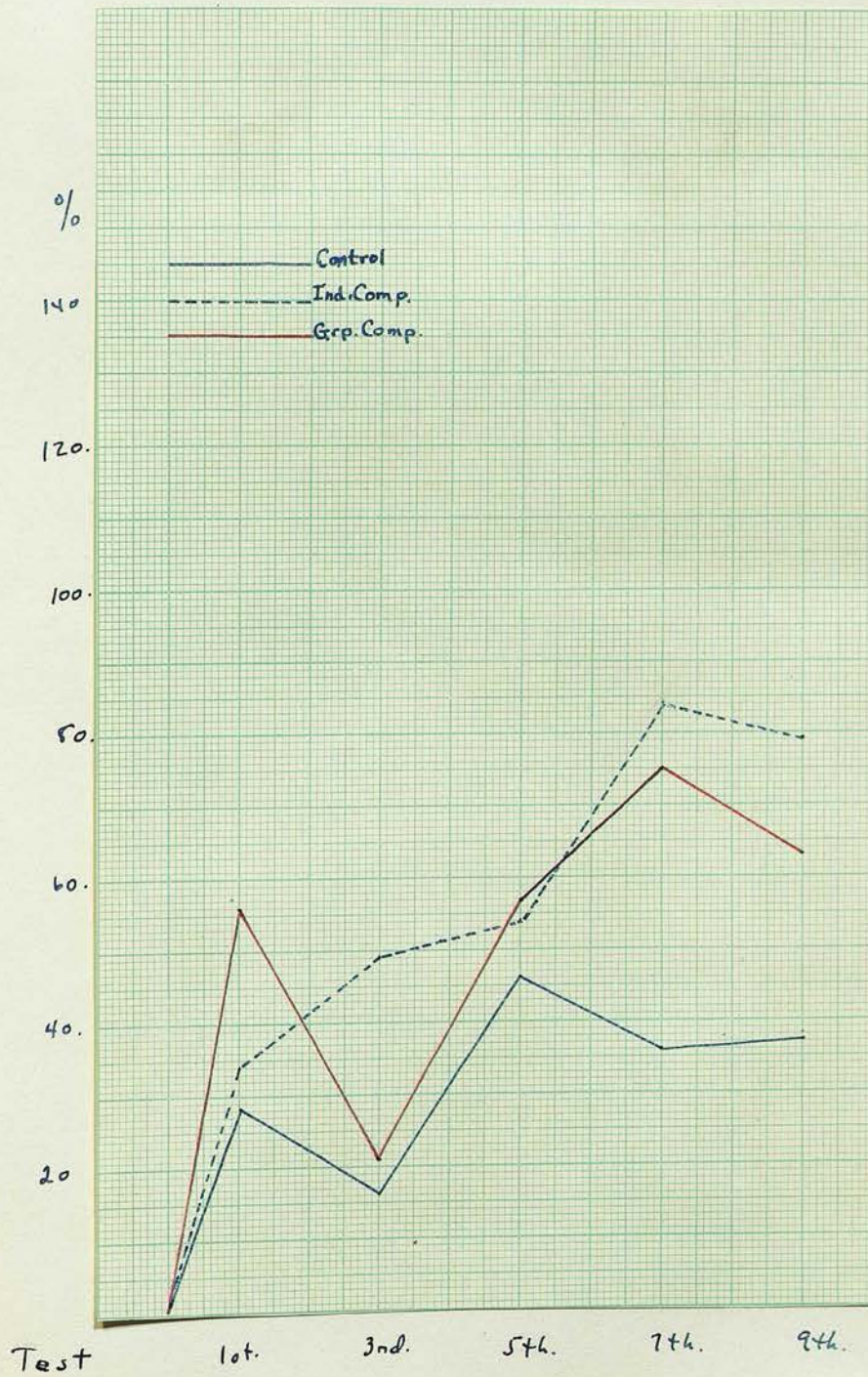
GRAPH NO. III.

A GRAPH SHOWING THE PER CENT OF
GAIN OF THE AVERAGE
SUBJECTS IN EACH
GROUP



GRAPH NO. IV.

A GRAPH SHOWING THE PER CENT
OF GAIN OF THE SUPERIOR
SUBJECTS IN EACH
GROUP



ANALYSIS OF RESULTS

The results of this experiment are interesting not only in themselves but in comparison with those results obtained in the first experiment. Tables I to III give the total results for the three groups as a whole. Tables III and IV record the Standard Deviation and P.E. Averages respectively. It will be noted from Table II that the Individual Competition Group increased its score by a gain of 82.9 % over against a gain of 67.7 % made by the Control Group and 78. % made by the Group Competition Group. It appears from these results that group competition is effective with children of this age group, but not as effective as the type of individual competition employed in this experiment.

Particularly significant are the figures on Table VII Here the per cent of gain made by the subjects at the end of the fifth test has been computed and listed with the final scores of the subjects in Experiment I. It will be recalled that in Experiment I. the testing extended only through five practice periods in addition to the initial test. It will also be recalled that in Experiment I. the Control Group made the largest percentage of gain at the end of the experiment. Table VII shows the same tendency to be present within the subjects

of this experiment. At the end of the fifth test the Control Group was in the lead in per cent of gain made between the fifth and initial tests. In light of this fact it is well to note on Table No. II, the way in which the per cent of gain decreased on the part of the Control Group as the experiment continued while both the Individual and Group Competition Groups made vast strides in the remaining four practice periods of the test. It was suggested in the discussion of Experiment I. that perhaps a six period test was not of sufficient length to give reliable results, and the present findings tend to support this supposition.

The possibility seems to exist that a novel situation such as that produced by this experiment when introduced into the normal routine of the class-room develops within the subjects of the experiment a desire to do good work which appears to be as great for the Control Group as it is for other groups which are given particular incentives. As time progresses, however, and the novelty of the situation wears off the Control Group, at least in this study, loses interest while the incentive groups become more and more stimulated.

The performance of the two competing groups within the Group Competition Group is of interest. Both groups

were told at the beginning of the experiment and reminded each day that they were of equal ability and the winning group was determined mainly by how hard the subjects within it had worked. On the first day Group A. took the lead but lost it in the second day, regained it on the third, held it for the fourth, and lost it again to Group B. on the fifth test. From that point onward Group B. held the lead despite effort on the part of Group A. to win, or at least evidences of their intentions to work harder when it was announced that they had lost the preceding day. Some of the children were heard to remark, "Come, on, let's get busy". It will be noted that in Experiment I. the lead shifted from one group to the other during the first five tests in much the same manner as occurred in this study. The slump of Group A. from that point onward in the present study will be of interest in comparison with future studies.

On the basis of their performance on the initial test the subjects were divided into Superior, Average, and Inferior groups within each of the three larger groups. It appears from the results recorded on Table IX. that the inferior subjects in the Group Competition Group made the largest per centage of gain of any, while the lowest percentage of gain was made by the superior students in the Control Group, and the second lowest by the superior

subjects of the Group Competition Group. It is interesting to note that in each of the three groups the inferior students made a greater per centage of gain than did either the average or superior students, that the average made the next greatest amount, and the superior subjects the least. The performance of the superior students in the case of Individual Competition is unusual in this case, as from earlier studies it might have been expected that they would have done exceptionally superior work under the impetus of this type of incentive.

Table XVI. shows the per centage of accuracy for each of the three groups. Contrary to the findings of Hurlock that "rivalry increases accuracy on the part of the children while absence of the incentive tends to decrease it", there is little difference in the present study between the per cent of problems solved correctly by the subjects of the Control Group and the Group Competition Group. The Individual Competition Group shows a slightly higher per centage of accuracy than do the other two groups. It should be noted at this point that in the present study the findings are based upon the number of correct calculations and not on the number of problems correctly solved. In other words, in this study each short division problem contained four digits in the answer.

If one digit was incorrect but the remaining correct the subject was given three credit points rather than having the entire problem classified as incorrect. This has a tendency to raise the per centage of accuracy in numerical figures.

Other investigators, for example Allport, and Whitmore, have maintained that competition has a tendency to decrease accuracy. In the present study as in Experiment I. the influence of competition has seemed to have little effect one way or the other. It is worthy of note that in the Individual Competition Group some subjects made an effort to count the number of problems they had done each day while the sheets were being collected. The fact that their scores differed from the number they did because of subtractions for inaccuracy may have influenced them to improve the quality of their work and thus may account for their increase in per centage of accuracy which is slightly greater than that of the other two groups.

The distribution of boys and girls within two of the groups was so irregular that a comparison of their scores would be of little value. In the case of the Group Competition Group however the average scores according to sex have been listed in Table XIII. The boys exceeded the girls in general average throughout the entire experiment

but the girls made a higher average per centage of gain than did the boys. This seems to be in keeping with the findings of Triplett, Hurlock, and others that although the difference is likely to be slight, competition seems to have a greater effect upon girls than upon boys. In the case of this study it was a gain of 80.% on the part of the girls over against a gain of 73.% by the boys.

In comparing our findings with those of Sims and Hurlock, bearing in mind that Hurlock's study was of shorter length than that of Sims and this study, there are several points which might be emphasized. Sims found that while his Control Group improved 102.2 % his Group Competition Group improved 109.9 % or a difference of 7.7 points in per cent. The difference in per cent of gain with the same two groups in the present study is 10.3 points. It must be remembered, however, that Sims was working with older subjects. On the other hand, Hurlock found an improvement of 41. % over and above practice effects between the two groups, which is a much greater difference than that obtained in our own study. An additional factor seems to enter in however, which may account for the wide discrepancy. Although Hurlock worked with children of the same age as the children tested in this study she included within her final figures the scores made by another group of children three years their junior whom she included

within her total study. When the two groups are considered separately it will be found that the older children, or those equivalent in age to the subjects of the present study, made only 29. % gain over and above practice effects while the younger children made a gain of 70. %. It is obvious then that Hurlock's final figures were noticeably affected by the influence of the younger children. Although Hurlock's differences are greater than our own, the findings of the present study are much more in accord with those results obtained by Hurlock for children of the same age than for her total group of subjects. The type of test used may account in part at least for the differences which do exist. Simple addition such as used by Hurlock for testing may lend itself more readily to a greater per centage of improvement than does short division of the type employed in the present study.

It has been suggested by some writers that learning which takes place under the influence of highly stimulating incentives is retained for a shorter period of time than learning which takes place under normal conditions. It has also been maintained by some writers, particularly Symonds and Chase, that motivating factors are of value only in so far as they make practice more palatable and that actually the amount of learning acquired is dependent

solely upon the amount of practice one gives to the process.

Because of these contentions and because no previous investigator has attempted to ascertain the permanent effect of incentive-stimulated learning when the incentive has been competition, a re-test was given the subjects of this study after a lapse of three month's time. The same test which had been given as an initial test in the experiment was used, and the subjects in all three groups were merely told that the experimenter was interested in knowing how well they could do on a similar test after three month's time.

Table No. XVII, shows the results of this test. It will be found that the Individual Competition Group showed 76.% average improvement upon the scores they had made when this same test had been given as the initial test of the experiment. The Group Competition Group made 69.% improvement, and the Control Group 49.%.

In comparison with the last test given at the end of the experiment three months previously the Individual Competition Group did only 3% poorer work than they had done after two weeks of practice and with the aid of a highly developed incentive. The Group Competition Group did 5.% poorer work, and the Control Group 10.%

Thus, one seems justified in concluding that in the case of this study the group which had made the greatest improvement during the main body of the experiment not only did the best work after a lapse of three month's time, but also retained the greatest per cent of its previous learning. Likewise the Control Group which made the least progress during the experiment lost over three times as much in per cent as did the Individual Competition Group and twice as much as the Control Group. It would appear from these figures that learning carried on under the influence of the type of incentives employed in this study has a greater per centage of carry-over than learning which takes place without these incentives.

SUMMARY

The conclusions based upon the findings of this study might be summed up as follows:

Individual Competition proved to have the greatest incentive value for the subjects in this study by causing a gain of 82.9% between the scores made on the initial and last tests as compared with 67.7% made by the Control Group. The statistical reliability of the differences was computed and the results are recorded on Table VI. It will be noted that the differences are great enough to assure their being true differences.

2. Group Competition proved however to have a strong incentive value as well, producing a gain of 78.% which is greater than the gain made by the Control Group but less than that made by the subjects having individual competition as an incentive.

3. In comparing the results of this study at the end of the fifth test with the results of Experiment I. which came to a conclusion at the end of the fifth test, there appears to be a striking similarity between the two studies, namely that at the end of the fifth test in both cases the Control Group excelled the other two groups in average per cent of gain. It appears that during the early part of the experiment when the novelty of the procedure is still fresh the incentive value of competition may be off-set by other incentive values which apparently are present. As the experiment continues, however, and the novelty wears off the control group appears to lose in efficiency and the competing groups gain.

4. The children of inferior ability appear to be more readily affected by the influence of competition than do the average and superior children within the same group. The inferior children of the Group Competition Group showed a gain of 120.8% at the end of the experiment as compared with 71.% and 63.% made by the average and superior subjects respectively. The superior students

in the Control Group did the poorest work of any of the subjects in the entire study.

5. The influence of group competition little affected the percentage of accuracy as compared with that of the Control Group. The Individual Competition subjects showed a slight trend toward increasing in accuracy as the study progressed.

6. Although the boys within the rivalry group of group competition excelled the girls in general average throughout the experiment, the girls made a higher percentage of gain than did the boys. It appears that girls are slightly more susceptible to the influence of a competitive incentive than are boys.

7. From the results obtained on a re-test after a lapse of three months it appears that learning carried on under the influence of the incentive of competition has a more permanent effect than learning carried on without the incentive. Individual competition proved to have a greater permanent learning value than did group competition and group competition better than no incentives.

EXPERIMENT NO. III

The third experiment of this study dealt similarly with the problem of the effect of competition on learning but in this case was concerned with the study of children of a still younger age, in an effort to determine the trend of development of the competitive spirit in children.

Tests identical with those used in the previous experiments were administered over a period of ten practice periods. It should be noted, however, that the children of this study had only recently mastered short division and for them the tests were unquestionably harder than for children of an older age who had been familiar with the process for a longer time.

The subjects were pupils in the 2A grade of the Stenhouse School in Edinburgh. The entire group included 127 children evenly divided as to sex, there being in the number 63 boys and 64 girls. The average age of the children was 9 years and 7 months.

The procedure was identical with that of Experiment II. The experimenter each day came to the class-room, the work the children were doing was put aside, and the tests given. The pupils are accustomed to practice teachers

from the training school and did not seem to be noticeably disturbed either by the interruption or by the presence of a stranger.

As in the case of Experiment II the sections of the Group Competition Group were asked to choose names for their respective teams. The result was that Group A. became known as "the Territorials" and Group B. as "the Lions". There was evidence of much enthusiasm over the competition, and in the mind of the investigator and the regular class-room teacher a real competitive situation was created.

The following charts show the progress of each of the three groups during the course of the experiment. Tables I and II show the results obtained for the groups as a whole. Tables III and IV record the Standard Deviations and P.E. Averages of all three groups, and statistical computations of the reliability of the differences appear on Table V.

TABLE NO. I.

AVERAGE SCORES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 30.6 | 34.0 | 37.8 | 37.9 | 29.7 | 35.0 | 37.8 | 35.3 | 42.4 | 44.0 |
| INDIVIDUAL COMPETITION | 33.2 | 35.5 | 39.3 | 45.0 | 35.4 | 39.6 | 48.6 | 40.6 | 54.6 | 54.6 |
| GROUP COMPETITION | | | | | | | | | | |
| Group A. | 31.4 | 34.4 | 41.2 | 43.9 | 37.9 | 46.2 | 53.4 | 44.5 | 53.8 | 57.5 |
| Group B. | 31.4 | 36.6 | 44.3 | 46.2 | 40.6 | 45.6 | 47.2 | 46.6 | 55.7 | 57.0 |
| TOTAL | 31.4 | 35.5 | 42.7 | 45.0 | 39.3 | 45.9 | 50.3 | 45.5 | 54.8 | 57.2 |

TABLE NO. II

PER CENT OF AVERAGE INCREASE

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH OVER INITIAL |
|---------------------------|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|
| CONTROL | 11.0 % | 23.8 % | 14.3 % | 15.3 % | 43.7 % |
| INDIVIDUAL COMPETITION | 6.9 | 35.5 | 19.2 | 22.2 | 64.4 |
| GROUP COMPETITION | | | | | |
| Group A. | 9.5 | 39.8 | 47.1 | 41.7 | 83.1 |
| Group B. | 16.5 | 47.1 | 45.2 | 48.4 | 81.5 |
| TOTAL | 13.0 | 43.3 | 46.1 | 44.9 | 82.3 |

TABLE NO. III

STANDARD DEVIATIONS

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 11.4 | 12.5 | 18.3 | 11.4 | 12.4 | 12.1 | 13.5 | 14.0 | 15.3 | 17.6 |
| INDIVIDUAL COMPETITION | 11.2 | 15.6 | 11.6 | 15.5 | 14.5 | 17.1 | 23.0 | 18.4 | 22.1 | 27.0 |
| GROUP COMPETITION | 9.1 | 14.4 | 22.1 | 18.4 | 15.6 | 19.9 | 22.6 | 17.7 | 19.7 | 21.9 |

TABLE NO. IV

P.E. AVERAGES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 1.1 | 1.3 | 2.0 | 1.2 | 1.3 | 1.3 | 1.4 | 1.5 | 1.5 | 1.8 |
| INDIVIDUAL COMPETITION | 1.2 | 1.7 | 1.2 | 1.7 | 1.5 | 1.8 | 2.4 | 1.9 | 2.3 | 2.8 |
| GROUP COMPETITION | .9 | 1.9 | 2.2 | 1.9 | 1.7 | 2.1 | 2.4 | 1.9 | 1.9 | 2.3 |

TABLE NO. V

RELIABILITY OF DIFFERENCES

| GROUP | ACTUAL DIFFERENCE | P.E. DIFFERENCE | DIFFERENCE IN P.E. UNITS |
|--|-------------------|-----------------|--------------------------|
| Between Control and Individual Competition | | | |
| 1st. Test | 2.6 | 1.6 | 1.6 |
| 5th. Test | 4.6 | 2.2 | 2.1 |
| 10th. Test | 10.6 | 3.3 | 3.2 |
| Between Control and Group Competition | | | |
| 1st. Test | .8 | 1.4 | .57 |
| 5th. Test | 10.9 | 2.5 | 4.4 |
| 10th. Test | 13.2 | 2.5 | 5.3 |
| Between Individual Competition and Group Competition | | | |
| 1st. Test | -1.8 | 1.5 | 1.2 |
| 5th. Test | 6.3 | 2.8 | 2.2 |
| 10th. Test | 2.6 | 3.3 | .79 |

TABLE NO. VI
COMPARISON OF % OF GAIN BETWEEN
FIFTH AND LAST TESTS

| GROUP | FIFTH TEST | LAST TEST |
|---------------------------|------------|-----------|
| CONTROL | 14.2 % | 43.6 % |
| INDIVIDUAL COMPETITION | 19.2 | 64.4 |
| GROUP COMPETITION | 46.3 | 82.3 |

TABLE NO. VII
COMPARISON OF PER CENT OF GAIN AT THE
END OF THE FIFTH TEST BETWEEN
THE GROUPS IN EACH OF THE
THREE EXPERIMENTS

| GROUP | EXPERIMENT I | EXPERIMENT II | EXPERIMENT III |
|---------------------------|--------------|---------------|----------------|
| CONTROL | 70.5 % | 73.0 % | 14.2 % |
| INDIVIDUAL COMPETITION | 63.9 | 61.4 | 19.2 |
| GROUP COMPETITION | 59.1 | 65.3 | 46.3 |

TABLE NO. VIII.

AVERAGE SCORES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Superior | 42.2 | 45.3 | 52.4 | 49.0 | 51.8 | 45.5 | 52.7 | 46.6 | 57.7 | 59.1 |
| Average | 31.0 | 32.8 | 36.2 | 35.7 | 28.0 | 34.4 | 34.3 | 33.7 | 44.4 | 40.6 |
| Inferior | 17.8 | 23.9 | 24.2 | 28.4 | 18.8 | 24.8 | 28.2 | 25.3 | 31.8 | 31.2 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | 45.0 | 50.1 | 54.4 | 58.1 | 45.7 | 58.9 | 67.1 | 55.8 | 73.2 | 78.2 |
| Average | 32.0 | 34.7 | 41.4 | 43.6 | 35.7 | 38.8 | 50.8 | 41.3 | 56.8 | 53.8 |
| Inferior | 20.5 | 19.2 | 21.3 | 30.8 | 21.2 | 25.7 | 29.1 | 24.3 | 32.5 | 30.0 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | 43.3 | 47.8 | 59.3 | 60.0 | 54.5 | 63.5 | 75.2 | 60.9 | 71.2 | 76.9 |
| Average | 31.0 | 35.8 | 43.1 | 42.3 | 38.9 | 45.1 | 52.1 | 42.6 | 54.2 | 53.0 |
| Inferior | 22.1 | 23.4 | 25.6 | 30.9 | 26.2 | 30.5 | 32.5 | 32.7 | 38.4 | 38.8 |

TABLE NO. IX
 PER CENT OF AVERAGE INCREASE
 COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH OVER INITIAL |
|---------------------------|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|
| CONTROL | | | | | |
| Superior | 23.3 % | 16.0 % | 47.8 % | 10.4 % | 40.0 % |
| Average | 5.8 | 15.0 | 10.9 | 8.7 | 30.9 |
| Inferior | 34.2 | 5.9 | 39.3 | 42.1 | 74.7 |
| INDIVIDUAL COMPETITION | | | | | |
| Superior | 11.3 | 29.1 | 30.8 | 24.0 | 73.9 |
| Average | 8.4 | 36.2 | 21.2 | 29.3 | 68.1 |
| Inferior | 6.7 | 50.2 | 25.3 | 18.5 | 45.3 |
| GROUP COMPETITION | | | | | |
| Superior | 8.0 | 38.5 | 48.5 | 42.9 | 77.6 |
| Average | 15.4 | 36.4 | 45.4 | 37.4 | 70.9 |
| Inferior | 5.8 | 39.8 | 38.0 | 47.9 | 75.5 |

TABLE NO. X

STANDARD DEVIATIONS

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | | | | | | | | | | |
| Superior | 5.3 | 9.7 | 13.9 | 11.0 | 11.5 | 9.1 | 11.5 | 15.9 | 11.0 | 15.7 |
| Average | 2.1 | 7.4 | 7.3 | 8.1 | 7.2 | 7.5 | 5.1 | 7.1 | 10.9 | 7.1 |
| Inferior | 7.5 | 8.5 | 9.6 | 9.0 | 6.2 | 8.4 | 9.0 | 7.5 | 11.2 | 14.9 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | 6.1 | 12.3 | 16.8 | 11.9 | 12.7 | 16.7 | 11.1 | 15.3 | 17.6 | 21.2 |
| Average | 3.1 | 6.9 | 9.5 | 6.9 | 8.7 | 8.3 | 13.8 | 13.3 | 11.7 | 12.1 |
| Inferior | 5.0 | 9.7 | 8.2 | 13.5 | 11.1 | 8.3 | 12.2 | 10.1 | 11.9 | 11.3 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | 4.7 | 14.6 | 24.7 | 13.4 | 15.3 | 18.5 | 20.9 | 17.1 | 18.3 | 22.6 |
| Average | .6 | 5.4 | 11.3 | 7.1 | 6.0 | 6.7 | 11.0 | 8.5 | 10.4 | 12.9 |
| Inferior | 5.1 | 7.1 | 10.9 | 7.9 | 8.5 | 9.6 | 8.1 | 9.0 | 13.5 | 8.2 |

TABLE NO. XI

P. E. AVERAGES

COMPARISON OF DIFFERENT GRADES OF ABILITY

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Superior | .9 | 1.8 | 2.6 | 2.0 | 2.1 | 1.7 | 2.5 | 2.8 | 1.9 | 2.8 |
| Average | .3 | 1.3 | 1.3 | 1.5 | 1.9 | 1.3 | .9 | 1.3 | 1.9 | 1.2 |
| Inferior | 1.3 | 1.5 | 1.8 | 1.8 | 1.1 | 1.5 | 1.6 | 1.3 | 2.0 | 2.7 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Superior | 1.1 | 2.2 | 3.0 | 2.2 | 2.3 | 3.1 | 2.2 | 2.8 | 3.2 | 3.8 |
| Average | .6 | 1.3 | 1.7 | 1.3 | 1.6 | 1.5 | 2.4 | 2.5 | 2.5 | 2.3 |
| Inferior | .7 | 1.8 | 1.5 | 2.8 | 2.1 | 1.5 | 2.2 | 1.9 | 2.2 | 2.1 |
| GROUP COMPETITION | | | | | | | | | | |
| Superior | .8 | 2.5 | 4.3 | 2.3 | 2.8 | 3.4 | 3.8 | 3.1 | 3.2 | 4.1 |
| Average | .01 | .9 | 2.0 | 1.4 | 1.2 | 1.2 | 2.0 | 1.5 | 1.9 | 2.4 |
| Inferior | .9 | 1.2 | 1.9 | 1.4 | 1.7 | 1.7 | 1.5 | 1.6 | 2.4 | 1.5 |

TABLE NO. XII

AVERAGE SCORES

ACCORDING TO SEXES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|------------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| CONTROL | | | | | | | | | | |
| Boys | 32.6 | 33.4 | 37.0 | 37.6 | 30.5 | 33.8 | 39.0 | 36.8 | 42.1 | 42.2 |
| Girls | 28.7 | 34.0 | 38.0 | 36.4 | 28.8 | 35.6 | 37.8 | 34.1 | 46.2 | 44.6 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Boys | 29.4 | 36.8 | 37.1 | 42.7 | 29.8 | 37.8 | 40.4 | 35.7 | 46.9 | 45.5 |
| Girls | 35.6 | 38.2 | 44.7 | 47.0 | 39.8 | 47.0 | 56.4 | 45.1 | 61.6 | 62.0 |
| GROUP COMPETITION | | | | | | | | | | |
| Boys | 31.0 | 33.9 | 39.8 | 41.2 | 38.0 | 44.4 | 48.0 | 43.0 | 51.2 | 53.0 |
| Girls | 34.3 | 37.9 | 51.2 | 50.0 | 40.0 | 48.0 | 56.9 | 48.3 | 59.9 | 62.1 |

TABLE NO. XIII

PER CENT OF GAIN

ACCORDING TO SEXES

| GROUP | FIRST OVER INITIAL | THIRD OVER INITIAL | FIFTH OVER INITIAL | SEVENTH OVER INITIAL | NINTH [*] OVER INITIAL |
|-------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------------------|
|-------|--------------------------|--------------------------|--------------------------|----------------------------|---------------------------------------|

CONTROL

| | | | | | |
|-------|-------|--------|-------|--------|--------|
| Boys | 2.4 % | 15.3 % | 3.6 % | 12.8 % | 29.4 % |
| Girls | 18.4 | 26.8 | 24.0 | 18.8 | 55.4 |

INDIVIDUAL
COMPETITION

| | | | | | |
|-------|------|------|------|------|------|
| Boys | 25.1 | 45.2 | 28.5 | 21.4 | 54.7 |
| Girls | 7.3 | 32.0 | 32.0 | 26.6 | 65.5 |

GROUP
COMPETITION

| | | | | | |
|-------|------|------|------|------|------|
| Boys | 9.3 | 32.9 | 43.2 | 38.7 | 70.9 |
| Girls | 10.4 | 45.7 | 39.9 | 43.7 | 83.2 |

TABLE NO. XIV

STANDARD DEVIATIONS
ACCORDING TO SEXES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | | | | | | | | | | |
| Boys | 12.0 | 11.7 | 14.0 | 11.8 | 12.5 | 10.2 | 12.5 | 13.6 | 17.3 | 18.8 |
| Girls | 11.3 | 13.1 | 14.1 | 14.2 | 12.8 | 12.4 | 14.3 | 16.4 | 13.9 | 16.5 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Boys | 14.6 | 17.3 | 18.2 | 17.8 | 15.9 | 18.4 | 20.4 | 23.1 | 22.4 | 26.9 |
| Girls | 10.5 | 13.8 | 16.1 | 13.3 | 13.2 | 21.5 | 21.6 | 18.0 | 19.3 | 20.5 |
| GROUP COMPETITION | | | | | | | | | | |
| Boys | 9.4 | 13.6 | 19.4 | 15.8 | 16.9 | 19.7 | 24.2 | 18.8 | 19.6 | 22.8 |
| Girls | 10.1 | 15.4 | 19.4 | 15.8 | 17.2 | 15.4 | 24.6 | 15.0 | 19.4 | 20.1 |

TABLE NO. XV.

P.E. AVERAGES

ACCORDING TO SEXES

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|-----------------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | | | | | | | | | | |
| Boys | 1.9 | 1.9 | 2.2 | 1.9 | 1.9 | 1.6 | 1.9 | 2.2 | 2.8 | 3.0 |
| Girls | 1.5 | 1.7 | 2.1 | 2.1 | 1.7 | 1.7 | 1.9 | 2.7 | 1.9 | 2.2 |
| INDIVIDUAL COMPETITION | | | | | | | | | | |
| Boys | 2.4 | 2.8 | 2.8 | 2.9 | 2.5 | 3.0 | 3.2 | 3.8 | 3.6 | 4.3 |
| Girls | 1.5 | 1.9 | 2.3 | 1.9 | 2.1 | 3.1 | 3.0 | 2.6 | 2.8 | 2.9 |
| GROUP COMPETITION | | | | | | | | | | |
| Boys | 1.3 | 1.9 | 2.7 | 2.3 | 2.6 | 2.8 | 3.4 | 2.8 | 2.7 | 3.2 |
| Girls | 1.5 | 2.3 | 2.9 | 2.6 | 2.8 | 2.5 | 3.9 | 2.4 | 3.0 | 3.2 |

TABLE NO. XVI

PER CENT OF ACCURACY
(PER CENT CORRECT)

| GROUP | INITIAL | 1ST. DAY | 2ND. DAY | 3RD. DAY | 4TH. DAY | 5TH. DAY | 6TH. DAY | 7TH. DAY | 8TH. DAY | 9TH. DAY |
|---------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CONTROL | 94.9 % | 94.1 % | 93.4 % | 96.5 % | 94.4 % | 95.4 % | 95.7 % | 93.7 % | 95.7 % | 95.7 % |
| INDIVIDUAL COMPETITION | 92.2 | 93.1 | 91.7 | 96.0 | 92.3 | 94.4 | 96.0 | 93.3 | 94.9 | 95.3 |
| GROUP COMPETITION | 96.2 | 96.0 | 95.6 | 96.9 | 96.3 | 96.6 | 97.9 | 97.0 | 96.7 | 97.2 |

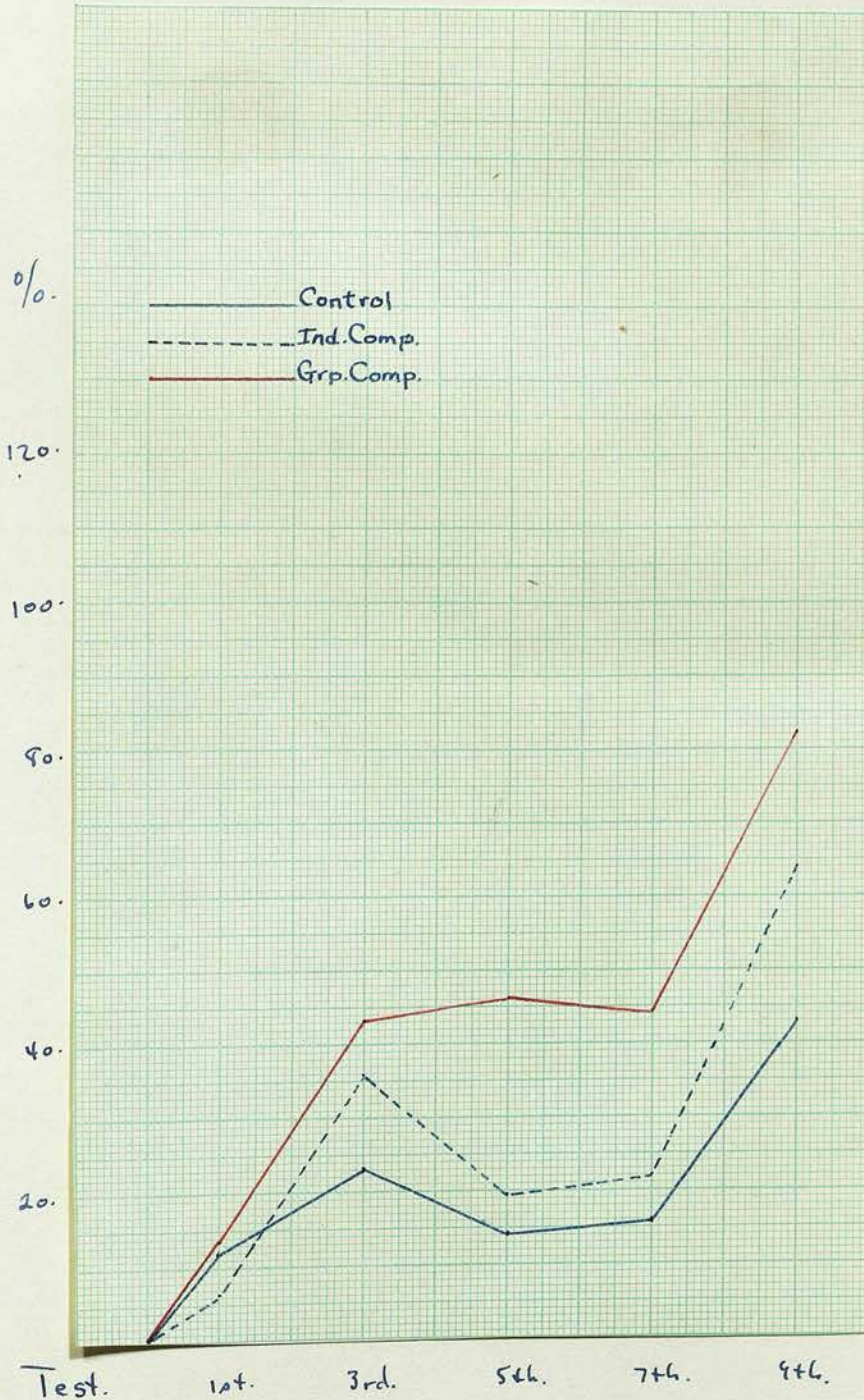
TABLE NO. XVII

RESULTS OF RE-TESTING

| GROUP | % IMPROVEMENT OVER INITIAL TEST | % IMPROVEMENT OVER LAST TEST | STAND. DEV. | P.E. AV. |
|---------------------------|---------------------------------------|------------------------------------|-------------|----------|
| CONTROL | 42.1 % | -1.1 % | 15.0 | 1.4 |
| INDIVIDUAL COMPETITION | 59.6 % | -3. % | 22.0 | 2.2 |
| GROUP COMPETITION | 64.3 % | -10. % | 23.0 | 2.5 |

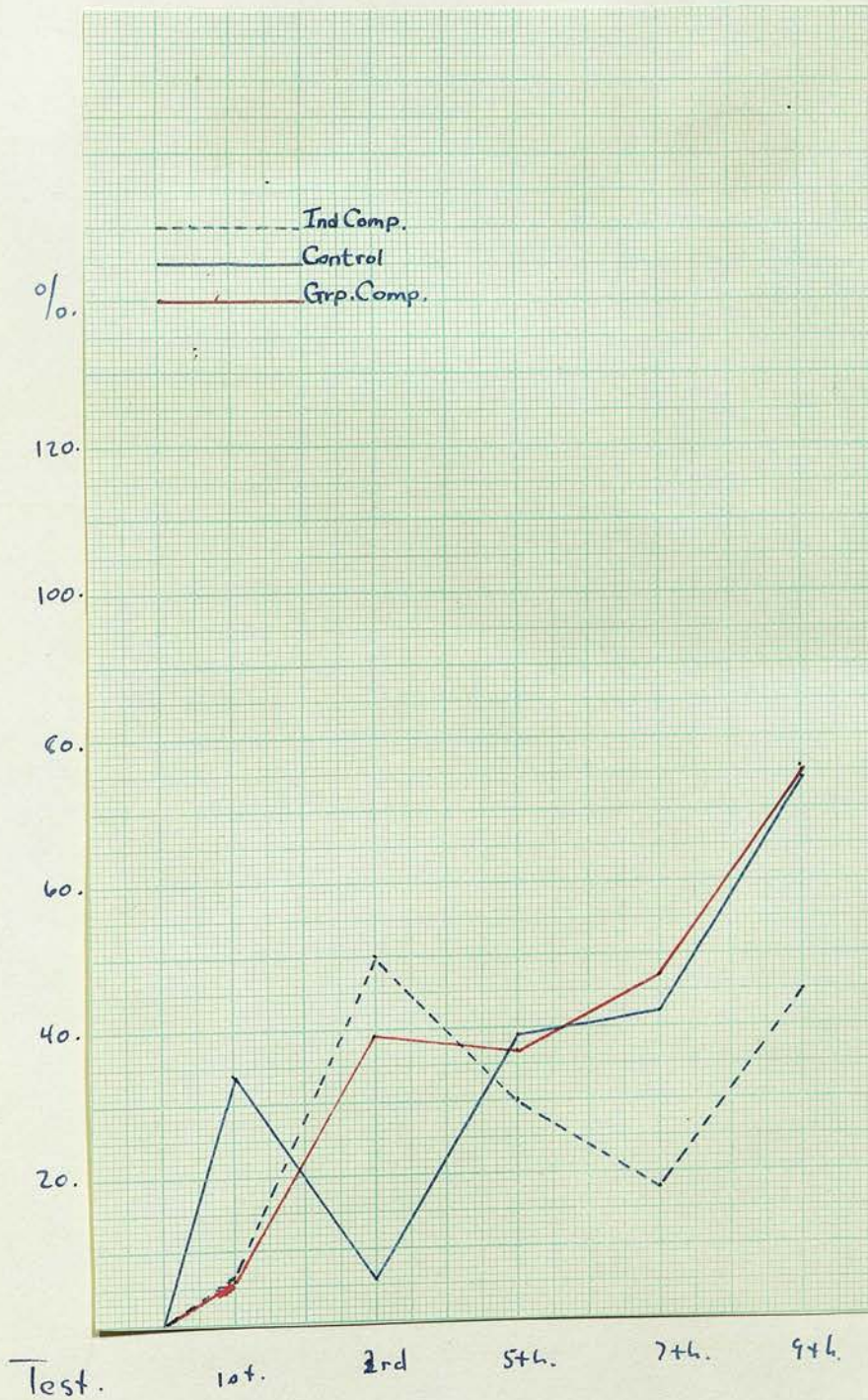
GRAPH NO. I

A GRAPH SHOWING THE PROGRESS
IN PER CENT OF EACH OF
THE THREE GROUPS



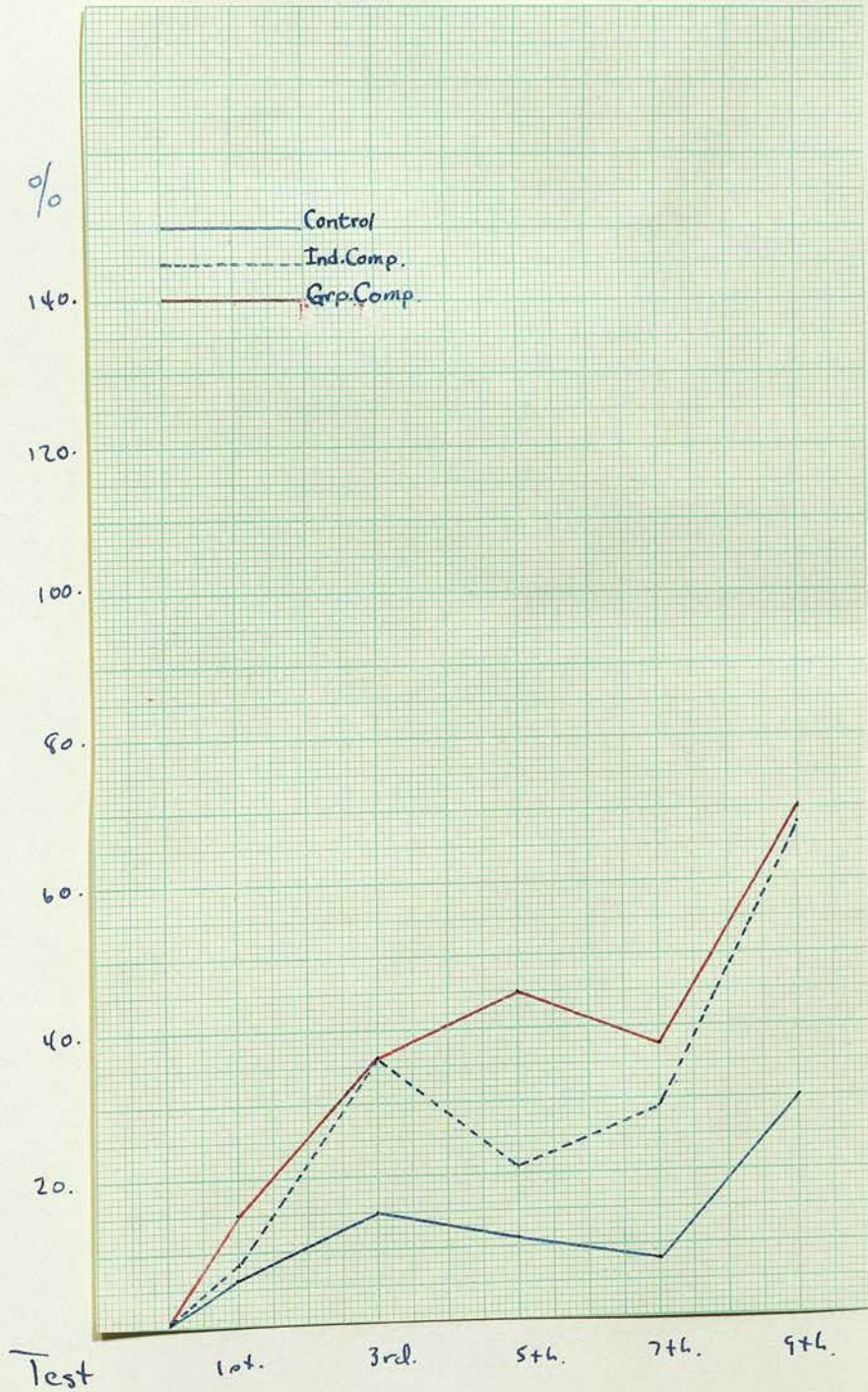
GRAPH NO. II

A GRAPH SHOWING THE PER CENT OF
GAIN OF THE INFERIOR SUBJECTS
IN EACH GROUP



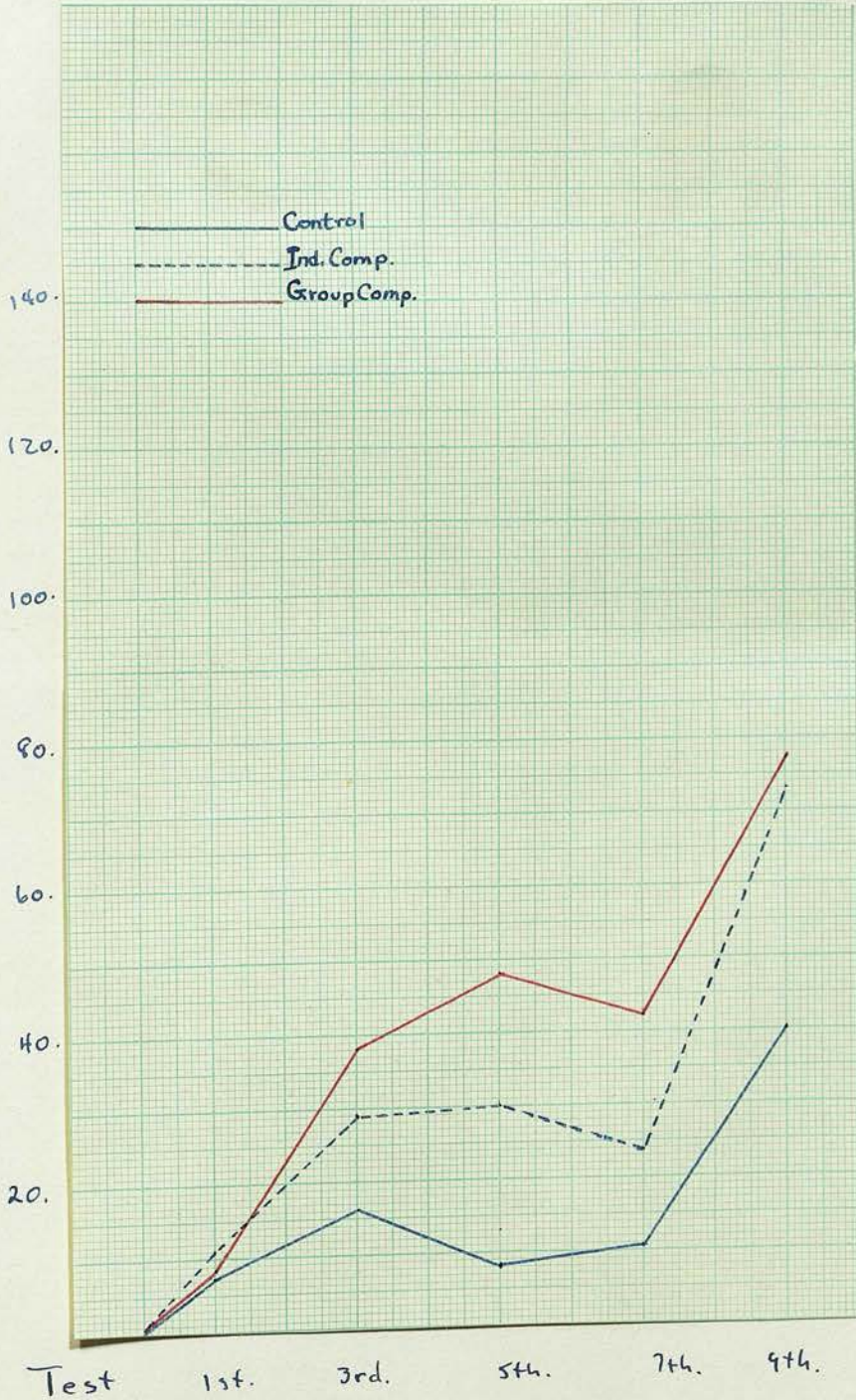
GRAPH NO. III

A GRAPH SHOWING THE PER CENT OF
GAIN OF THE AVERAGE
SUBJECTS IN EACH
GROUP



GRAPH NO. IV.

A GRAPH SHOWING THE PER CENT
OF GAIN OF THE SUPERIOR
SUBJECTS IN EACH
GROUP



ANALYSIS OF RESULTS

The accompanying charts again serve best in showing the results obtained in this study. It will be noted readily both from the average scores and the per cent of average gain made by the three groups that in this study the results differ from those of Experiment II. In Experiment II the subjects were more favorably affected by individual than by group competition while in the present study group competition proved to be more stimulating than the type of individual competition employed. It will be recalled that in Experiment II the subjects were three years older than the children of this study.

In this experiment the children working under the incentive of group competition made 82.3 % gain as compared with 64.4 % made by the Individual Competition Group and only 43.6 % made by the Control Group. On every day throughout the entire experiment the Group Competition Group made the highest score. Several interesting points come to light in relation to these findings.

The first has to do with the scores made on the fifth test. This test occurred on a Friday and it happened that on this particular day the State Inspectors were visiting the school and a special teacher's meeting was being held on that morning, which meant that the children were to be given an exceptionally long recess period. Before the

test was given two of the regular teachers told the experimenter that the children would no doubt do very poorly as the normal school routine was noticeably altered and the children were somewhat excited about it and less attentive to their work than under normal conditions. It is interesting to note that both the Control Group and the Individual Competition Group fell noticeably in their scores on that day, and although the Group Competition Group also fell the percentage of gain for this group on that day was only slightly less than on the preceding day. It may have been that the effect of group competition was strong enough to counter-balance the distracting effects of the altered schedule, or it may be that for some other reason this particular class had been less affected by the general unrest of the school situation.

In regard to the two competing groups within the Group Competition Group it will be found that Group B. took the lead on the first day, held it for three successive days following, lost it to Group A. on the fifth day. Group A. held it for a day following, lost it again for two days and regained it on the last day by a very slight lead. The discouraging effect found by some investigators to result from losing for several days in succession seems not to have been the case in this study, as is evi-

denced by the ability of the losing group to regain the lead in the cases of both Group A. and Group B.

As in the case of the two previous experiments the subjects on the basis of their initial test scores were divided into thirds, the highest being classified as Superior, the middle group as Average, and the lowest third as Inferior. The average scores and the per cent of average gain were then calculated for each of these three divisions within the three groups. They may be found on Tables VIII to XI inclusively. It will be noted that the greatest per cent of gain was made by the superior subjects in the Group Competition Group. It has been found in other studies with children and with subjects of older ages that group competition is not always effective with subjects of superior ability but in this study with children of this age it appears to be a most effective incentive. The three lowest per centages were made by the superior and average subjects in the Control Group and the inferior subjects in the Individual Competition Group. In contrast to the low scores made by the average and superior students in the Control Group the inferior subjects of that group did second best in average per cent of gain. It would appear that practice was especially effective with inferior subjects and less so for the

better students. In the Individual Competition Group the superior subjects made the greatest per cent of gain, the average next, and the inferior the least, which may serve to show that competing against one's own record and as a member of a group against other members of that group is effective with children of this age group according to their ability, being most effective in the case of the superior children, less so with the average and still less so in the case of inferior subjects. In group competition while all three groups did well, better records were made by the Superior and Inferior subjects than by the average.

When a comparison was made between the boys and girls in each of the three groups it was found that in each group the girls made a higher per centage of gain throughout the experiment than did the boys. The figures relating to this division will be found on Tables XII, XIII, XIV, and XV. The higher per centage of gain for girls was true not only for the incentive groups but for the Control Group as well. These findings are in keeping with those of Triplett, Hurlock, and others, that girls profit slightly more from practice effects than boys and likewise, although the difference is comparatively small, the effect of competition also shows a slight difference again in favour of the girls.

In regard to the effect of competition on accuracy the per centage of problems correctly solved for each day has been listed on Table No. XVI. Again it should be noted that the subjects were given credit for each calculation correctly done and that one mis-calculation within a problem did not mean that the entire problem was considered incorrect. This fact accounts for the high numerical figures of the per centage of accuracy as found on the above mentioned table. It will be found by studying this table that the highest per cent of accuracy was made by the Group Competition Group which again serves to refute the commonly accepted idea that competition decreases accuracy. While the highest per centage of accuracy on each day was made by the Group Competition Group the greatest improvement between the per cent of accuracy on the initial test and that on the last test was made by the Individual Competition Group with an increase of 3.1 points in per cent.

In an effort to determine the permanent effect of learning carried on under the influence of the incentive of competition on children of this age, the same three groups of subjects studied in this experiment were again tested after a lapse of one month's time. The subjects were told that they would be given only one test, and that the purpose of it was to discover how well they

they could do after a month's time had passed. The results of this re-test may be found on Table No. XVII. The greatest per cent of gain between this test and the initial test of the experiment was made by the Group Competition Group with a gain of 64.3 %. The second highest gain was made by the Individual Competition Group with a gain of 59.6 % against 42.1 % made by the Control Group. Thus the three groups ranked in order of per cent of gain much as they did at the close of the two week period of the experiment. The Control Group lost the least between the last test of the experiment and this re-test with a loss of 1.1 %. The Individual Competition Group lost 3. % and the Group Competition Group 10.%. In Experiment II the group which had gained the most during the two weeks practice period lost the least upon the re-test. That was not the case in this study as the Group Competition Group which had gained the most lost the greatest per cent on the re-test. Whether this is due to the difference in the ages of the subjects or to the difference between the length of time after which the re-tests were given is a question. Further experimentation needs to be done upon this point. The important factor revealed by the present investigation is that learning carried on under the influence of competition seems to have a permanent effect and that subjects

who learned under the influence of this incentive after a lapse of one month's time still do a much higher percentage of work than do subjects who had only the influence of practice effects during the experiment.

CONCLUSION

The findings of this study may be summarized as follows:

1. With children of this age group , group competition is more effective than the type of individual competition employed in this study, and it in turn is more effective than mere practice.
2. The failure of one or the other of the two competing groups in competition appears to have a stimulating rather than a discouraging effect upon its members.
3. The superior and inferior subjects profited the most from the influence of group competition, and individual competition appeared to have a bad effect upon children of inferior ability.
4. In comparing the effect of competition upon boys and girls there appeared only a slight difference and this was in favor of the girls.
5. The presence of an incentive appeared to make for a greater per cent of accuracy. Group Competition

produced the highest per cent of accuracy throughout the experiment but Individual Competition showed the effect of making for the greatest improvement in accuracy between the initial and last tests.

6. When the permanent effect of learning carried on under the influence of the competitive incentive was tested after a lapse of one month's time, it was found that the group which made the highest per centage of gain between the initial and last test of the experiment still made the best score at the end of a month's time, and the group which had made the least improvement still made the lowest score. Thus it appears that learning carried on under the influence of an incentive does have permanent effect, showing that learning under the influence of incentives is of value not only for the present but for permanent learning as well.

Finally, it may be said that from the evidence put forth by this study it would appear that children of this age group respond favorably to group competition as an effective incentive device both for immediate and delayed results.

CONCLUSION

The present review of the problem of incentives to learning gives some indication of the vast field which this subject covers, and of the comparatively minute amount of thorough-going research which has as yet been undertaken in the field.

The value of a greater understanding of the incentive problem is clear if the studies made upon the wide discrepancies which exist between the A.Q. and the I.Q. can be used as a basis for judgment.

Attention, intention, and attitude appear to be important factors in the learning process and if these can be increased and improved upon for good by the use of wisely administered incentives the case for each and every type of incentive is strengthened.

The past quarter of a century has witnessed an amazing growth in the study of the underlying factors which determine man's behaviour. As these factors become better understood and classified the problem of relating environmental stimuli to them in order to obtain desired results becomes apparent. This relationship tends to present the incentive problem in a new light, as incentives come no longer to be considered as isolated factors in human behaviour but as closely allied elements, or better still as component parts of the total problem of human motiva-

tion.

A review of the present existent theories of motivation show at least several fundamental urges or drives dominant in man and sensitive to external stimuli. Regardless of the interpretation given them by the various schools of psychology, the existence of certain fundamental motivating factors such as the desire for social approval, pugnacity etc. are recognized by most to be powerful determining elements in man's behaviour. The various types of expression which these inner drives take are important aspects of the problem of human behaviour. The better they become understood the more possibility is given to the hope of directing man's activity into desired channels.

It has been pointed out in this study that if man's behaviour is determined by inner drives, urges, or instincts attempts to stimulate activity must take these into account and ally the external situation with the latent innate tendencies which in turn stimulate the individual into activity. External situations which do this have been classified as incentives.

An analysis of the problem of incentives reveals several attributes which may be associated with them. Foremost among these is this factor made clear in the

definition of incentives as used in this study, of the close relationship between incentives and the motivating elements in life. It has been suggested that this may account for a second rather generally recognized aspect of the incentive problem, that of the inter-dependence and inter-relationship of the various incentives themselves.

It has been pointed out further that before any incentive can be properly evaluated it must be considered in light of the total situation of which it is a part. Moreover it must be recognized that the value of an incentive may differ at different times and in varying circumstances.

Many incentives are thus far little understood except to be vaguely recognized as being possible sources of stimuli. Others which are more generally recognized and which lend themselves more readily to research have been studied to some degree. The fore-going review of this experimental work reveals a great amount of material but one is readily struck by the lack of unity and thorough-going character of the research on any single incentive.

Because of this fact an attempt has been made in this study to confine the experimental investigations to one type of incentive, namely, competition, and by so doing attempt to aid in the presentation of a more complete analysis of the development of the competitive spirit in children and adults.

Previous studies have revealed that the competitive impulse probably makes its appearance at the age of three or four years, usually resulting in a decrease in output of work until about the age of five when the child begins to exert positive effort to out-do his fellow-worker and thus increase his efficiency. By the age of six it is thought that 90. % of all children have the competitive impulse well developed.

The investigations of this study dealt with three different age groups, namely, $9\frac{1}{2}$ years, 12 years, and university age. From the results obtained and insofar as competition was present as an incentive with the type of problem employed in this study, the following **conclusions** may be drawn regarding competition as an incentive.

I. With children of $9\frac{1}{2}$ years of age both group competition and individual competition of the type employed in this study are effective in stimulating a greater amount of learning than results from mere practice. Group competition, however, has a greater effect than does individual competition.

II. With 12 year old children both types of competition are also effective but individual competition more so than group competition.

III. It appears from the present studies that girls are slightly more favorably affected both by competition and by practice than are boys.

IV. Superior subjects among older children tend to be less favorably affected by group competition than younger children of superior ability. The latter appear to be highly stimulated by it. Individual competition proved to be more effective with superior children of the older groups than with those of the younger group. With inferior subjects individual competition produces a lower percentage of increase than does either group competition or mere practice. This was true in all three age groups studied.

V. Contrary to prevalent belief the presence of competition as an incentive tends to increase rather than decrease accuracy.

VI. Learning which takes place under the influence of competition as an incentive has a permanent effect both after one month and three month intervals. The percentage of retention is greater in the case of the older children than of the younger, in the type of learning and under the conditions employed in this study.

There remains much to be done in the way of experimental research before any adequate summary of the problem of competition as an incentive can be given. Further investigations are needed with adult subjects. The inadequacy of the present study dealing with adults, and of those carried on by one or two other investigators serve to emphasize this need. Other types of learning

need to be tested under the influence of competition; the relationship between the I.Q. and responses to competition needs investigation; and many comparative studies should be made between the effects of competition and other incentives. It is hoped that some of these investigations may be undertaken at a later date.

In summary, the competitive impulse, well-developed at the age of six appears to grow in strength throughout childhood and at the age of nine expresses itself most strongly in the form of response to group competition. At the age of twelve the emphasis appears to have shifted and individual competition proves to be more stimulating than group competition, at least in the type of problem used in this study. Indications suggest that perhaps as age increases the effect of group competition diminishes, and other factors enter in which have a strong additional incentive value. An understanding of what these may be and their relative strengths awaits further research.

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