"L A C K O F C O N C E N T R A T I O N"

A CLINICAL INVESTIGATION AMONG SCHOOLCHILDREN

By

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A C K N O W L E D G M E N T S

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CHAPTER I.

INTRODUCTION.

1. Statement of the Problem and Need for Research

The problem arose in the setting of the Child Guidance Clinic of the University of Cape Town where children were from time to time referred for "Lack of Concentration". It soon became evident that "lack of concentration" was an extremely vague, descriptive term used to cover a variety of conditions. The parent and teacher were able to state that the child could not concentrate, but they had little knowledge of what was actually lacking in the child. The Clinic did not have at its disposal :

(1) a precise measuring instrument for assessing the child's level of concentration;

(2) a definite training programme in which the child could participate;

(3) methods of assessing the main factors associated with lack of concentration.

As a result only rather general advice could be given to parents whose children were referred for this problem.

Thus, it was obvious that, despite the importance of this problem particularly in the field of education, there was little real understanding of it, and research in this very extensive field seemed to be indeed opportune.

2. Purpose of the Investigation.

The main purpose of the present study is to arrive at a clearer understanding of the term 'Lack of Concentration' for the clinical psychologist. This implies :

(1) defining concentration and accounting for its lack in the group of children studied;

(2) showing the inter-relationships and links between concentration and other variables;

(3) a) devising tests of concentration

b) formulating a training procedure with the object of developing concentration

c) devising a set of alternate tests to assess the effectiveness of the training programme;

(4) evaluating the present status of the problem and emphasizing the need for further research and investigation.

3. Review of Cases referred for "Lack of Concentration" to the Child Guidance Clinic of the University of Cape Town during the period 1956 to 1958.

(1) Number of Cases

1956 : 12
1957 : 7
1958 : 13
Total : 32

(2) Referring Agent

School : 18
Parents : 6
Doctors : 6
Friends : 2
Total : 32

(3) Chronological Age

5 years : 2
6 " : 2
7 " : 3
8 " : 7
9 " : 7
10 " : 4
11 " : 6
12 " : 1
Total : 32

(4) School Standard

Nursery School	:	1
Special Class	:	1
Sub A	:	3
Sub B	:	2
Standard I	:	9
" II	:	10
" III	:	4
" IV	:	1
" V	:	1
Total	:	32

(5) Intelligence Quotients

Sixteen children were tested on the Revised Stanford-Binet Intelligence Scale and 13 on the Individual Scale of the National Bureau for Educational Research. The Wechsler Intelligence Scale for Children was administered to two children and the Merrill-Palmer Scale to 1. Hence it must be noted that the intelligence quotients are not entirely comparable. The following classification could be made :

I.Q. Above 120	:	4
" 110 - 120	:	3
" 90 - 109	:	16
" 80 - 89	:	6
" 65 - 79	:	3

Thus, one sees, first of all, that, as lack of concentration is dominantly a scholastic problem, so the school is the major referring agency. The problem seems to present itself most frequently in the age group 8 to 11 years, this group accounting for 24 of the cases seen.

As a tentative assumption, it may be stated that it appears to be at the ages where formal school instruction begins that the problem first comes to the fore-ground. It is in the

primary school, in the lower standards that the child finds it really necessary for the first time to practise sustained attention; if these habits are not present or for some unique reason cannot be acquired, or if the practise of these habits is obstructed, then the problem of lack of concentration presents itself.

No definite explanation can be offered for the absence of referral of such children from the senior school. It is possible either that the problem resolves itself and the child, under a regular and controlled routine, acquires the habits of concentration that he was previously lacking, or that the difficulty then presents itself in a different setting - either as an emotional problem which was present before but not dominant and recognised as such, or as a specific scholastic difficulty and poor school progress.

(6) Medical Histories

Hearing loss	: 2
Defective vision	: 2
Asthma present or past	: 5
Stutter	: 2
Bedwetting	: 3

Convulsions, worms, concussion, meningitis, glandular fever, hayfever, eczema, sinusitis and gastro-enteritis were each found in individual cases.

(7) Domestic Factors and Interpersonal Relationships

In 6 instances there were some abnormal home circumstances such as broken or incomplete home, or step-parent; marked sibling jealousy occurred in 8 cases; marital discord was evident in 5 cases; unpopularity and inability to mix with peers occurred in 1 case; and a rejection of the child compensated for by over-protection was found in 1 case.

(8) Solutions to the Problem

The advice that was considered necessary after investigation can be discussed under three main headings :

(a) Advice with reference to education - In only 6 cases was it considered that actual training in habits of concentration would improve the situation. In all the other instances other factors were more significant; for example, advice as regards homework routine or supervision was given in 4 instances; remedial teaching or coaching was recommended for 4 children and 3 children were advised to repeat their standard at school; information as to Special Class placement or maximal scholastic expectations for the child was given in 3 instances.

All in all, in 19 different cases, the treatment of the problem was with reference to scholastic factors.

(b) Advice with reference to routine and handling in the home - This applied to 10 children . In 4 cases the parents had to attempt to increase the social maturity of the children or to train them in self-help. Two children were found to be in need of sympathetic, kindly handling, and 2 to require an orderly routine and firm, consistent handling. In one instance, the father's ideals for the child were too high and he was advised to lower them. Suggestions for improving sleep behaviour, an associated problem, were made in 1 case.

(c) Advice with reference to tension-causing factors in the home - Here the most commonly-occurring element was sibling-jealousy. Suggestions to improve this situation were made in 5 instances, in 4 of them additional advice having to be given about the general domestic situation, tension between the parents, general emotional immaturity of the child, the adult standards which were too high for the child, or inconsistent handling. In 1 case an attempt was made to improve the discord between the parents. In addition, in 2 cases, the emotional maladjustment was of such a proportion that it needed prolonged treatment in the Clinic; in another 2

instances, the parents merely needed reassurance and the problem was not really a problem as such.

From this brief review it appears evident that it is necessary, in an investigation of lack of concentration, to distinguish a number of elements which may act as causative factors or which must be considered in the solution of the problem.

CHAPTER II

REVIEW OF THE LITERATURE

1. Theories of Concentration

(1) Origin, development and definitions of the concept.

In dealing with the trend in theories of concentration, it becomes evident that, in the history of psychology, concentration as a concept at first had no standing of its own; it was attention that was defined and written about, and thus it is necessary to trace the development of these earlier ideas about attention.

The importance of attention in the psychology of the latter part of the last century arose from the closeness of its relationship to consciousness; it was this relationship that had a great influence on the theories of attention. The most popular of the psychological theories then was that which identified attention with clearness in consciousness. This interpretation was first set forth early in the eighteenth century by Malebranche, and it reached its apex in the work of Titchener[1] (1923) who described attention as being identical with sensory clearness. Much the same view was held by Wundt, by Wolf a good few years later and by Pillsbury[2] early in 1900 who states :

> Increase in the degree to which an impression is conscious and increase in attention to that impression are synonymous terms.

When the Functionalist School appeared, attention was assigned the role of selectivity. Thus, for William James[3] (1890) attention " ... is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought". Similarly,

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1. A Textbook of Psychology, p. 267.
2. Attention, p. 2.
3. Principles of Psychology, Vol. I, p. 403.

Wolf regarded attention as a form of preferential treatment whereby some things are admitted into consciousness and others not, or some are placed in the very centre of consciousness and others are relegated to the margin. However, there was disagreement as to how this selection takes place.

In most of the American psychological literature of the period Attention was called a selective process, but the descriptive material was generally influenced by the Structuralist emphasis upon the phenomenal aspect; this fact may be attributed to the influence of Titchener in whose laboratory a comprehensive experimental program continued for some time while there was no corresponding research coming from Functionalist quarters. In France and Italy, the selective interpretation was even more widely emphasized, largely owing to the influence of Binet who was himself a follower of James.

The next stage came with the appearance of Behaviourism when the interest in attention began to decline, this being a result of the increased emphasis upon the behavioural aspects of experience and the consequent tendency to reject terminology that had acquired a mentalistic tinge. Thus Watson ignored attention and Bekhterev reduced sensory attention to the reflex adjustment to the incoming stimulus, and ideational attention to implicit speech . Paschal[1] (1941) notes that it was Holt in 1915 who established the pattern of the behaviourists by declaring that as the faculty of attention had been analyzed and all the factors that belonged elsewhere had been separated, there remained only the core of clearness; seeking that which in behaviour would respond to attention in cognition, he found it in " ... the process whereby the <u>body</u> assumes and exercises an adjustment or motor set such that its activities are some function of an object, are focussed on the object".

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1. Holt, E.B. <u>The Freudian Wish</u>, p. 178, as quoted by Paschal, F.C. "Trend in Theories of Attention". <u>Psychol. Review.</u>, Vol. 48, 1941, p. 386.

Dashiell[1] (1928) followed on this by describing attention as an attitude that would facilitate a person's response to some particular stimulus, the set of attending including the adjustment of receptor mechanisms, postural changes, respiratory and circular functions and muscular strains. Pillsbury (1908) however, seems to disagree with this; he regarded the widespread motor phenomena and bodily processes accompanying attention to any stimulus as succeeding, or at the most, as accompanying the attention and not preceding it.

Dallenbach[2] (1930) quotes Ford's definition of attention in terms of behaviour. He regards attention as the "... name for the beginning of a synthesis of reactions to a novel environmental pattern ..." and he points in support of this definition to the results of experiments on distraction. Distractors at first attract attention and the efficiency of the work performed is lowered; with the lapse of time the distractors lose their effectiveness and are not attended to - that is, the reactions are so closely integrated that they are capable of resisting interference - and the efficiency of the work performed is not affected. This definition brings to the foreground the idea of the building-up of a new pattern of behaviour and does not emphasize only the physiological aspects of behaviour. Had Ford stated that his definition was not applicable to simple primary and involuntary attention, no objection to it could have been made.

While systematic psychologists were questioning the validity of the term Attention, and criticizing it as meaningless, unnecessary and mentalistic, it continued to occupy a salient position in the various branches of applied psychology, where the workers contented themselves with a commonsense inter-

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1. Fundamentals of Objective Psychology, p. 285.

2. Ford, A. "Attention-automatization". Amer. J. Psychol., 1929, Vol. 41, pp. 1 - 32.

pretation. Psychiatrists and educational psychologists were faced with the necessity of measuring attentional variations or reactions. Their studies have constituted almost the whole of the experimental literature in this area over the past twenty years, and it is in these fields that one begins to see the emergence of Attention or Concentration as a clinical entity.

In the industrial and personnel field too, batteries of occupational and aptitude tests began regularly to include tests of attention. Then, with the beginning of mental testing, the degree of concentration and range of attention were tested, if not directly, then by an emphasis upon tests demanding the maintenance of a high level of efficiency. A number of efforts were made to develop batteries of tests for the measurement of attention, and the peculiarly close relationship of attention to intelligence is emphasized by workers in the latter field from the time of Binet.

With progress in the field of psychopathology, disturbed attention came to be looked upon as one of the more frequent and clinically significant correlates of mental disorder. Psychiatrists and clinical psychologists accepted, as an operating definition, the control of the direction of response the lack of which was said to be responsible for the inability to make adaptations, a condition denoted as feeble-mindedness. Binet himself had defined the levels of feeble-mindedness in terms of attentional reactions.

In a number of psychopathological states, distinctive attentional symptoms and deviations became recognized as having diagnostic value, for example, the inability to concentrate in mania, the low span of attention in hysteria, the excessive fixation in paresis, and the heightened distractibility in brain-injuries.

It was the activity in these various fields that helped to keep interest in attention and that stressed the practical importance of such a concept.

No sooner had the Behaviourists declared their views on attention, when the newly-developing field of 'mental set' introduced emphasis on a new aspect, the postural determinants of reaction. The story of Attention would not be complete without considering the development of this line of thought.

Its antecedents are to be found in Ach's 'einstellung' and Watt's 'aufgabe'. In its subsequent history, it appeared chiefly in the role of the directive factor in controlled association. The neural explanation was that cortical tracts, still partially active in consequence of a previous stimulation, respond more readily to any appropriate stimulus.

Thorndike (1905), had coined the phrase 'mental set' to denote the idea in mind at the moment as a determinant of attention. Its present application is attributed to Woodworth[1] (1918) who began by saying :

> The mental set, or intention of performing a certain operation or solving a certain problem, is a drive, reinforcing certain associative connections and inhibiting others, and thus exerting a selective influence.

In 1921 Woodworth treated attention as the exploratory phase of perception, and described mental set as selecting from the previously formed associations, the one fitting the present task. Gradually, more emphasis was laid upon the selective aspect of attention while mental set by 1934 had given way to preparatory set or adjustment. Finally, in 1940 Woodworth brought set, selectivity and attention together.

Dashiell[2] (1928) brought set and attention into juxtaposition as the two types of postural response. He later clarified the relationship between set and attention, re-defining

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1. Dynamic Psychology, p. 124.

2. op. cit., Chap. 10.

attention as the assumption of a set - this being the adjustment of receptor mechanisms primarily, with the accompanying diffuse postural and circulatory changes completing the picture. Similar views were held by Fearing and Freeman who also took a postural view of attention.

Paschall[1] (1941) concludes this approach adequately with the following statement :

> The proponents of mental set have quite generally been inclined to assume that the phenomena of attention are adequately provided for through this approach ... But that there has been no general acceptance of the identity of set and attention is evidenced by the fact that they are given separate bibliographical classifications.

Thus two distinct interpretations of attention had developed in parallel fashion - the members of the radical party adhering to the set platform and the conservatives thinking in terms of selectivity and turning toward the preparatory adjustment. The second of these two directions of development had started with a return to the theory of William James.

The physiological theories of attention in the period following the first World War were of two types, those denoting attention as the mental aspect of the neural processes of facilitation and inhibition, and those that looked upon the neural substrata as a state of partial activation of cortical areas. The latter, notes Paschal (1941) had already been identified as the central theory of set. But as psychology was then becoming more interested in the description of reaction systems, neither of these theories had any real influence at that time and had to await the further work of Hebb about twenty years later.

The first person to treat attention exhaustively from the standpoint of the mode of behaviour exhibited was Kantor[2]

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1. Paschal, F.C., op. cit., p. 390 - 391.

2. Principles of Psychology, p. 214.

(1924) who said :

> Attention reactions are then the indispensable preliminary reactions to all psychological conduct. Only after a stimulus has been actualized, can the person proceed with the performance of whatever response is elicited by a specific stimulus. In this sense attention reactions are not only preliminary but they are definite preparatory reactions. They function to prepare the individual for whatever type of action is to follow. In more complex behaviour situations, attentional reactions are more than preparatory, they are in a genuine sense anticipatory ...

Attention is thus here defined as a reaction and is more than just a part of the perceptual reaction; it determines whether the organism will react in a certain way at all. Included are both affective and cognitive components, although the latter Kantor reduces to a "... momentary appreciation of the presence of a stimulus object". The actions 'which actualize stimuli' range from simple postural changes to the behaviour complexes that serve to sustain attention in reading and thinking. In short, Kantor may be said to have re-stated James' position in terms of a stimulus-response psychology.

In the period immediately following, writers generally interpreted attention as a preliminary act of adjustment. Pieron in 1929, says Paschal[1] (1941), calls attention "a pre-perceptive reaction of expectancy which consists of movements and attitudes of exploration, muscular readiness for response and general excitation setting off the affective co-efficient"; later he emphasized the release of energy.

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1. Pieron, H. Principles of Experimental Psychology, p. 65, as quoted by Paschal, F.C. op. cit., p. 393.

Following this came a short period in which the prevalent interpretation was that attention is the name for the total adjustment of the organism in contrast to the view that it is a specific reaction. Murphy[1] (1933) cites the fact that a frequent characteristic of the mentally disordered patient is the "distractibility of the patient, the fact that he is unable to maintain any kind of internal steering process, to hold attention on any one thing".

Spearman[2] (1937) also takes up the story of attention. He reiterates the criticism that, like intelligence, attention is altogether too indefinite a concept. He declares that if it has any meaning, it can only be that of directing mental energy. Stern[3] (1938) combined the idea of the direction of mental energy with that of the preperceptive nature of attention. "Attention is that personal state which constitutes the immediate prerequisite of a personal performance. The essential characteristics of attention are the clarification of the goal in consciousness and the concentration of force upon clarifying and attaining it".

Thus the implication throughout seems to be that attention is an active process, purposive and anticipatory.

Paschal[4] (1941) sums up the situation in the following way :

> In resumé, we may state that theories of attention, having departed from the cognitive definition, took a teleological direction, identifying attention with the selective aspect of selective adaptation ... The next

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1. General Psychology, p. 224.
2. Psychology Down the Ages, Vol. I, Chap. 7.
3. General Psychology, p. 472.
4. Paschal, F.C. op. cit., pp. 395 - 396.

> step was its identification with preparatory reaction, namely a step from a teleological to a reactional theory ... It next became a more definite preperceptive preparation. There entered a second factor, that of the control of energy ... (and) there followed a trend toward specificity of the preparatory act. Its essential nature is given an explanation in terms of preparatory set ...

Two theories had come into the foreground then, out of the thinking of the past quarter of a century. The one, the mental set theory, looked upon attention as a vague, diffuse term for the phenomena which are adequately covered by mental set. The other, a selective theory, saw in attention a preparatory set of adjustments which serves to pave the way for reaction to a particular stimulus. Paschal[1] concludes that the act of attention is "an implicit anticipatory reaction approximating identity with the reaction that is to follow". The degrees of attention, he states, correspond to the degrees of identity between the implicit anticipating and the subsequent overt reactions. He regards both attention and mental set as immediate determinants of reaction, but notes that attention differs from mental set in that it is an active, purposive process. According to him, the two of them together constitute the preparatory state of adjustment that determines to which of the simultaneously presented stimuli the organism will respond.

(2) Types of Attention

During the period under review various kinds of Attention were usually distinguished and the classification

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1. Paschal, F.C. op. cit., p. 397.

was based on various grounds. James[1] (1890) classified attention in the following manner : in considering the kind of object or activity to which the attention is directed, he makes the distinction between sensorial and ideational or intellectual attention, the former pertaining to objects of sense, the latter to ideas; attention may be either immediate when the topic or stimulus is interesting in itself, without relation to anything else, or derived, when it owes its interest to association with some other immediately interesting thing. Furthermore, attention may be either passive, reflex, non-voluntary and effortless, or active, voluntary and effortful. This distinction is obviously based upon the amount of effort exerted. Both sensorial and intellectual attention, says James, may be either passive or voluntary, but voluntary attention can only be derived. So one may attend involuntarily to an intense sense-impression or to some image or idea exciting or interesting in itself; but when one attends voluntarily or actively, one makes an effort to attend, always for the sake of some remote interest which the effort will serve.

The distinction between 'voluntary ' and 'involuntary' seems to be intimately bound up with the idea of 'interest'. Encyclopaedia Brittanica[2] (1929) actually distinguishes between 'Attention from interest' and 'Attention from effort'. The former is usually spontaneous, easy and involuntary, the latter often a strain, unpleasant and voluntary.

Ribot[3] (1890), too, distinguishes between spontaneous or natural, and voluntary or artificial attention. He regards voluntary attention as a result of education and training and as deriving its whole being from spontaneous attention. And

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1. James, W. op. cit., pp. 416 ff.
2. "Attention" Encyclopaedia Brittanica, Vol. 2, 14th ed., 1929, p. 658.
3. The Psychology of Attention, p. 8.

finally, the point made by Arnold[1] (1910) that a number of attentions exist and not a single power of attention, is worthwhile noting : "Attention in the visual field is something different from attention in the auditory field, and the same is true of attention in the tactile sphere". This links up with the neurophysiological idea that lack of attention is specific for each modality.

(3) Relationship between Attention and Motivation

In this short description of kinds of attention, an important aspect has been brought into the foreground - the relation between attention and interest, or, to consider it more broadly, the relation between attention and motivation. This relationship has been dealt with in a variety of ways and has been emphasized in different degrees. For some writers, it has been merely one of the conditions of attention, for others the condition, and still others have defined attention in terms of some such concept as 'interest'. It will be seen later how important it is to examine the whole idea of motivation, emotion or interest, when considering attention.

As soon as attention was assigned the rôle of selectivity, the way was made clear for the entrance of 'interest'. It became necessary to explain why the individual chóse to attend to certain stimuli and not to others. Thus James[2] (1890) says, "The things to which we attend are said to interest us. Our interest in them is supposed to be the cause of our attending ..." One sees in James' theory the notion that attention is an activity that depends upon a motive strong enough to arouse the interest necessary to keep the attention fixed. A similar idea is found in Ribot[3] (1890) who considers that "... the immediate and necessary condition of attention in all its forms is

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1. Attention and Interest, p. 42.
2. James, W. op. cit., p. 416.
3. Ribot, Th. op. cit., p. 111.

interest ..." He actually seems to identify interest with emotional states, attractive or repulsive tendencies, which are always at the root of attention.

Interest itself, states Book[1] (1927) has been defined as "the impulse to attend". He quotes Dewey as stating that it marks the annihilation of the distance between the person interested and the materials and results of his action. Book says, "Other writers have made interest synonymous with the feeling of satisfaction or pleasure that always accompanies spontaneous and successful attention. Such a feeling of pleasure may perhaps be said to be the sign in our consciousness which notifies us that we are in reality growing interested in a subject or task".

This hedonic viewpoint as presented by Ribot and Book interestingly anticipates the much later work of McClelland et al[2] (1953) in connection with the achievement motive. McClelland puts forward a discrepancy - persistence hypothesis to explain 'affective arousal'. Briefly, he states that 'affective arousal is a function of "the size of the discrepancy between the stimulus (perception) and the adaptative level of the organism (expectation)". Positive affect is the result of smaller discrepancies and results in approach-responses; negative affect is the result of larger discrepancies and leads to avoidance-responses. McClelland explains that a motive is formed by pairing cues with 'affective arousal' or with conditions that produce affective arousal'. It is perhaps not misinterpreting McClelland to equate 'affective arousal' with the prerequisite condition for attending.

With the growth of dynamic psychology, came more recognition of the importance of motivation in attention.

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1. Book, W.F. "How to Develop an Interest in one's Tasks and Work". J.Educ.Psychol., Vol. XVIII, 1927, p. 2.

2. The Achievement Motive, p. 44 ff.

Boring[1] (1950) traces the development of the dynamic principle which begins in a very camouflaged way in the nineteenth century in the term 'attention' and proceeds along its path in the ideas of preparation, Einstellung, determining tendency and attitude, reaching its latest development in the term 'need'. As early as 1904 Stout[2] had defined attention as a mental prospectiveness and had remarked on its identity with conation. A clearer appreciation of the dynamic principle in attention was made by McDougall[3] (1923) who gives the following explanation of attention : "... attention is merely ... striving considered from the point of view of its effects on the cognitive process. The more strongly we strive to see, to hear, to understand, or in any way to achieve better or fuller cognition, the more attentive we are ..." He states that to have an interest in any object is to be ready to pay attention to it; interest is latent attention and attention is interest in action. McDougall presents in the terminology of his day the contrast between attention directed by voluntary effort and that which follows some strong impulse; he notes that the latter type of attention is always more intense and effective.

The relationship between attention and emotion or motivation will be given further consideration in theories which follow. One may note here the statement made by Henderson and Gillespie[4] (1956) that decreased attention to the environment may be the outcome of lack of interest, or of a more deliberate shutting-out : "A patient's attention varies inversely with his preoccupation with his own problems. Hence, any affective disturbance may cause a diminution in useful attention".

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1. A History of Experimental Psychology, pp. 715 - 717.
2. A Manual of Psychology, p. 257.
3. An Outline of Psychology, pp. 271 - 272.
4. A Textbook of Psychiatry, p. 127.

The debt owed to theorists in the field of dynamic psychology for stressing, directly or indirectly, the importance of the dynamic principle in attention, is a great one and must be recognized as a significant contribution to the present-day knowledge of the concept. The necessity to include the concepts of interest and motivation in discussion and definition of concentration cannot be over-emphasized and at the same time, the implication of the terms for education must be carefully considered.

(4) Relationship between Attention and Intelligence

The relationship between attention and intelligence cannot here be discussed in detail but is mentioned because of frequent references to it in the literature; the diversity of opinion as to this relationship seems to indicate the need for further investigation of this aspect.

Attention was one of the processes which Binet studied, and performance on early tests in his battery of intelligence tests calls, amongst other things, for attention. Binet seems to have included, in his definition of intelligence, the ability to attend - the tendency to take and maintain a definite direction. Spearman[1] (1932) questions whether attention is wholly, partly or not at all the same as intelligence, and he states that all three views may be found in the literature. He notes that one of the most widely-supported interpretations of 'g' is as the power of attention. Burt[2] (1909) in fact, says that "... so called 'Voluntary' Attention is, of all recognized psychological procesees, the essential factor in general intelligence".

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1. The Abilities of Man, pp. 88 - 89.

2. Burt, C. "Experimental Tests of General Intelligence". Br.J.Psychol., Vol. III, 1909 - 1910, p. 169 ff.

Attention, he notes, is a factor commonly used in characteristic intelligence; it is not a trait or faculty, such as judgment, but is a condition under which mental action functions. This view, which accounts for 'g' by ascribing individual differences of ability to inequalities in power of attention, was advocated not only by Burt, but also by Woodrow and Garnett who took 'g' to measure the capacity to concentrate attention. Spearman concludes that it is only permissible and possible to say that 'g' measures attention if one defines attention as "the application of mental energy".

This point of view is most strongly put forward by Stoddard[1] (1944) who considers that "a concentration of energy and a resistance to emotional forces" is an essential attribute of intelligence and he severely criticises standard mental tests for their failure to provide sufficient opportunity for the emerging of this power. A connection is seen here with the views of Rapaport[2] (1945) who holds that certain intelligence sub-tests measure attention and concentration.

(5) Relationship between Attention and Memory

No pretence is made to deal with this relationship, as with the one preceding, in any detail. It is however, of value to recognize the existence of an intimate relationship between attention and memory.

Thus Pillsbury[3] (1908) states that memory is influenced by attention in each of its three processes. Retention is dependent on the degree of attention that was given at the moment of learning; recall is always directed by attention - "If the mind is attentive in the right way, the correct bit of

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1. The Meaning of Intelligence, pp. 31 - 32.
2. Diagnostic Psychological Testing, Vol. I, pp. 166 - 214.
3. Pillsbury, W.B. op. cit., pp. 129 - 148.

information is recalled, if not, the recall will be in error"; and recognition, says Pillsbury, is influenced by attention both in its quickness and correctness for when one is attentive, recognition is quick and when one attends to the object that appears, recognition is accurate. He concludes his discussion on attention in memory by emphasising that all training of memory is through training in attention; similarly, Knowlson[1] (1931) remarks that the value of memorizing, as a means of developing 'concentrative power' is higher than is usually believed.

And James[2] (1890) in discussing Attention and Memory, also emphasizes that the image of an object or event is capable of revival in proportion to the degree of attention with which it has been considered - " ... an object once attended to will remain in the memory whilst one inattentively allowed to pass will leave no trace behind".

This relationship between Attention and Memory has, it will be seen, bearings on the measurement of and training in concentration.

(6) Later Theories of Attention and Concentration

It will be seen from the previous review that Attention as a concept had its place in the foreground of psychological thinking during the latter part of the nineteenth and the first quarter of the twentieth century. Largely ignored by the early Behaviourists, it was re-introduced by dynamic psychologists but relegated to a secondary position as a process intimately bound up with motivation. With regard to Concentration, the general opinion is that it is neither more

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1. The Secret of Concentration, p. 186.
2. James, W. op. cit., p. 427.

nor less than sustained attention. For example, Drever[1] (1953) defines it as "the fixing of attention; or a high degree of intensity of attention".

In an effort to make the distinction between Attention and Concentration somewhat clearer, two more recent approaches to the problem will now be presented, one stemming from the psycho-analytic orientation and the other from a bio-social viewpoint.

Rapaport[2] (1945) attempts to give a working definition of concentration and attention. Making use of psycho-analytic terminology, he states[3] :

> "... attention corresponds to the free mobilization of energies which are not specifically tied up with any particular emotion, interest or drive, but are at the free disposal of the Ego to be utilized in thinking and in dealing with reality ... Attention is considered here an effortless, passive, unhampered contact with outside reality - a free receptivity. This free receptivity appears to be hampered if the subject's affects and anxieties are not well-controlled and get out of balance".

The hypotheses that underlie this view of attention are as follows : all psychological energies derive from instinctual sources; part of these - affects, drives, strivings, impulses - bear the mark of their instinctual origin and are referred to by Rapaport as "specifically - deployed" energies. Another part of the psychological energies, having lost the marks of their instinctual origin in the course of development,

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1. A Dictionary of Psychology, p. 46.
2. Rapaport, D. op. cit., pp. 166 - 214.
3. ibid., p. 168.

became freely available to the Ego for its "purposes" - these are referred to as "not - specifically-deployed" energies; attention then depends upon the strength of the Ego, by which Rapaport[1] means that "... the 'specifically-deployed energies are kept in balance and control, harmonizing with and not encroaching upon the Ego's functions, nor demanding that it employ its 'not - specifically-deployed' energies to curb them". From these hypotheses, it becomes clear that unbalanced affects and anxieties or any overvalent, that is, 'emotionally-overloaded' ideas, may encroach upon attention.

Rapaport then proceeds, in terms of the above hypotheses, to define concentration. Concentration "... would mean employing the 'not - specifically-deployed' energies in order to control the 'specifically-deployed' energies and to keep out of consciousness the ideational representations of the latter which interfere with 'attending'" [2] The focussing of consciousness upon a current topic, by deliberate exclusion of other emotional or thought contents, is designated by Rapaport as Concentration.

Thus, Attention is regarded as automatic and effortless, Concentration as voluntary and effortful. The expression 'voluntary', notes Rapaport, refers to the energy freely available to the individual for disposal in intellectual processes, in contrast to the 'specifically-deployed' energies which are not so available. Attention is then an expression of or a function of the equilibrium of these 'specifically-deployed' energies, that is, Attention is a function of the Ego's efficacy in controlling the 'specifically-deployed' emotional and intellectual energies so that their ideational representations enter

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1. Rapaport, D. op. cit., p. 166.

2. ibid.

consciousness at appropriate times only. According to Rapaport, in a strong Ego, this control is not experienced consciously; however, in a weak Ego, or where the material being dealt with is complex, 'not-specifically-deployed' energies must be available to control and limit the field of consciousness - this control or concentration is experienced consciously.

Rapaport's theory certainly attempts to make a distinction between Attention and Concentration, and incorporated in his definitions are several important ideas, for example, the process of exclusion of irrelevant responses or thought contents from the consciousness and the distinction between the two terms on the basis of the amount of effort exerted. In addition, the theory offers an explanation for lack of attention or concentration in terms of anxieties or ideas which became so powerful and have such significance for the individual that they cannot be controlled and usurp the consciousness altogether.

However, the hypothetical basis which Rapaport couches in psycho-analytical terms seems to be rather unsatisfactory. Terms such as "specifically-deployed" and "not-specifically-deployed" energies impede understanding of the concept; it is queried too whether the distinction between attention and concentration is best made on the basis of 'effortless-effortful' and 'involuntary-voluntary'.

In contrast to the theory of Rapaport, the ideas of Cameron and Magaret[1] (1951) are presented. Although they do not use the words 'attention' and 'concentration', they do describe certain types of behaviour organization which may be of value in distinguishing between the two processes. They begin by explaining the 'selective reactivity' which distinguishes one learner from another - "By <u>reaction-sensitivity</u> we mean <u>a selective readiness-to-react to certain components of a stimulating situation and not to others</u>. Reaction-sensitivity is the consequence of one's having acquired a system of related attitudes and responses".[2] So, for example, an individual with a persis-

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1. Behaviour Pathology, pp. 70 - 75; 449 - 457.
2. <u>ibid</u>., p. 71

tent attitude of anxiety becomes selectively responsive to the threatening or fear-provoking components of his environment. Progressive 'reaction-sensitization', that is, " ... the process in which a person, once he has become reaction-sensitive in a specific direction, continues to develop further readiness-to-react in the same direction, on the basis of successive acquired reactions",[1] accounts for the differences between individuals which become progressively greater as time goes on. This process, note the writers, is closely related to the learning concepts of generalization and stimulus-equivalence.

Reaction-sensitivity seems to be the modern interpretation of 'set' and may be compared with Woodworth's[2] explanation (1918) which has already been referred to : "The mental set or intention of performing a certain operation or solving a certain problem, is a drive, reinforcing certain associative connections, and inhibiting others, and thus exerting a selective influence". Thus, reaction-sensitivity partly explains the selective aspect of consciousness, the direction taken in response.

But how do attention and concentration fit in with this? Cameron and Magaret proceed to say that selective learning, through progressive reaction-sensitization, may have two general consequences in behavioural organization. First, selectivity channels and restricts the individuals' repertory of acquired reactions to an inter-related pattern, which for him is characteristic; this type of organization is termed 'stable and exclusive'. However, the channeling and restriction of behaviour patterns through reaction-sensitivity cannot be rigid and inflexible; the organization of behaviour must remain sufficiently elastic so that the individual can alter his reactions or shift readily from one behavioural sequence to another. This type of organization is known as 'unstable and

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1. Cameron, N. and Magaret, A. op. cit., p. 71
2. Dynamic Psychology, p. 124.

inclusive'. It is important to note that normal behaviour organization depends upon an optimal balance between exclusion and inclusion. It is considered that it is these two terms that may be of value in explaining the processes involved in attention and concentration.

Effective behaviour is said to depend as much upon the exclusion of the unrelated and inconsequential from an act as it does upon the inclusion of what is requisite and relevant. Cameron and Magaret[1] state : "In the more or less unstructured, developing situation, behaviour organization is most effective when it is comparatively unstable and inclusive; for then it is sufficiently flexible to adapt to unanticipated changes in the stimulating field". It is this 'unstable and inclusive' behaviour to which Rapaport's 'free receptivity' or attention seems to correspond; but in comparison with Rapaport's definition, the explanation presented by these two writers is far more lucid.

Cameron and Magaret[2] then state that, in contrast to the 'unstable and inclusive' behaviour organization :

> ... behaviour organization that is stable and exclusive is most effective in structured situations where precision in close-knit sequential operations is essential ... For the acquisition and the practice of effective skilled behaviour demand that a person be capable of organizing and maintaining a unified and smoothly-integrated dynamic system. And this he must do even in the presence of stimulation that tends to evoke competing and contradicting responses.

This 'stable and exclusive' behaviour organization may perhaps be looked upon as 'Concentration'; the field of stimu-

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1. Cameron, N. and Magaret, A. op. cit., p. 456.
2. ibid., p. 456.

lation to which one may respond is narrowed down and it remains narrowed; the organism is no longer in a state of readiness to react or attend to many stimuli and this condition is maintained until the completion of the operation. The employment of 'unstable-inclusive' and 'stable-exclusive' to distinguish between the brief, wider Attention and the sustained, limited Concentration seems to strike more accurately at the fundamental difference between the two concepts, and this distinction is favoured rather than that made by Rapaport of Attention being automatic and effortless and Concentration being voluntary and effortful. It is true that in certain circumstances the individual may exert a conscious effort to keep his mind on the task before him, but real Concentration exemplified in complete absorption in a task, need not involve consciously-experienced control.

Furthermore, lack of concentration becomes more easily explainable if one employs the concept of 'over-inclusion' used by Cameron and Magaret[1] as meaning "an exaggerated instability of behaviour organization in which the number and kind of simultaneously effective excitants are not restricted to a relatively few coherent ones". It is the failure to exclude the effects of intefering stimulation, the failure in limitation and inhibition of contradictory, competing and more or less irrelevant responses that characterizes 'over-inclusion' the result of which is that the reacting individual no longer maintains the boundaries of the stimulating field; he responds to successive and simultaneous stimulation, regardless of whether or not the components are part of the organized pattern, or habitually evoke responses that are adequately inter-related. Thus, when over-inclusion occurs and attention becomes so very dispersed, concentration is impossible. Inability to concentrate on the required topic or material may also be due to 'over-exclusion' which results in pre-occupation, that is, "the protracted domination of behaviour by a single theme"[2] ; this will usually be the case,

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1. Cameron, N. and Magaret, A. op. cit., p. 457.
2. ibid., p. 456.

as Rapaport[1] (1945) has indicated, when overvalent ideas impair contact with reality. This is a more pathological condition where the individual cannot concentrate because of preoccupation with some emotional idea.

(7) Neurophysiological Work on Attention

It remains now to speak of the highly important and most recent work on attention which has been done in the field of neurophysiology and which attempts to account for attention and the selectivity of response in terms of brain processes and to explain physiologically the relationship between attention and motivation.

This awakened interest shown by learning theorists in the neurophysiological basis of thinking and motivation can be attributed directly to the work of Hebb. Hebb[2] (1952) states : "Man or animal is continuously responding to some events in the environment and not to others that could be responded to (or 'noticed') just as well." He notes that psychologists have, almost without exception, recognized the existence of the selective central factor that reinforces now one response, now another, that is, they have recognized the existence of attention, set, attitude or the like, the fact that responses are determined by something else besides the immediately-preceding sensory stimulation. Such recognition is, according to Hebb, really a denial that behaviour is only a series of response to environmental stimulation; yet he considers that psychologists have admitted this fact reluctantly and sparingly and have never included it in setting up theories.

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1. Rapaport, D. op. cit., p. 233.
2. Organization of Behaviour, p. 4.

Two reasons are given to account for this :

(a) the tradition of long-standing in psychology to search for the property of the stimulus which by itself determines the ensuing response at any given stage of learning - this approach was understandable as a consequence of psychology's persistent fight against animism;

(b) the apparent lack of a theoretical rationale for the autonomous central process which made psychologists reluctant to admit its existence.

Hebb points out that modern electrophysiology now provides abundant evidence to support the idea of the existence of some determining tendency which has, in fact, had to be recognized since the days of the Wurzberg school at least. Electophysiology of the central nervous system indicates in brief that the brain is constantly, continuously and 'spontaneously' active at all times whether it is being stimulated or not in the sense of environmental changes going on about a person; and an afferent excitation must be superimposed on an already existent excitation. This 'spontaneous neural activity' makes it impossible that the consequence of a sensory event should be uninfluenced by the pre-existent activity. The implications of this fact will be discussed further. One may note here that

> If the psychologically known factor of set and the like is recognized in that activity, then the problem for psychology is no longer to account for the existence of set but to find out how it acts and above all to learn how it has the property of a consistent, selective action, to find conceptions for dealing with such complexities of central, neural action.[1]

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1. Hebb, D.O. op. cit., p. 7.

Such terms as set, attention, Pavlov's and Hull's stimulus-trace, Beach's central excitatory mechanism and Morgan's central motive state are a reference, says Hebb[1], to the 'central process which seems relatively independent of afferent stimuli' defined by Hilgard and Marquis and which he himself calls the '*autonomous central process*' - "All these things have the same property of an activity that has a selective effect on behaviour without being part of the present afferent excitation".

Bugelski[2] (1956) comments on Wolpe's use of the term 'drive' to describe an excitation in the central nervous system that intervenes between what he calls 'need conditions' and effector responses, and considers that it is his analysis of drive as a 'central excitation' that is carried forward by Hebb. Hebb became interested in the function of the reticular system in the brain stem which appears to function as a diffuse, non-specific, projection system. What is known of this system? It is a recently-discovered network of cells in the brain, notes French[3] (1957) that has many vital functions, notably arousing and maintaining consciousness and choosing between important and unimportant messages. The actual seat of the power to think, to perceive, to respond to a stimulus with anything more than a reflex action lies in the cortex of the brain, but the cortex cannot perceive or think unless it is awake. It was only about ten years ago, according to French, that Morgan and Moruzzi decided that it was the reticular formation which acted as a kind of sentinel arousing the cortex, and they named it the 'reticular activating system' (RAS). All the great sensory nerve trunks in

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1. Hebb, D.O. op. cit., p. 7.
2. The Psychology of Learning, pp. 39, 135, 205 - 242.
3. French, J.D. "The Reticular Formation". Scientific American, Vol. 196, 1957, pp. 54 - 60.

the body have brush-like branches which stream into the reticular formation; sensory signals from all parts of the body go to the cortex by direct pathways, but on the way through the brain stem they also feed into the reticular formation. Evidently, the reticular formation, when so stimulated, sends arousing signals to the cortex and the awakened cortex can then interpret the sensory signals it is receiving directly.

The RAS, says French, is a kind of general alarm; its response is simply to arouse the brain, not to relay any specific message. The reticular formation responds in the same way to any sensory stimulus, alerting the cortex to a state of wakefulness so that when the specific stimulus arrives at the appropriate centre of the cortex, the brain can identify it. However, the RAS also learns to be selective in its sensitivity to particular stimuli. To quote French[1] :

> It is as if the RAS becomes endowed by experience with the ability to discriminate among stimuli, disregarding those it has found unimportant and responding to those that are helpful ... The RAS, like the starter in an automobile, starts the brain engine running, but this is by no means the end of its job. It goes on functioning to keep the individual in a conscious state ... If the RAS cannot function normally, consciousness is impossible.

French explains that the alert state would seem to depend upon an interplay between the cortex and the RAS, for the reticular formation is stimulated not only by the sensory nerves, but also by impulses from some parts of the cortex. Moreover, experiments involving electrical stimulation of certain areas of the cortex in monkeys seem to indicate that in the waking state, the RAS plays a part, in combination with the cortex, in focussing attention.

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1. French, J.D. op. cit., p. 56.

The RAS also has a hand, apparently, in regulating all the motor activities of the body - it can modify and control muscle movements of both the voluntary and the reflex type and it can, in fact, enhance or inhibit sensory as well as motor impulses; thus it acts as a kind of traffic - control centre, facilitating and inhibiting the flow of signals in the nervous system. It seems to be an integrating machine which equips man to focus his sensory and motor systems on the problem in hand. French[1] says :

> It awakens the brain to consciousness and keeps it alert; it directs the traffic of messages in the nervous system; it monitors the myriads of stimuli that beat upon our senses, accepting what we need to perceive and rejecting what is irrelevant; it tempers and refines our muscular activity and bodily movements. We can go even further and say that it contributes in an important way to the highest mental processes - the focussing of attention, introspection and doubtless all forms of reasoning.

According to Hebb, the reticular formation functions as an 'arousal system' whose activity makes organized cortical activity possible. When the 'arousal system' is active, sensory impulses can have their proper effect; without the activity of this system, sensory impulses cannot go beyond the sensory cortex and cannot affect the rest of the cortex so that learned stimulus - response relations are lost. Hebb considers the 'arousal system' to be equated with a general 'drive' state which controls the functions of sensory imput and efferent output. Thus, sensory impulses will have weak, strong, positive or negative effects depending upon the operations of the 'arousal system'. Cortical activity itself can also activate the 'arousal

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1. French, J.D. op. cit., p. 60.

system' - this Hebb identifies with cognitive processes in psychological terms; Bugelski[1] notes that if this is the case, there occurs what Hebb calls the "immediate drive value of cognitive processes".

Hebb admits that intimate physiological information about the operation of the 'arousal system' is still lacking, but, speaking in terms of 'a conceptual nervous system' he pictures the cortical synaptic functions as 'facilitated by the diffuse bombardment of the arousal system'. An important caution is raised by him in his conjecture that too great an activity in the 'arousal system', as in extreme emotion, great hunger and so on, results in an upset of 'delicate adjustments involved in cue functions' and a consequent disorganization in behaviour. On the other hand, too low a level of 'arousal system' activity results in a loss of stimulus-response relationships because of failure of sensory impulses to get to the proper cortical area.

Bugelski[2] considers that the analysis made by Hebb leads directly to the conception of an 'optimal' degree of arousal system activity for behaviour to occur. The concept of an optimal level of brain activity, in turn, leads to the notion that such an optimal activity represents the brain's normal function. The importance of such a view, he says, is that it represents a reversal of the traditional orientation which pictures the organism as being like a vegetative automaton, sleeping or resting until aroused.

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1. Bugelski, B.R. op. cit., p. 39.

2. ibid., p. 205.

How then, does the constant activity of the cortex modify the incoming impulses and the resulting behaviour? When external stimulation is introduced, any activity that is initiated enters an already active brain and must take its chances, so to speak, of having any influence on behaviour. The probability that any particular sensory stimulus will have any significant effects on the already on-going pattern cannot be determined physiologically at present, emphasizes Bugelski.

The general effect of any stimulation is to break up the existent pattern or to blend with it. In the latter case, no change occurs in behaviour to any significant degree. So long as the inputs are mild, routine, ordinary, they fit into the pattern and are ineffective and provoke no great changes. However, the effect of strong, irregular and persistent stimuli is to alter the pattern of brain waves from the normal vegetative state to one of relative disorderliness; with the repetition of disruptive stimulation, the behavioural evidence suggests that the unusual stimulation is attended to, or taken care of more and more readily and efficiently with less all-round disorganization. It might be inferred, states Bugelski[1], that the brain pattern is also less disorganized in such cases and that the new stimulation is becoming integrated with the ongoing major patterns.

Hebb emphasizes persistently the point that present and recently prior activity of the cortex and lower centres of the brain play a prominent if not all-determining role in the possibilities of associative activity. He discusses the problem in terms of neural facilitation and inhibition. If prior and/or present neural activity is such as to facilitate the discharge of

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1. Bugelski, B.R. op. cit., p. 236.

appropriate cells, then the possibility of the development of specific cell assemblies and connections is favoured; should such neural background activity be unfavourable or inhibitory, then cell assemblies will not be formed. Hebb actually speaks of such "central facilitation" as the equivalents of attention or 'expectancy' or 'set', and for him, clearness would reduce to something like readiness of neural elements for reaction. According to Bugelski[1], clearness refers to the relative degree of isolation of the variables to be associated both in the present setting, and in the temporal history of the learner. It is likely, he says, that an organism is always learning something; the problem is to find out what is being learned and then to make the necessary changes if the learning is not of the desired material. If an organism is not learning with some expected efficiency, then the problem should be examined to determine whether the association possibilities are being obscured by interfering biases, sets, expectancies or stimulus-properties.

A picture of attention in terms of brain-functioning has been presented and the relationship between drive and attention may now be clarified.

Bugelski[2] earlier took the position that as far as laboratory experiments are concerned, the concept of motivation can be most usefully thought of in terms of sets. Wolpe, he states, regarded sensory stimulation to be of the same class of events as are drives but holds that the reverse is not necessarily true - that is, all drives are not sensory stimuli. Thus, says Bugelski, at least some kinds of drives, and perhaps all, may have another function besides that of providing stimuli; this function may be that of "lowering" the resistance of certain nervous pathways to other stimulation. He states[3] that "... If the 'drive' state can be considered as one which lowers the

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1. Bugelski, B.R. op. cit., p. 135.
2. ibid., p. 210.
3. ibid., p. 211.

resistance to the passage of certain impulses we have a situation which is analogous to setting a switch which permits some kind of reaction to occur smoothly and efficiently and prevents others from occurring at all, or at best, with difficulty". Presumably, this must be done in terms of some kind of alteration of neural states in the central nervous system as it is not readily conceivable how such control of sensory and motor thresholds could rest directly and solely in non-neural tissue. The 'central neural excitation' of Wolpe, notes Bugelski, appears as an appropriate device to serve the functions described; it corresponds, too, with Hebb's central facilitating and 'arousal state' and behaviourally amounts to what has been described in the psychological literature as 'sets'. "Motivation", says Hebb[1] (1955), "refers here in a rather general sense to the energizing of behaviour, and especially to the sources of energy in a particular set of responses that keep them temporarily dominant over others and account for continuity and direction in behaviour"; therefore, the characteristic of behaviour which marks it as motivated is its "persistence in a given direction".

Hebb, it has been seen, equates attention with neural facilitation and he considers that the concept of set amounts to such neural facilitation which permits the organism to respond readily to some stimuli and not easily, if at all, to others; thus, for Hebb, the same operations that are performed to create sets are employed to create 'attention'. According to Bugelski[2] "... A set behaviourally considered amounts to preliminary or preparatory responses which have the functional characteristics of increasing the efficiency of responses to stimuli about to be presented".

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1. Hebb, D.O. "Drives and the Central Nervous System". Psychol.Rev., Vol. 62, 1955, p. 244.

2. Bugelski, B.R. op. cit., p. 212.

(8) Conclusions

To conclude, the trend in and development of theories of attention may be considered in the light of wider issues or movements in the history of psychology as a whole which are discussed in detail by Boring[1] (1950). First of all, the general movement must be noted from a 'faculty' or 'content' psychology to an 'act' or 'functional' psychology; secondly, the emphasis in psychology was at different times upon sensation and perception, upon learning and then upon motivation; and finally, in accordance with the 'mind-body' controversy, so theories developed about the psychophysiology of perception and brain function which influenced the prevalent theories of attention.

'Faculty' or 'content' psychology studied consciousness and the emphasis was placed upon sensation and perception. This line of thought is exemplified in the theories of Wundt (1874) and Titchener (1910), who regarded attention as a power and as being identical with clarity in consciousness. 'Act' or 'functional' psychology, however, studied behaviour as the predominant interest for psychology. A gradual development took place as may be seen in the work of James (1890) and Dewey (1896) and the Behaviourism of Bekhterev (1910) Watson (1913) Holt (1915) and Dashiell (1928); the work of Külpe (1893) and the Wurzberg school which had begun in agreement with Wundt's theories, also paved the way for attention to be regarded from the behavioural point of view as an 'act or process', for the opinion given was that the determining tendencies which control thought and action, do not appear in consciousness and must be known by other means than introspection. With the work of Thorndike (1905) Woodworth (1918) and Dashiell (1928) the differences between 'set' and 'behaviourism' were somewhat resolved

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1. Boring, E.G. op. cit., Chap. 27.

and two new interests developed, resulting in the work of Lashley (1923) Tolman (1932) Skinner (1938) and Hull (1943) on learning theory and in a more definite formulation of the dynamic principle and the rôle of motivation by such theorists as Holt (1915) Woodworth (1918) McDougall (1923) Tolman (1932) and of course, Freud. Thus, attention could then be considered not only as an 'act' or process, as a set of responses which may occur according to the principles of learning theory but also as a motivational process.

Finally, with the acceptance of the fact that mind and brain could not be regarded as separate and unrelated entities, and with the increase in knowledge of brain processes, the way was made clear to consider attention as a process in terms of learning, motivation and brain functioning.

This historical sketch is highly simplified and the complex inter-relations between the different spheres of development have had to be omitted, for the sake of clarity.

It is perhaps a result of the change in psychology from emphasis upon sensation and perception to learning and motivation that attention as a concept is not dealt with in modern texts to as large an extent as it was in the older literature; it is for this reason that many of the references cited belong to an earlier period in psychology when 'attention' occupied a prominent place. It appears, however, that after a fairly long period of relegation to a secondary position, 'attention' is now once again being considered worthy of further investigation.

2. Measurement of Concentration

(1) Difficulties in the measurement or testing of Concentration

Here too, it was necessary to start by perusing past literature on Attention. It may be noted that the difficulties mentioned should be considered in relation to the ideas about attention which were prominent at the time, for as the theories of attention change, so must the problems in its measurement change.

All the early writers, while maintaining the reality of 'attention', stress that it is something which is not easy to test. No doubt, one of the major difficulties which accounts for this was the lack of proper definition or the presence of numerous and varied definitions of the term at that time. Pillsbury[1] (1908) notes that "Attention, in fact, is a word that covers so many different processes that no single test will probably ever be devised that shall measure all the part processes satisfactorily". Whipple[2] (1924) emphasizes that a direct measure or test of degree of attention is difficult to secure and that one can measure not the process or condition of attention itself, but only a product or concomitant of that condition. Easley[3] (1931) quotes Woodrow as holding that it is unnecessary to agree on the ultimate nature of attention if it is measured in terms of its manifestations.

Two great difficulties in the way of selecting tests of attention are discussed by Pillsbury[4]. The first is that it is almost impossible to discover tests that will give the basal capacity for attention, rather than some special facility that has been acquired through training; the same point is made

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1. Pillsbury, W.B. op. cit., pp. 91 - 92.
2. Manual of Mental and Physical Tests, Part I, pp. 262 - 263.
3. Woodrow, H. "The measurement of Attention". Psychol.Monog Vol. 16, 1914 (no. 76), p. 6., as quoted by Easley, H. "An Attempt to Isolate the Factor of Attention". Am.J.Psychol., Vol. 43, 1931, p. 202.
4. Pillsbury, W.B. op. cit., pp. 84 - 85.

by Whipple[1] (1924) who states that the learning factor is a fundamental source of difficulty in his tests of attention. Secondly, it is almost impossible to find a test that will not in part depend upon other capacities, for example, the retentiveness of the memory or the quickness of motor response, that really account for the difference between individuals which, on the gross results of the test, one would be inclined to attribute to attention.

Easley[2] (1931) indicates two limitations of all the current tests in use; first, he states that it cannot be said with certainty that attention is measured by any one of them because they are based on insufficiently critically - examined assumptions; and secondly, there is no assurance that the attention involved in any one test is the same as that involved in another - even a high correlation between two tests may be due to some other common factor and not to attention. Paschal[3] (1941) recognizes the fact that attention, like intelligence, can be measured only indirectly but he emphasizes that unlike intelligence measurements, no adequate criteria can be set up as checks and no validity-coefficients are offered in evidence.

All these difficulties were particularly prominent and probably accounted, to a great extent, for the paucity of research done in this field.

The two following sections, a theoretical classification of the methods of measurement, and the description of the tests, cannot entirely be treated as separate entities, and overlap to a great extent. However, it will be useful to consider broad types of measurement under a separate heading wherever the writers have specificially mentioned them.

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1. Whipple, G.M. op. cit., p. 263.
2. Easley, H., op. cit., p. 202.
3. Paschal, F.C. op. cit., p. 399.

(2) Theoretical Classification of the Methods of Measurement

As early as 1908, Pillsbury[1] gave a detailed and useful classification of measures of attention, still worthy of note. The three main methods which may be subdivided in so far as they are adapted to the determination of the capacity for attention over long periods, or for brief acts of attending, are as follows.

(a) Direct measurement in terms of the amount of accomplishment in some task that involves attention in as high a degree as possible;

(b) Indirect measurement by making some secondary change in the course of the operation stand as a measure of attention, for example, fluctuations of attention, or the mean variation in a set of measurements of performance;

(c) Measurement of the strength of attention in terms of the amount of stimulus that is necessary to distract attention.

All these methods, states Pillsbury[2], are still in a tentative stage and require extended use before they can be said to be at all valid and of value or before the results obtained with one method may be comparable with those obtained with others; no one of the methods is completely satisfactory, and, as they stand, no two can be said to measure the same capacity.

In accordance with his definition of attention as a 'clearness of sensation', Titchener[3] (1923) states that the most promising method, in theory, is "... to determine, introspectively, how many degrees of clearness can be distinguished in the various departments of sense, and then to bring every degree of clearness into relation with a definite sort and amount of distraction". Then, if degree of clearness is correlated with

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1. Pillsbury, W.B. op. cit., p. 84.
2. ibid., p. 91.
3. A Textbook of Psychology, pp. 295 - 296.

intensity of the distracting stimulus one may know the highest degree of attention attainable with a given amount of distraction, and, accordingly, one may use the numerical value of the distractor as a measure of the degree of attention. This aspect of distraction obviously links up with Pillsbury's third group of tests. The measurement of attention in the face of difficulty and distraction is regarded as highly relevant to the problem under investigation, that is, lack of concentration among school children; although Titchener's method is theoretically of historical interest, the practical difficulties are great and he does not suggest at all how the degrees of clearness are to be determined introspectively - it may be queried strongly whether this can, in fact, be done.

Titchener[1] also discusses the measurement of the degree of attention in terms of measurement of the degree of effort which accompanies it and in terms of kinaesthetic sensation. The latter is thought to be of little value. Titchener himself notes that it would be nearer the truth to say that the more pronounced the effort, the lower is the degree of attention, for the very fact that one is <u>trying</u> to attend means that one is not giving full attention. This point seems to be in direct contrast to Rapaport's theory that concentration is effortful.

(3) <u>Description of the Tests found in the Literature</u>

The most important tests falling under Pillsbury's first division, that is, direct measurement in terms of the amount of accomplishment in some task that involves attention in as high a degree as possible, are the discrimination of two points on the skin, reaction-times, memory span, the time, accuracy and number of observations required for copying letters

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1. <u>A Textbook of Psychology</u>, p. 294.

figures and geometrical patterns, counting dots, marking the letters of one kind in a page of foreign language or 'printer's pie' and filling in omissions in a discourse. Each of these tests is open in some degree to the objections discussed above - they depend also upon some special facility acquired through training and may thus not give the basal capacity for attention, and they depend in part upon other capacities.

The validity of the method of discrimination of two points on the skin seems very slight as a means of measuring attention. The method of reaction-time, as discussed by Whipple[1] (1924) and Dallenbach[2] (1926) seems to depend both upon natural motor quickness and training, and the general opinion is that, particularly where reasoning and thought are called for, the reaction-time is affected by things other than degree of attention.

Easley[3] (1931) describes Woodrow's 'detractor method' which consists of taking one measurement of a certain performance under optimum conditions of attention, and another measurement of the same performance under unfavourable conditions of attention; the difference between the two measures is his measure of attention. Woodrow concluded that his investigation had resulted in the experimental demonstration of a general capacity of attention on the part of the individual, but Easley says such a conclusion is applicable only to the function of simple reactions. The method, in theory, would seem to have some value and could perhaps be extended with the choice of a suitable performance and the correct optimum and unfavourable conditions, to measure even concentration, but no conclusions can be drawn about its validity at present.

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1. Whipple, G.M. op. cit., p. 265.

2. Dallenbach, K.M. "Attention" Psychol.Bull., Vol. 23, 1926, pp. 7 - 8.

3. Easley, H. op. cit., pp. 203 - 205.

Memory span, as signified in the copying test and in others described by Whipple (1924) in which a tachistoscope is used and cards containing geometrical designs, pictures, nonsense syllables or digits are exposed for three seconds, the subject having to repeat orally or draw what he has seen, is reported to depend in part upon attention, but also upon native retentiveness, and is still further influenced by special training in attending to one thing rather than the other.

Binet's method of counting dots arranged in an irregular groupnis said by Whipple[1] (1924) to be distinctly difficult and to necessitate active concentration when attempted without the aid of a pointer to keep the place. This method, although at first considered significant, was later found to be very closely related to training so that chance training could obscure any defect of attention that might be present. As regards the Ebbinghaus method of filling in omissions in connected discourse, the detection of the omission may be regarded as a function of attention, but the process of supplementation would appear to involve more general processes of reasoning and association.

The marking of A's on a page of print, popularly known as the 'Cancellation' test, was originated by Bourdon and has been used by a large number of investigators for purposes related to attention; it is rather remarkable for the variety of forms it has assumed and for the divergence of statement as to what it really measures. The essential principle is the crossing-out of an assigned symbol or symbols from a prepared form containing the assigned symbol in conjunction with a number of others of the same general order. Pillsbury[2] (1908) holds that the test is the most satisfactory of his first group, that it has been used frequently with satisfactory results and is

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1. Whipple, G.M. op. cit., p. 239.
2. Pillsbury, W.B. op. cit., pp. 87 - 88.

open to few theoretical objections; he says that it is dependent on an activity that is relatively rarely subjected to special training and that such general training, for example, from reading, as is beneficial, is practically universal and equally common to all; the only extraneous element that is important is motor quickness and this plays a much smaller part than do the disturbing and variable factors in the other tests. Whipple[1] (1924) and Paschal[2] (1941) consider, however, that a distinct learning curve may be seen in the performance, and that the value of the test is not very clear since it does not test pure attention and is also affected by non-intellectual factors, such as conscientiousness. Amongst many other things, the test has also been said to measure discrimination or to be concenned with meaningless and mechanical activities.

Sterzinger in 1924 as quoted by Dallenbach[3] (1926) adapte the cancellation test which in its usual form tests sensory attention only, to the investigation of abstract attention, the kind that he believes is required of mental workers. The subjects were given letters arranged in meaningless groups and were instructed to cancel letters having certain positions, for example, to cross out every letter between two vowels; the group of letters and the instructions were varied so that every letter of the alphabet should be cancelled. However, his analysis of the results shows that here too, it is not only the degree of attention that determines successful performance.

Despite the doubt that the 'Cancellation' test is a measure of attention, it is actually used, in a variety of forms in a number of batteries for organic brain damage where a defect of attention, or distractibility is usually a noticeable symptom. The method can also be related to the auditory field by the reading out aloud of a series of digits or letters to the subject who is required to tap each time a certain letter or digit occurs.

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1. Whipple, G.M. op. cit., p. 309.

2. Paschal, F.C. op. cit., p. 399.

3. Sterzinger, O. "Zur Prüfung und Untersuchung der abstrakten Aufmerksamkeit". Z.f. angew. Psychol., 1924, 23, 121-161 as quoted by Dallenbach, K.M. op. cit., pp. 15-16.

One other method described by Whipple[1] (1924) and Easley[2] (1931) is some form of the Münsterberg test which involves reading; for example, a page of letters is presented to the subject, arranged in such a way that some of the adjacent letter combinations form words, but the majority of them do not and the problem for the subject is to underline all the adjacent letter combinations that form words. Here, the process of reading is complicated in some manner in order that the increased difficulty may exact a higher degree of attention.

Pillsbury[3] (1908) concludes the discussion on his first group of tests by noting that any operation that can be subjected to measurement is certain to involve attention in some degree, and so might be regarded as a measure.

Two examples may be given of the tests which exemplify Pillsbury's second category, that is, 'indirect measurement by making some secondary change in the course of the operation stand as a measure of attention'. One is the use made of the attention wave as a measure of fatigue, in a way that is said also to show variations in the capacity for attention. The ratio of the period of visibility to the period of invisibility which varies with the state of rest or fatigue of the individual, would, says Pillsbury[4] (1908) probably indicate the general level of attention apart from any special training; however, the disadvantage of the method is noted in that one cannot compare one individual with another with any degree of certainty. A possibly truer test mentioned which might serve as a measure of the capacity of the individual to attend against distraction is the measurement of the amount of distracting stimulus that would bring about a decrease in the ratio of visibility to the total time.

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1. Whipple, G.M. op. cit., pp. 332 - 333.
2. Easley, H. op. cit., p. 205.
3. Pillsbury, W.B. op. cit., p. 88.
4. ibid.

Another method, related to the preceding in so far as it uses a variation in the continuous accomplishment as the measure of attention, has been suggested by Oehrn as follows : The mean variation in a series of measurements would indicate the degree of attention, as the variation from the average must be in subjective factors, the most important of which is attention. However, the value of this method is also inconclusive.

The third form of the test, that is, 'measurement in terms of the amount of stimulus that is necessary to distract attention' was first suggested by Kraepelin during his observation of mentally-disordered patients and was subsequently tested by a number of workers. The idea was that if one could measure the amount of stimulus necessary to distract from a task of any kind, one would know how much attention was being given to the operation. Pillsbury[1] (1908) notes, however, that in all the investigations there was a failure to comply strictly with the conditions that Kraepelin set and that it would be very difficult to realize his conditions that the object attended to should be the only thing the subject was prepared for and that the distracting stimulus should always come unexpectedly and unwillingly; as the value of the distraction would depend upon the way in which the stimulus attracted attention, one would have to measure attention before the distraction values could be determined. Thus, the test might well be made by the first direct method.

Cronbach[2] (1949) and Anastasie[3] (1957) describe Ruggle's test of Self-Control which requires the subject to work in the presence of attractive distractions. Here, arithmetic problems are presented to the same subjects under normal and

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1. Pillsbury, W.B. op. cit., pp. 90 - 91.
2. Essentials of Psychological Testing, p. 418.
3. Psychological Testing, p. 640.

distracting conditions, one form being given on a sheet covered with cartoon-like sketches, verbal comments and other miscellaneous doodles; this involves a certain amount of inhibition on the part of the subject who must resist the tendency to respond to the more attractive stimuli than are provided by the task at hand. However, there is no knowledge of the validity of the test.

Pillsbury[1] (1908) emphasizes that different kinds of attention are measured by the three different methods; the ability to attend against odds might be measured by one of the distraction methods or by the method of recording attention waves and noting when the period of visibility is diminished by an extraneous stimulus; the capacity for attention due to training would require a test of ability to notice some element of a complex that is perceivable with difficulty; and the capacity for attention in general, as inherited and not in any way due to training could probably not be analyzed from the complex but the nearest approximation could perhaps be given by averaging a number of tests in which the individuals had been trained as little as possible. He notes that a thorough test in all these respects would give a measure not only of attention but also of general intelligence.

It seems relevant here to mention Easley's[2] (1931) investigation of the presence of a special or group-factor of attention which was carried out with five tests of attention - cancellation, Münsterberg test, Woodrow test, Mean Variation and Reaction-time. On the basis of his results, Easley concluded that there was little or no relationship among the several measures of attention, that there was no evidence of any group-factor of attention involved in any combination of the attention-

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1. Pillsbury, W.B. op. cit., p. 93.

2. Easley, H. op. cit., pp. 203 - 215.

tests, that there was little or no relationship between the measures of attention and the other mental functions which one would suppose to require a high degree of attention, that if attention was involved in all of the measures to any extent, then the intelligence tests he used were at least as good measures of it as were the attention-tests, and that the direct and indirect methods of measurement that he investigated did not measure the same thing.

Burt[1] (1909), in an investigation of general intelligence, selected for study a number of tests as standing in a possible functional relationship with the capacity called general intelligence. One of these was the Dotting-test in which the subject had to mark with a pencil an irregular zig-zag row of dots lithographed in red upon a paper tape and carried past the field of view at an adjustable speed by a small wooden drum rotated by clockwork; the position of each dot being unknown till it was seen, each stroke had to be aimed. This test was said to measure the power of sustained effort of maximal concentration, in short, to measure voluntary attention. Burt concluded that his association and attention tests - Memory, Mirror test, Spot Pattern and Dotting - have pure correlations with intelligence and that attention is a particularly essential factor in them, as they involve the building-up, under the guidance of attention, of new associations between one set of stimuli and another, between one set of movements and another, or between stimuli and movements. He found the Dotting-test to correlate most with all the other tests and, consequently, to head the hierarchy.

Rapaport[2] (1945) in his discussion of the Wechsler-Bellevue Intelligence Scale, maintains that attention plays the major role in the Digit-Span sub-test, and concentration in the Arithmetic sub-test, that the impairments on these sub-

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1. Burt, C. op. cit., pp. 153-156, 166-169.

2. Rapaport, D. Op. cit., pp. 169-199.

tests are most frequently understandable as impairments of these functions, and that no other sub-test of the Bullevue Scale is related more clearly to these functions. He proceeds to explain the scores achieved on these tests by his mentally-disordered groups of subjects in terms of his theory of attention and concentration. According to him, the assumption usually made that Digit Span is a test of memory is incorrect; he notes the qualitative similarity of the subjective experience in Digit Span performance to that described as typical for attention and its failures; Digit Span achievement is highest if intake is effortless and free. Thus Digit Span may be said to test Attention. As regards the Arithmetic sub-test, Rapaport[1] states :

> Arithmetic is considered here a test of concentration, because to pass the items of the sub-test which, excepting perhaps the last two, consist of the four basic calculations, the subject .... must utilize <u>patterns</u> of arithmetical relations ingrained in him. He must reflect on and deliver the answers from the <u>patterns</u> that he possesses. Such focussing upon internally or externally, actually or potentially existing patterns to discover and amend them, is concentration .... It is a test of the patient's ability to concentrate, and with this concentration, to summon up knowledge he has, within the limits of a given time .... on this level the necessary arithmetic knowledge is so ingrained that merely concentration comes into play in delivering it to the consciousness.

Rapaport notes, in addition, that the Picture Completion sub-test is also, in part, a test of concentration, the relevant function here being the discovery of consistency or

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1. Rapaport, D. <u>op. cit.</u>, p. 231.

inconsistency, the appraisal of relationships within a limited time. In this task, all the materials necessary for achieving a good response are put before the subject and the gap in pattern can be perceived only by concentration on the parts of the picture.

In conclusion, one may refer first to the criticisms made of each test already discussed and to the section on difficulties in the measurement of concentration. The striking feature is the paucity of the research that has been carried out as to the validity of the various tests. Thus, one is dubious of what the tests measure and of whether they really do measure the stated ability. The numerous difficulties that were present in the way of testing make this understandable, at least to a certain extent. The majority of the tests discussed are said to be tests of attention, not tests of concentration, and they are largely restricted to the sensory field; ideational or 'mental' attention is given little consideration. It has become evident that 'attention' is a complex process and that many factors are related to it; one must, therefore, recognize the fact that it will be very difficult to measure 'attention' as such, and it remains to be seen whether 'attention' can, in fact, be measured. Much further investigation is necessary before one can say whether it will be possible to devise a set of tests of concentration, each of which will have a sound rationale and will afford a basis for comparison of individuals and evaluation of subsequent improvement.

3. Training in Concentration

In this section, too, the obvious feature is the minimal amount of research done and the paucity of ideas which pertain directly to the training of concentration.

(1) Possibility of Training in Concentration

Brooks[1] (1922) holds that the efficiency of study depends as much upon the child's study habits as on his natural ability, and good study habits can be formed, he says, only by special training in the art of study. He describes three types of inefficient activity in studying - the pupil who deliberately whiles away his study time because he has no interest whatsoever in school or work, the pupil who reads over the lesson in a dilatory, ineffective manner with his mind constantly wandering to more inviting fields of thought in his own sphere of interests, this being largely because the lessons assigned present no definite problems in which he is interested, and the pupil who is busy every minute of the study-time but whose time and energy is largely wasted because of ineffective methods of study and ill-directed efforts. The performance and concentration of all these children, maintains Brooks, could surely be improved, although not by precisely the same methods in each case; it will be seen later what methods he advocates in order to improve efficiency of study.

Although there is little reference to the possibility of training in concentration, the general opinion with regard to improving methods of study, is an optimistic one. It will be seen that relatively few methods are directly proposed as a means of improving powers of concentration and the value of any one method postulated to improve methods of study has not been sufficiently substantiated.

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1. Improving Schools by Standardized Tests, pp. 246 - 247.

(2) Relationship between Concentration and Learning Theory

The intimate relationship between Concentration and Learning may, it seems, be looked upon in two ways. First of all, concentration is said to be one of the abilities necessary for efficient learning; thus, Thomas[1] (1922) points out that "... Real skill in study means the power of effective, independent self-direction" and he holds that concentration is one of the factors necessary for effective direction of mental energy. Secondly, effective concentration implies the practice of the correct habits of concentration; therefore, the acquisition of the habits of concentration is in itself a form of learning, and the principles of learning theory may apply to any attempt that is made to develop powers of concentration.

Among the most essential conditions for effective learning mentioned by Frandsen[2] (1957) are practice, provision for transfer of training, motivation, reinforcement, and freedom from anxiety and distorting attitudes which impair or prevent learning; he notes that it is the function of the teacher to guide pupils in awareness of goals and of efficient modes of attack, and to adjust goals or standards to the progress of the learner. According to Bugelski[3] (1956), who discusses the principles of learning theory which may be applied to education, the teacher has two functions - the motivating function of securing the child's attention and the instructing function of reinforcement. He says[4] that "The function of the teacher is to prepare the situation and chain of events in such a fashion that the learner has the maximum possibilities of acquiring the proper connections." The concept of motivation, he maintains,

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1. Training for Effective Study, p. 4.
2. How Children Learn, pp. 46 - 47.
3. The Psychology of Learning, Chap. 16.
4. ibid., p. 457.

should be restated as a readiness for learning as in this sense, it carries the weight of a concept of attention; it is essential, too, to take into account individual differences in capacity as these set limits upon what kinds of processes can be acquired.

Transfer of training, motivation and reinforcement will be discussed in further detail presently. Leontiev[1] (1932) presents a theory of the development of voluntary attention as the acquisition of a series of habits of behaviour. Voluntary attention, he says, is a higher form of regulation of behaviour which is instrumental and realized by means of a second series of stimuli, that is, 'artificial' stimuli or signs. The child gradually becomes capable of using external stimuli with the idea of organizing his own behaviour; a process of transformation takes place on the basis of the control of the child's attention from without, with the help of external stimuli, so that these external stimulus-means or "instrument. signs" are replaced in the process of development, by internal stimuli which 'grow in' and acquire a 'significative' meaning. Such 'applied-to-oneself', instrumental, significative regulation of behaviour; maintains Leontiev, is what one calls voluntary attention. He proceeds to trace the route of such development of behaviour in children under laboratory conditions and he concludes that the development of the voluntary attention of the child should pass through a stage when his behaviour is controlled with the assistance of external stimuli-signs, which are subsequently replaced by internal signs.

Luria (year unknown) formulates a similar theory with regard to the regulatory role of speech. He says[2] that "... The capacity of the child to subordinate its movements to the instructions of other people subsequently turns into the

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1. Leontiev, N. "Development of Voluntary Attention in the Child". J.Genet.Psychol., Vol. 40, 1932, pp. 52 - 82.

2. Luria, A.R. Experimental Analysis of the Development of Voluntary Action in the Child.

capacity to subordinate its movements to orders which are formulated in its own internal speech." The experiments he cites show the significant role of the second signalling system which gradually becomes the highest regulator of human behaviour. There are in fact, a number of investigators who believe that language is especially important in the voluntary control of behaviour.

From the point of view of the development of behaviour which is not a response to stimuli serving basic drives and instincts, concentration too might perhaps be considered as a form of voluntary behaviour. Leontiev does not state directly any implications his theory may have for training in concentration; it is considered that, in training the school-going child to concentrate, any form of motivation or reward might serve as the external stimulus-sign, to instil in the child a set of habits that become so much a part of him that the external signs are no longer necessary and he concentrates according to the ways that have become habitual and because of some internal process which, once established, continues with its own force.

Immerman[1] (1952) carried out research on lack of concentration during study with learning theory as a basis. She regards concentration as a form of behaviour and as a learning process during which the subject is trained to respond to certain stimuli in a specific way. Lack of concentration is said to arise usually early in school life, the difficulty originating in the manner in which the pupil is taught to read; he acquires a large number of specific reading habits in response to printed words which enable him to pronounce them, but he does not acquire the equally important and more general habits which enable him to grasp the meaning of a group of words

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1. Immerman, J. Concentration and Day-Dreaming during Study. Unpublished Master's Thesis, University of Cape Town, 1952.

assembled in a particular way. Thus, he learns to read the words mechanically and this does not disturb the course of the day-dream which is unconnected with the words he is reading. In order to improve the student's powers of concentration, the old, unsatisfactory habits of study must be extinguished and effective ones must be built up in their place; this can only be done if the point where the faulty behaviour begins, that is, the start of the day-dream, is tackled.

The student must acquire the habit of responding appropriately and correctly to stimuli that have, as a rule, passed unnoticed and, in order to do this, he must be trained to attach the appropriate new reaction to some <u>other</u> deliberately chosen stimulus, for example, the end of the paragraph in the material which he is studying. He must be instructed deliberately to learn the habit of stopping his reading at the end of each paragraph of the material and he must then try to recapitulate and recite the main contents of what he has just read; if he is successful in this, he goes on to the next paragraph but if he is unsuccessful, he reads the paragraph again and, on completing it, again recites its contents. This process may have to be repeated several times before the student is able to proceed to the next paragraph. The end of the paragraph says Immerman, becomes the stimulus for stopping and recapitulating which automatically involves the termination of the day-dream; by the laws of learning, the stimulus that starts the day-dreaming also becomes conditioned to its termination. In this way, even if the exact point of the start of the day-dream is unknown, its frequent, repeated and regular termination will ultimately have the effect that the day-dreaming habit is completely extinguished and that the correct reactions are aroused and established as habits.

Immerman[1] notes also that the way in which the subject sees his problem and his consequent behaviour is determined by the way he has learned to behave towards it. Thus, the training process described should lead to a new perception of and a new attitude toward the learning situation; this process may be described in terms of the symbols of learning theory.

This theory and training procedure seem to be of value in correcting the faulty habits of study found in lack of concentration. However, it does not sufficiently consider the question of motivation; the older student usually has some motivation to work for the sake of working or in order to pass his examination and perform the set task as accurately as possible, but the school-going child lacks this - he needs something more immediate and attractive as an incentive. Thus, the greatest difficulty would seem to be this - how can one make the pupil want to apply these rules in training, in fact, how is one to make him want to participate in any training?

(3) Conditions and the Nature of Attention

There are a number of so-called conditions or determiners of attention which may also serve as a guide to training and these have been described in the Encyclopaedia Brittanica[2] (1929) as being of two principal kinds, namely, the nature of the external 'stimuli', that is, objective conditions, and the subjective conditions within the individual.

Among the important external or objective determiners of attention are such factors as contrast, size, colour, movement, repetition and novelty, the latter being said to be the most important of all. External determiners, says Munn[3] (1951) are

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1. Immerman, J. op. cit., p. 6.

2. "Attention" Encyclopaedia Brittanica, Vol. 2, 14th ed., 1929, p. 657.

3. Psychology, p. 396.

potent only to the degree that they 'tap' the individual's continuing sets, the internal determiners, and they stem from motives - in other words, one is more likely to respond to aspects of one's needs, desires and interests.

James[1] (1890), Thomas[2] (1922) and Knowlson[3] (1931) all stress the fact that attention cannot remain fixed on any one point longer than a few seconds; as attention then inevitably swings away from the object central in the consciousness to one or another in the margin, it is the closeness of relation of the things in the margin of consciousness to the object of study which largely determines whether or not the attention shall return to that object of study. Thus, the more complex an object or the richer in content an idea, the longer attention of a sustained character can be given. Following on this idea, Thomas[4] (1922) and Dallenbach[5] (1926) discuss the possible value, in the process of holding the attention, of any task involving muscular activity where the movements themselves furnish an appropriate variety to satisfy the attention demanded for their direction. Both Arnold[6] (1910) and Stillman[7] (1928) emphasize that one should appeal to each pupil, through as many senses as possible; the principle here would seem to underlie the method of teaching which involves more than one sense-organ, for example, audio-visual methods.

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1. James, W. op. cit., pp. 420 - 421.
2. Thomas, F.W. op. cit., p. 120.
3. The Secret of Concentration, p. 18.
4. Thomas, F.W. op. cit., p. 126.
5. Dallenbach, K.M. op. cit., p. 13.
6. Arnold, F. op. cit., p. 246.
7. Training Children to Study, p. 116.

Knowlson[1] (1931) discusses in detail a regime for training in powers of concentration; he emphasizes the value of practice and postulates, as exercises for acquiring concentration, paraphrasing, the analysis, comparison and contrast of objects, the writing down of one's thoughts about a list of words and names, and memorizing.

(4) Rôle of Motivation and Interest

The role of motivation and interest in any form of learning is considered by all writers to be extremely important. The real problem of the teacher, says Risk[2] (1958) is to establish strong motives in order to sustain attention, or in other words, to sustain activity toward the goals or objectives of the class-work where satisfaction does not arise spontaneously. Stephens[3] (1956) considers that there is no certain knowledge of just how any motive operates; this knowledge, it seems, may be provided by the neurophysiological work on attention which has already been discussed.

The possible value of numerous individual motives could be discussed in this section; however, rather than enumerate every motive that has ever been used, it is perhaps more important to present several ideas about motivation in general. Physical and physiological motives, although they are always in the background and cannot be ignored, are used only indirectly and it is the social and intellectual motives, says Stephens, to which the teacher can appeal in most direct fashion and which he can apply most freely, for example, the child's need to be with people and to have them think well of him, his need to move things around, to manipulate, to create and express himself, and his overpowering need to think well of himself.

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1. Knowlson, T.S. op. cit., 235 pp.
2. Principles and Practices of Teaching, pp. 320 - 322.
3. Educational Psychology, p. 308.

Much importance has of late been placed on 'ego-involvement' as a form of motivation. Rosenzweig[1] (1943) is reported to have carried out some work on the influence of certain factors on the recall of completed and interrupted activities. The interest is not in the completed and interrupted tasks as such, but in the explanation of the difference between 'task-oriented' and 'ego-oriented' attitudes. An individual whose attitude is 'task-oriented' works at a task primarily because he is engrossed in the task itself; his pride and self-esteem are not deeply involved. On the other hand, an individual whose attitude is 'ego-oriented' works at his task mainly because of egotistic motives; he regards the task as an activity in which success is necessary for the maintenance of self-esteem and his interest in the work as such is negligible. Certain experiments are said, too, to indicate the presence of an additional motivating factor, 'ego-enhancement', which results in a tendency to remember especially well experiences which are associated with success.

Stephens[2] (1956) explains that "By saying that the student's ego is involved, we mean that, in his mind, failure in the assigned task will lead to some impairment of the ego, to some loss of self-respect, or to a reduction in his sense of worth. The ego is involved whenever the student feels that an important part of him is wrapped up in the outcome of the task". It is held that there may well be a difference between children and adults but that in children, and in all probability in the experimental training procedure described at a later stage, 'ego-oriented' attitudes and 'ego-involvement' would be necessary for the highest form of motivation and best participation in the training.

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1. Rosenzweig, S. "An Experimental Study of Repression". J.Exp.Psychol., Vol. 32, 1943, pp. 67 - 74, as quoted by Crafts, L.W. et al. Recent Experiments in Psychology, Chap. 5.

2. Stephens, J.M. op. cit., p. 299.

The value of interest in learning and attention is emphasized by numerous people, in the earlier years, for example, by Arnold[1] (1910) Thomas[2] (1922) and Knowlson[3] (1931) and more recently by Frandsen[4] (1957) and Rick[5] (1958); and here again, the hedonic viewpoint emerges. Book[6] (1927) gives the results of an experiment carried out on five different types of learning with 124 college students; in each of the five types of learning studied, interest in improvement not only increased the learner's rate of gain but also materially improved the quality of his work. Book states very optimistically that practically any interest can be cultivated for the process takes place according to a few very definite laws. The first and foremost of these laws, mentioned by many others as well as Book, is that all new and acquired interests must be built upon the native interests or tendencies with which an individual is already endowed; thus, if one wishes to develop an interest in a particular subject, one must first find something about it that already interests one or relate it to an interest already present to which it may be a means. Secondly, one must secure much information about the subject or task as getting to know about it may provide the interest necessary to further action and attention. Finally, success is required in order to make the student exert himself fully and vigorously toward his task. The principles of 'effect' and 'reinforcement' which are discussed by numerous learning theorists today are, perhaps, a re-statement in more modern terms of older ideas, and these, too, must be considered in motivation and the learning process.

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1. Arnold, F. op. cit., p. 255.
2. Thomas, F.W. op. cit., p. 114.
3. Knowlson, T.S. op. cit., p. 159.
4. Frandsen, A.N. op. cit., p. 45.
5. Rick, T.E. op. cit., p. 35.
6. Book, W.F. "How to develop an interest in one's tasks and work". J.Educ.Psychol., Vol. 18, 1927, pp. 1 - 10.

Risk[1] (1958) who discusses needs and drives as 'behaviour controls' or 'motive forces', that is, dynamic forces leading to action, emphasizes the importance of acquired behaviour controls, and especially of 'emotionalized controls' or 'value adaptations'; these terms are used to designate the 'emotionalized outcomes' of learning, for example, attitudes, interests, ideals and so on. He admits, however, that it is difficult to study, measure or control them. He[2] emphasizes, too, that in order for learning to be most effective, the learner must gain confidence in his ability and be free from emotional tensions.

Risk divides the technique of motivation into two phases; the first is to secure and maintain spontaneous attention by appealing to basic drives or to present attitudes and interests; the second phase is to build motives by appealing to values that the student recognizes, namely, values related to felt needs, present ideals, personal qualities and social values, social approval, school awards and so on.

Mention must be made of the significance of the pupil's relationship with his teacher and parents as affecting motivation. The general opinion is that a feeling of responsibility for the work assigned, the satisfaction and pleasure derived from it and the will to attend are all dependent upon the interest others show in the work, namely, the teacher and parents. It follows that where the home circumstances of the child are adverse, or where the attitude of the parents or teacher is at fault, the child's level of motivation will be low.

Other motivating factors to be considered are the value of praise and blame, the use of tests and the setting of suitable standards or goals, the influence of the class as a whole upon the individual pupil, and of the group leaders, and the value of competition.

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1. Risk, T.M. op. cit., p. 85 +
2. ibid., p. 35.

Stephens[1] (1956) emphasizes the distinction made in Lewinian psychology between extrinsic and intrinsic motives; for example, the pupil's wish to be able to read would be an intrinsic motive, whereas his hope to gain the teacher's approval would be extrinsic. There is a very important practical difference between the two kinds of needs, as intrinsic needs can be met only by the behaviour in question, whereas one may try to satisfy the extrinsic needs by roundabout devices. Among the intrinsic motives can be listed the need to manipulate, to achieve and to make a success out of life. Wherever a choice is possible, the intrinsic motive is to be preferred as it leads more directly to the behaviour desired; presumably, it implies more 'ego-involvement' as well, and therefore, less need for supplementary restraints to prevent roundabout behaviour. However, as in some cases intrinsic motives are not always readily available, one has to use, at least temporarily, some less intrinsic form of motivation.

Finally whoever makes use of motivation must recognize the fact that it is possible to over-motivate and to make the student too anxious and eager to do well, thus leading to many errors in performance. It appears that some form of motivation is necessary to bring the child into the situations in which learning may occur; its significance for the educator must not be over-looked.

(5) Methods of Increasing Efficiency of Study advocated by S.S. Brooks

These methods described by Brooks[2] (1922) were actually put into practice in some of the schools he visited and they seem worthy of note. Brooks emphasizes that efficient silent reading drill is the fundamental factor in efficient study; the ordinary

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1. Stephens, J.M. op. cit., pp. 305 - 308.

2. Improving Schools by Standardized Tests, Chaps. XI, XIV and XV.

methods of assignment, study and recitation, are, he holds, of no value, but properly-directed silent-reading drills furnish the most practical means available for developing good study habits in children through actual practice in the factors of efficient study, namely, interest, attention, thinking, and the correlation and association of ideas. These methods, then, must be especially relevant to training in attention and concentration. It must be remembered, says Brooks, that the ability to recognize and pronounce words is no true evidence that their meaning is understood and that usually in oral reading, the habit is forced upon the pupil of paying more attention to forms of words than to their meanings; it is also of no value to give pupils books to read at seats for silent-reading drill because this does not demand or force that concentration of attention so absolutely essential to a complete and accurate understanding of what is read.

What are the methods of varying the class drill on reading material which <u>are</u> of value? One way is to give the whole class a definite length of time to read a certain amount of material and then to have one pupil tell in his own words what he has just read. Meanwhile, the other members of the class listen with their books closed and watch for errors or omissions which they are permitted to supply after the pupil reciting has told all he can remember. The advantages here are that everybody is working all the time, it is impossible for the pupil to reproduce completely and accurately the main thoughts in the material unless he has read it attentively and rapidly and, since no one but the teacher knows who is going to be called upon to recite after the reading, every member of the class must read attentively.

A second way of treating the same material is for the teacher to prepare beforehand a list of questions based on the text to be read; after the pupils have read a section, timed as before, she may test their comprehension of the thought by asking questions, the answers to which are given or suggested in the section read. A third variation of the method is that, instead of having the class read a section beforehand and then asking the pupils to answer the questions from memory, the teacher may ask the questions one at a time and let them read to find the answers; the game here is to see who can find the correct answer first.

The question method, states Brooks, ensures better concentration than the others as the child must read attentively and understandingly if he is not to miss the answers when he comes to them. If the answer to a question is merely suggested by a fact mentioned in the text, so much greater is the demand on the attention of the reader, and real thinking is introduced as an element in the reading. Brooks holds that this method develops the ability to scan a paragraph or a page in search of a definite idea while ignoring unessential details. He advises that most of the questions should be formed so that they cannot be answered by words or phrases taken directly from the book and without association of ideas and seeking of relationships among the facts given in the text by the reader. Thus, the pupils may be led, in spite of themselves, to do some real thinking.

Other forms of silent-reading drill are also advocated by Brooks. The children may be required to read paragraphs from a text which has no paragraph headings and to suggest suitable headings or topic sentences for the paragraphs. All suggestions should be discussed fully and the class should decide which one is best and why. One may also have the pupils consider each sentence or statement in the paragraph with a view to discovering

a common or central idea to which each statement refers. Hunting for irrelevant statements in paragraphs may be made a special type of silent-reading exercise. Other good material could be pictures accompanied by descriptions or little stories in which many of the statements do not agree with the pictured facts and in which the errors have to be pointed out; here the mis-statements cannot be indicated by the pupils unless they understand the printed thoughts.

Finally, Brooks discusses the value of directed or supervised class study which is so organised as to develop in the pupils methods of attack that will constantly improve their ability to do independent work. According to him, the results of such study are quite equal to or even better than those usually obtained by the traditional daily question-and-answer method following a period of unsupervised study, and fully as much ground can be covered. In fact, to develop good study habits in children, the study must be directed.

These types of silent-reading class drill apparently prove very effective in holding the children's interest in forcing concentration of attention on the matter being read. Their interest is mostly in the immediate objects to be achieved, namely, to see who can read the paragraph in the shortest time and understand it well enough to give the principal facts of the assignment from memory and in a connected manner, to see who can be the first to discover, from among the details of the text, the answer to a definite question, or to see who can first discover the main thought of a paragraph. Despite the chief interest being in the spirit of lively competition engendered by these drills, the interested, active and enthusiastic co-operation of the pupils is secured under conditions that make for real improvement in

ability to study and to concentrate. Brooks[1] states that "The strict concentration of attention impelled by these drills is much more favorable to retention of subject-matter than is the usual perfunctory reading at seat in so-called study". In this way, good silent-reading drill compels practice in proper methods of study which may logically be expected to carry over into the closely-related activity of seat-study.

Brooks emphasizes that effective supervised study is practicable in any school system where the administration and teachers have the courage, ambition and intelligence to attempt it.

(6) Transfer of Training

In training a child to concentrate or to use methods of study which one desires that he apply in all study, in class and in individual learning - situations, one must know the principles underlying the transfer of such methods.

The idea of transfer is, in fact, probably basic to the whole notion of schooling. One must know how to teach so that the results not only will persist for a reasonable length of time but also so that these results will be applicable in a wide variety of situations. Thus the fundamental educational problem is what methods of teaching and learning will be most conducive to transfer. The extent to which learning can be transferred is a problem which has, it seems, been the subject of much controversy.

A number of theories have been postulated to account for transfer of training. The two most widely-accepted and discussed at present are the theory of generalization and the theory of identical elements. The latter states that transfer

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1. Brooks, S.S. op. cit., p. 251.

is due to the number of tendencies or behaviour units that are common to the practised and unpractised activity, that is, that transfer takes place according to the extent to which there are identical elements in the old and new tasks. The generalization theory, on the contrary, holds that transfer is due to generalization or to the extent that the learner is able to build up general principles in one activity and utilize them in another. Some writers consider that the two theories may perhaps be saying one and the same thing.

If positive transfer can be induced by deliberate teaching to that end, it is essential to know what methods the teacher should use or under what conditions the teaching should take place; here again, the opinions vary greatly. Stephens[1] (1956) advocates at least two procedures as general rules. First of all, the feature of the lesson which may be applied to other fields should be emphasized; where the thing to be transferred can be stated as a rule or principle or formula, the student must be made consciously aware of it; to increase transfer, he must be helped, during the learning of task A to isolate and attend to the elements, principles or techniques which can be used in task B. The greatest benefit is said to be derived where the student himself works out the principle or formulates the rule.

The same rules for transfer are formulated by Gates et al.[2] (1942) who say, firstly, that transfer depends upon understanding, and, secondly, that as the essential relationships are discovered and generalized, so learning becomes meaningful and what is learned becomes more available for wide application. Both they and Risk[3] (1958) emphasize that transfer is not automatic; it depends upon a deliberate attempt to interpret new

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1. Stephens, J.M. op. cit., pp. 431 - 445.
2. Educational Psychology, p. 537.
3. Risk, T.M. op. cit., p. 55.

situations in the light of past experience, and to apply appropriately the meanings or methods previously learned; furthermore, the teaching must provide for transfer - the student must practice and the learning situations must include appropriate application and use of the outcomes, in situations approximating life situations as much as possible.

Valentine[1] (1918) discusses the problem with special reference to concentration and the important factor of motivation. He notes that the will to attend, which is a basic element in concentration, is one thing at least which can be developed as a result of successful experiences in the past; this can be done only when a child proves from experience that concentration on what is at first sight uninteresting has its value, either the reward of further interest in the subject, or a reward external to the subject itself. The pupil's aversion for things *prima facie* uninteresting is lessened in this way for he realizes more clearly that they are possible means to valuable ends. Valentine describes the mental activity of turning the attention to an uninteresting thing as being reinforced or 'stamped in' by such successful experiences. In the sphere of concentration, one should perhaps consider transfer in motivation and attitudes as being particularly significant. Risk[2] (1958) notes that the amount of transfer depends upon a strong desire on the part of the learner to make learning effective and that a learner who gains confidence in his ability to solve problems, actually increases his ability to cope with new situations.

What part does intelligence play in transfer of training? Stephens[3] (1956) states that if the formulation of a general principle is an aid in transfer, then the bright student who can actually perceive and formulate it more successfully, must surely have a great advantage. Valentine, too, is of the

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1. Valentine, C.W. "Volitional Attention and its Training", *Mind*, Vol. 27, 1918, pp. 40 - 54.

2. Risk, T.M. *op. cit.*, p. 55.

3. Stephens, J.M. *op. cit.*, p. 443.

opinion that it is only with the more intelligent pupil that one should expect much in the way of a general improvement of the power of volitional attention as a result of training with a specific subject, as it is characteristic of high intelligence to realize the unity of means and end.

CHAPTER III

EXPERIMENTAL DESIGN

1. Definition of Attention and Concentration

The explanation presented here is based, to a large extent, on the theories of Cameron and Magaret[1] (1951), Hebb[2] (1952) and Bugelski[3] (1956) which have already been presented. An attempt will be made to define Attention in terms of brain functioning and to take into account the role of motivation.

In the first place, attention must be considered as a process, and not as a faculty; thus, one should speak, in fact, of 'attending' rather than of 'attention'. The view is taken here that attending may be regarded as a preparation for response or as a readiness-to-react in the sense that the individual, before he can deal with his environment, must make certain preliminary or antecedant responses. Therefore, the process of attending may be thought of both as a preparation for other responses and as a form of response in itself.

The individual does not react to all the numerous stimuli around him - he selects certain stimuli to which he will respond. In order to explain this process of selection further and, perhaps, more clearly, Cameron and Magaret's terms 'exclusion' and 'inclusion' may be considered. Response to a particular set of stimuli can be best made if the response is only to those and not to others as well; thus, all the relevant stimuli must be included for response to be made to them while the irrelevant stimuli must be excluded. For example, distracting stimuli will interfere with response to the relevant stimuli because they evoke

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1. Cameron, N. and Magaret, H. op. cit., pp. 70 - 75, 449 - 457.
2. Hebb, D.O. op. cit., pp. 4, 87, 102 ff., 151 - 153.
3. Bugelski, B.R. op. cit., pp. 39, 135, 205 - 242.

responses to themselves and they must, therefore, be ignored or excluded. One may say that the individual must inhibit response to any irrelevant stimuli. The inability to attend to the problem at hand, or to specific stimuli presented, is then explainable in terms of 'over-inclusion' and 'under-exclusion', that is, a failure in limitation and selection in which too many stimuli are included and in which too few are excluded so that the individual will respond to interfering and irrelevant stimuli. This seems to be the condition of distractibility or day-dreaming. Being inattentive implies attending to too many stimuli or attending to the wrong stimuli. Lack of concentration may perhaps also be thought of as 'over-exclusion' and 'under-inclusion', this being again a failure in selection but differing from the first type in that the individual here gives such close attention to one set of stimuli that he excludes virtually all others. This seems to be the condition known as pre-occupation. It is seen, therefore, that an adequate balance must be preserved between 'exclusion' and 'inclusion'.

The process of selection may now be described in terms of brain functioning, according to the theory of Hebb (1952) and further work by French[1] (1957) and Bugelski (1956). The condition of attending implies that there must be some selective central mechanism which intervenes between stimuli and responses. This mechanism seems to be the reticular formation in the brain stem and may be referred to as the reticular activating system (RAS). The RAS, apparently, learns to be selective in its sensitivity to particular stimuli and facilitates and inhibits the flow of signals in the nervous system, making the individual accept what he needs to perceive and reject what is irrelevant; the neural processes of facilitation and inhibition are, therefore, one of the functions of the RAS and account for the selective

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1. French, J.D. op. cit., pp. 54 - 60.

aspect of attention. As the RAS is constantly active, facilitation or inhibition will be determined by the general level of this arousal system or by the general 'drive state'. First of all, an optimal drive level is necessary for any impulse to be transmitted so that a response may be made to it; secondly, the prior and/or present neural activity can be such that it will either facilitate or inhibit the discharge of the appropriate cells. The significance of past experience as affecting the neural activity of the RAS is seen here.

Thus, attention may be taken, as Hebb states, to mean the readiness of the neural elements for reaction, or in other words, the degree of central facilitation or inhibition that occurs. It seems possible, also, to relate McClelland's[1] (1953) discrepancy-persistence hypothesis and 'affective arousal' to Hebb's explanation of attention. The adaptation level of the organism (expectation) can perhaps be thought of as the readiness of the neural elements for reaction to the incoming stimulus (perception). The size of the discrepancy between the two will be determined by the nature of the stimulus and the degree of readiness of the neural elements for reaction to it, and this discrepancy in turn determines, in McClelland's terms, the level of affective arousal, the degree to which the individual will approach and attempt to perpetuate or attend to, or 'avoid' and try to terminate or take little notice of the stimulus.

The particular set of stimuli which is selected seems to be determined first of all, by 'external' conditions, that is, aspects of the stimuli such as size, intensity and volume, and secondly, by 'internal' conditions, that is, drive or motivation.

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1. McClelland, D.C. et al. op. cit., Chap. II.

Stimuli which are persistent, irregular and strong will be selected or attended to because they break up the existent pattern of cortical activity; these stimuli may come from the external environment or from the cortex itself. The role of motivation is to lower the resistance to the passage of certain impulses; as this must be done in terms of some kind of alteration of neural states in the central nervous system, it may be said that motivation probably affects the level of the arousal system and so determines the degree of facilitation or inhibition.

Finally, it seems that the distinction between attention and concentration can be made only as follows. The process of selection in both is basically the same but Concentration may be thought of as a much higher degree of attention in that the selection of stimuli is more refined and the operation of the selective mechanism continues over a longer period. From this point of view, Concentration may perhaps be considered as 'stable' behaviour organization, for the process of exclusion of irrelevant stimuli and inclusion of relevant ones continues - the act of attending is intensified and sustained. The role of motivation is also more important in concentration than in attention and what is perhaps here playing a larger role is the type of motive which Hebb (1952) terms "the immediate drive value of cognitive processes".

It is maintained here that "lack of concentration" means lack of the correct habits of concentrating, an inability to exclude irrelevant stimuli for a sufficiently long time. The causes of this may be :

(a) brain injury
(b) mental retardation
(c) lack of motivation and interest
(d) the presence of an emotional difficulty or maladjustment
(e) lack of knowledge of the correct habits of concentration.

It is further held that in the latter three cases, the situation may be rectified and the child may learn "how to concentrate".

2. Outline of Experimental Design and Methods of Procedure

In considering the experimental design one may return first to some of the original aims of the investigation which pertain to this section. It was considered necessary to define concentration and account for its lack, to show the inter-relationships and links between concentration and other variables, to devise a set of tests of concentration, to formulate a training-procedure with the object of developing concentration and to devise a set of alternate tests to assess the effectiveness of the training programme.

It was decided to select, as subjects for the research, boys aged ten or eleven years of at least average intelligence and without any serious physical or scholastic difficulty, who were described by their teachers as "lacking in concentration". Thus, such variables as sex or very low intelligence could be eliminated, and a simple explanation of the problem, for example, in terms of sub-normal intellect or brain injury could be ruled out. The specified age of the subjects was chosen because the referring problem appeared to be at its worst in primary-school children, and children aged ten or eleven were considered to be of sufficient maturity to respond both to tests and to a training procedure. Another practical consideration was the reasonable closeness of the schools to the Child Guidance Clinic; in addition subjects were selected from a number of schools from different suburbs so that at least some cross-section of socio-economic and cultural levels could be obtained.

The subjects were selected in the following manner. Interviews were conducted with a number of school principals, the nature of the research was explained and it was requested that the principals inform the teachers of this and enquire whether any pupils were considered to be suitable subjects for the research. The permission of the parents having been obtained, arrangements were then made to see each child and to carry out the preliminary investigations.

These were :

(1) administration of the Wechsler Intelligence Scale for Children. If this result was found to be satisfactory for the purpose of the research, there followed
(2) an interview with the parent of the child
(3) an interview with the class teacher of the child
(4) a test of 'School Attitudes' and interview with each child
(5) administration of the Graded Reading and Arithmetic scholastic tests of the Child Guidance Clinic.

All these investigations, except for (3) were carried out at the Child Guidance Clinic, so that the conditions of testing or interviewing were, as far as possible, identical for each child and parent.

A tentative set of tests of concentration was devised and then administered to a group of seventeen children from one school, in order to determine the validity of the tests. These children, having served for the pilot study, were not used at any other stage during the research. After statistical operations had been applied, and the results of this study had been both empirically and logically examined, the final set of tests of concentration was obtained and administered to the subjects who had undergone all the preliminary investigations. The division into Experimental and Control groups was then made on the basis of performance on the tests of concentration.

Training in concentration took place over a period of approximately three months, the members of the Experimental Group attending two afternoons a week at the Child Guidance Clinic for one hour at a time. The Control Group did not participate in any training. After an interval both groups were re-tested with a set of alternate tests, and all the parents and teachers were interviewed finally at the end of the experiment. Again, statistical operations were applied to determine the significance of the training methods.

The experimental design has been briefly outlined; each step may now be considered in greater detail.

3. Preliminary Investigations - Assessment of Intelligence, Interviews with parents, teachers and children

As a result of the interviews conducted with the principals of the four selected schools, the names of 35 presumably suitable children were offered. On administration of the Intelligence test, it was found that seven children had to be excluded because their intelligence quotients were below the predetermined criterion of I.Q. 94.

The number was divided among the schools as follows :

School A : none

School B : 3 out of 5 children had intelligence quotients of 75, 84 and 88

School C : 3 out of 7 children had intelligence quotients of 86, 88 and 90

School D : 1 out of 6 children had an intelligence quotient of 88.

Thus it is evident that children sometimes labelled as poor concentrators do, in fact, rather suffer from subnormal intelligence. The distinction must surely be made between the child who can reasonably be expected to improve his work and powers of concentration and be in whom a primary mental retardation accounts for the inattention and lack of progress.

In considering the distribution of the Intelligence Quotients in detail, (see Table I) it becomes evident that at School A, only 2 children had I.Q.'s below 100, the majority being well above that level. At School D, only one child had an I.Q. above 99, while 5 had I.Q.'s below 100; at School C 3 children were in the range 100 - 109, the rest being scattered over the lower levels. None of the pupils who were tested at School B had an I.Q. above 99. It is of interest to note here that, corresponding to this difference in range of intelligence between School A and the other three schools, there seemed also to be a dissimilarity in the socio-economic and cultural levels.

TABLE I

DISTRIBUTION OF INTELLIGENCE OF 35 SUBJECTS

RANGE OF INTELLIGENCE	SCHOOL A	SCHOOL B	SCHOOL C	SCHOOL D
120 and above	3	0	0	0
110 - 119	5	0	0	0
100 - 109	5	0	3	1
94 - 99	2	2	3	4
90 - 93	0	0	1	0
80 - 89	0	2	2	1
79 and below	0	1	0	0
Total	15	5	9	6

Thus 28 children were found to be suitable, on the basis of intelligence. Of this number, three had to be excluded, two because of the parents' lack of co-operation and one because the family left Cape Town shortly after the preliminary investigations had been completed.

Interviews were then conducted with a parent of each child, wherever possible with the Mother, as she was assumed to be able to offer more information than the Father. These interviews had two main purposes - to elicit information about the manifestations and the causes of lack of concentration. The method of interviewing was largely non-directive, and 'leading' questions were, as far as possible, avoided. The points listed below illustrate what information it was considered necessary to seek.

(1) Household and Residence Aim - to gain a clear picture of the home background, socio-economic, cultural, physical and psychological. The general atmosphere of the home was noted with particular reference to any abnormal circumstances or stresses and strains as well as to the child's status in the family; conditions such as broken home, frequent separations

from home, deceased parents, financial or marital difficulties, excessive emphasis upon education were noted.

(2) Interpersonal Relationships. Aim - to discover the most significant relationships, both negative and positive in value, and to evaluate the social maturity of the child. Relationships with parents, siblings, peers and teacher were all considered and special note was taken of such features as sibling-rivalry, loneliness, unpopularity with peers.

(3) Routine. Aim - to establish whether such factors as lack of rest, disturbed sleep, inadequate diet or poor feeding habits, insufficient recreational opportunities, overstrain through excessive extra-curricular activities, rigid organization or lack of supervision of routine, were important factors in the problem.

(4) Home Discipline. Aim - to estimate the general nature of the discipline, amount of discipline necessary and its effect on the child, whether it was too severe and rigid or too lax or inconsistent, and whether there was much disagreement between the parents over discipline.

(5) General Health. Aim - to obtain information about the child's physical condition, with special reference to vision and hearing, speech defects and any history of illnesses or accidents.

(6) Emotional Development. Aim - to evaluate the level of emotional maturity and adjustment; features such as insecurity, lack of affection, fears, nervousness, enuresis, thumbsucking, delinquency and dishonesty were all taken into account.

(7) School Career and Status, Work and Behaviour. Aim - to obtain an idea of the child's general level and standard of work, any special scholastic difficulty, any indication of falling-off, changes of school, child's attitude to school and work, performance of homework, status in relation to siblings,

parents' attitude to school and homework, parents' aspirations for the child and whether these were in line with the child's capacities, the child's aspirations and level of motivation.

(8) Lack of Concentration Proper. Aim - to establish its manifestations, duration and onset, its restriction to schoolwork and/or other situations, the causative factors as offered by the parents, and the parents' attitude to and method of handling of the problem.

In each case an attempt was made to obtain an independent evaluation of the parent, her attitude toward the research project and the child's problem, overt and real, and, finally, to extract the most significant findings which seemed to bear on the referring problem and its nature.

In the interview with the class teachers, more specific information was sought about lack of concentration. Here too, the interview was kept as 'free' as possible. The points listed below indicate the information sought.

(1) Standard of Work. Aim - to obtain an idea of the child's general level and standard of work, any special scholastic difficulty, the capability of the child to improve, the nature of the child's school reports and the teacher's opinion of the child's level of intelligence. Special note was taken of any record of failure of a standard and the rate of absenteeism.

(2) Performance of Homework. Aim - to elicit information about the amount of homework given, the time necessary to complete it, whether it is done regularly and thoroughly or not, whether inadequate performance is due to inattention in the classroom or to faulty and poor execution or lack of supervision at home, the attitude of the child to homework, and the teacher's opinion of the parents attitude.

(3) Lack of Concentration Proper - its Manifestations.

(a) Aim - to determine its duration and onset, whether other teachers make similar complaints about the child, and the causative factors as offered by the teacher.

(b) Aim - to gain a clear picture of the manifestations in work. The following factors were considered - would the child be capable of better performance if his powers of concentration improved, was the inability to concentrate evident in all forms of work, in the visual sphere, for example, reading and content subjects, writing and 'blackboard' work, or in the auditory sphere, that is, when then child has to listen to a lesson or instructions given by the teacher, or was the child inattentive when given work of a silent nature to do at his desk, was the child's work careless and untidy, did he rush through his work in a slipshod manner or did he work slowly and day-dream.

(c) Aim - to determine the manifestations in behaviour, that is, was the lack of concentration evident overtly in hyperkinesis, restlessness and fidgeting or did the child evince apparent concentration while actually day-dreaming, that is, was it 'externally' or 'internally' manifested, was the child easily distracted by things and individuals around him or by his own thoughts, was he very talkative in class, did he try to distract others and display attention-seeking behaviour toward the teacher and/or pupils, was he purposefully disobedient or impertinent to the teacher.

(d) Aim - to determine the manifestations in level of motivation. Special note was taken of such features as the interest shown by the child in his work, his keenness to perform well, his response to failure or poor performance of work and to praise and encouragement, the degree of praise he required and the degree of frustration-tolerance he possessed, that is, his ability to persist and continue with a task in the face of difficulty or drawbacks, or despite an unwillingness to do so.

(4) Interpersonal Relationships. Aim - to discover the nature of the child's relationships with his teacher and classmates, special note being taken of timidity and fear, aggressiveness and attention-seeking behaviour, level of popularity, loneliness, and attitude toward teacher.

Again, in each case, the writer attempted to obtain an independent evaluation of the teacher, her attitude toward the child and the research project.

The purpose of conducting an interview with the child was to establish his attitudes, mainly toward his parents, siblings, peers, teacher, school and work. The information obtained here, it was thought would be helpful in confirming or giving a truer picture of the facts elicited in the two previous interviews with the parents and teachers. A standard set of questions was asked of each subject, as follows :

(1) What is the nicest thing that has ever happened to you?
(2) What is the worst thing that has ever happened to you?
(3) What do you like most out of everything you know?
(4) What do you hate most out of everything you know?
(5) Who do you like most out of everyone you know?
(6) Who do you hate most out of everyone you know?
(7) What do you think of school?
(8) What is your teacher like?
(9) What are the boys in your class like?
(10) Tell me about your family?
(11) Tell me about your friends?

In addition, the test of School Attitudes used at the Child Guidance Clinic was administered to each child. This consisted of ten incomplete sentences which were read to the child who had to complete them, the assumption being that the child would project his own attitudes into each situation.

(1) One day, John went to school for the first time. When he came home, he told his Mother that the teacher had .....

(2) One night when John went to bed he was very sad because his school friend had .....

(3) John liked most of the school subjects except ..... He hated this because .....

(4) One day the teacher shouted at John because .....

(5) In class one day John giggled a lot and the teacher .....

(6) When John came home from school, his Mother said, "Do your homework and tidy your cupboard". Which did he do first? ..... Why? .....

(7) When playtime came .....

(8) When John's school report came, his parents said .....

(9) One day John asked his Father to help him with his homework. His father said .....

(10) John asked the teacher something in class. What did he ask? What did the other boys do? .....

The results of all these interviews are presented at a later stage.

4. Tests of Concentration

(1) Difficulties in the construction.

First and foremost is the difficulty in definition of the term. Can concentration be measured according to its definition? Can it be measured directly or only indirectly? Is it at all possible to measure concentration as a whole or should one limit measurement to particular aspects or fields of concentration, and if so, which aspects? As the manifestations of concentration and the variables differ so much from one individual to another, can one individual be compared with

another on the basis of test performance? It may be queried too, whether the basal capacity for concentration or the present level should be tested, and whether one can avoid the dependence of the test performance upon other capacities. If level of motivation is an important facet of concentration, how can this be measured?

If concentration implies sustained attention, attention over a long period of time, how is measurement of this to be related to tests which are practicable to administer, from the point of view of time? Is one to measure lack of concentration in general, or lack of concentration for specific topics? Should tests be administered individually or to a group of children and how closely should the material used in the tests resemble that with which the child deals in the classroom and that which will be found in the training procedures? As the idea of a test immediately implies conditions different from those in which the child is normally, is it possible to measure concentration as it will be under normal circumstances, in the home and classroom? And finally, what criteria may be used to establish the validity of the tests - other tests which have not been sufficiently validated, the judgment of the parents or teachers, or scholastic attainment?

It must be stated here that in order to meet all these difficulties, prolonged and very extensive investigation and research would be necessary. The attempt has been made here to devise tests of concentration with a recognition at least, if not a solution of, the difficulties involved.

(2) Preliminary set of tests - description and rationale

The measures postulated as tests of concentration are enumerated below in the order in which they were administered.

The 11 Individual Tests were :

(a) Arithmetic Addition Auditory Simple

(b) Arithmetic Addition Auditory Distraction

(c) Memory for Sentences

(d) Arithmetic Addition Visual Simple

(e) Arithmetic Addition Visual Distraction

(f) Card-Sorting

(g) Knox Cubes

(h) Picture-Card Exposure

(i) Digit Span Modification

(j) Memory for Simple Prose

(k) Presentation-Sorting

The 5 Group Tests were :

(a) Instructions

(b) Checking

(c) A- Test Visual

(d) E- Test Auditory

(e) Reading Comprehension

Individual Tests

The four individual Arithmetic tests may be dealt with as a group. First of all, why is Arithmetic Addition postulated as a test of concentration? Rapaport[1] (1945) said of the Arithmetic sub-test of the Wechsler Intelligence Scale as follows :

> Arithmetic is considered here a test of concentration, because, to pass the items of this subtest which ... consist of the four basic calculations, the subject - the average person of our civilization, must utilize patterns of arithmetical relations ingrained in him. He must reflect on and deliver the answers from the patterns that he possesses. Such focussing upon internally or externally, actually or potentially existing patterns

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1. Rapaport, D. op. cit., p. 199.

> to discover and amend them is concentration ... on this level the necessary arithmetic knowledge is so ingrained that merely concentration comes into play in delivering it to consciousness.

This use of arithmetic as a test of concentration seemed to merit further investigation. The four arithmetic tests devised for this piece of research consist of simple Addition sums, the answers to which may be fairly easily realized by the subject, provided that he concentrates on the task. Particular stimuli are presented to the subject who must listen or look carefully, selecting only these stimuli and excluding all irrelevant ones, he must select carefully and his attention must be directed and sustained. The answer to the sum cannot be achieved by a mere repetition of the digits, and reflection on the stimuli chosen is required. Although, according to Rapaport, the presence of time-pressure always emphasizes the role of concentration it was decided to exclude a time-limit in order to facilitate comparison of the four tests with one another. Thus the subject is allowed as much time as he desires but the time taken for each sum and the total time is recorded. Concentration is thus measured indirectly, in either the visual or auditory sphere, by means of the accuracy, that is, the number of sums correct, and the speed, that is, the time taken. The task is considered to demand a high degree of concentration.

According to the norms of the Scholastic Tests used in the Child Guidance Clinic, the addition sums of which are similar to those presented in the tests, a child aged 8 years and 8 months at the end of his second term in Standard I, should be able to complete accurately eighteen sums in five minutes. None of the subjects who took part in the experiment proper obtained results significantly lower than this level, although quite a few did show results significantly higher. Thus the

minimal arithmetical ability was present in all the subjects. The wide range of ability is recognized as a possible objection to the use of Arithmetic as a test of concentration for it may be argued that those with better Arithmetical ability will perform more successfully on the test; however, the difficulties in the way of selection of subjects whose achievement in Arithmetic was comparable and who also possessed all the other qualities necessary for selection were innumerable and insurmountable. Therefore the Arithmetic tests are included as tests of concentration, but it is recognized that it is probably not only ability to concentrate that determines performance.

So much for the general rationale. Four Arithmetic tests were chosen because it seemed desirable to test powers of concentration in the visual and auditory spheres, that is, concentration when looking at and listening to some stimulus. In addition, it was considered useful in certain of the tests to present definite distracting elements, for the ability to perform in the presence of and in spite of distracting influences is considered exteremely relevant and one aspect of the power of concentration. There follows a description of each Arithmetic test of concentration.

(a) Arithmetic Addition Auditory Simple

Description : 18 addition sums each having 3 digits which the examiner reads at an even rate of one digit per second to the subject. If repetition of the digits is necessary the item is considered a failure. Score, which is the number of sums correct and the total time taken for the sums, reflects the level of auditory concentration.

Examiner says : I am going to read some short addition sums to you and you have to add the numbers correctly as fast as you can. You will be able to do the sums in your head and I want you to tell me the answers as soon as you know them. Ready ...

(1)	6 + 9 + 5	(10)	9 + 3 + 8
(2)	6 + 4 + 5	(11)	7 + 3 + 3
(3)	3 + 7 + 5	(12)	7 + 8 + 7
(4)	3 + 5 + 9	(13)	5 + 7 + 5
(5)	4 + 5 + 3	(14)	6 + 7 + 3
(6)	3 + 4 + 8	(15)	5 + 4 + 4
(7)	8 + 4 + 5	(16)	5 + 8 + 3
(8)	3 + 6 + 8	(17)	4 + 8 + 7
(9)	5 + 9 + 5	(18)	7 + 9 + 4

(b) Arithmetic Addition Auditory Distraction

Description : 5 addition sums each having 3 digits which the examiner reads to the subject, each digit being separated from the other by simple questions and comments which are assumed to serve as distractions from the real task. Score is the number of sums correct and the time taken for each sum as measured from the saying of the last word in the sum to the giving of the answer. Concentration in the auditory sphere with the presence of distracting stimuli is measured here. It is true that the distracting stimuli are more or less forced upon the subject for there are many questions, for example, which he has to answer, and these stimuli were specially included in order to draw attention away from the real task. However, the individual with better powers of concentration will be less distracted and will be able to hold in mind more easily the nature of the task, that is, to take note of the digits mentioned, to regard

all other stimuli as irrelevant and worthy only of slight attention, and to arrive at a correct answer to the sum as soon as possible. In addition, the child whose powers of concentration are poor and who is easily distracted, will, it is assumed, have to wait until the end to add the digits and obtain an answer, whereas he who can concentrate will be able to add the digits cumulatively as they are presented. Thus level of concentration will be reflected not only in the accuracy but also in the speed of performance. It is probable too that memory plays a part for the subject may have to remember the numbers over a period of time until the end of the sum; however, memory and concentration are, in any case, closely related and the rôle of memory in this test is considered to be insignificant compared with that of concentration. The number of sums had to be limited because of the practical difficulty of time.

Examiner says : Now I am going to read some numbers to you and I want you to add them correctly as fast as you can. But I wont say the numbers one after the other; I shall ask you other questions and say other things inbetween each number and if I ask you any questions you must answer them immediately. (Examiner demonstrates with the following example -

3 What's your name? ... 1 Where do you stay? ... 2 How old are you? - Answer is 6, because 3 and 1 and 2 make 6).

There will be 5 sums altogether and when I tell you to give me the answer, you must give it to me as soon as you can. Do you understand? Ready ...

(1) Now Name, what class are you in? ... I see. What's your teacher's name? ... 3 What colour are your pants? ... This is really easy, is'nt it? ... 5 Have you any brothers or sisters? ... How many? ... I bet you're never naughty at home. 4 Do you stay near here? ... Did you come by train or by bus? ...
Now, if you can, tell me the answer.

(2) Do you like spinach? ... Pop-eye ate a lot of it, didn't he? ... 4 Are you wearing a jersey? ... You're doing fine so far. Do you think children should read comics? ... 7 How many children are there in your class? Now let's go on. Do you find these questions easy? ... 3 I'm going to ask you a riddle now. What are girls always looking for but hoping they'll never see? ... Ladders in their stockings.
Now give me the answer.

(3) Do you like Arithmetic? ... Do you like going swimming? ... 8 Which beach do you go to in summer? I see. 6 I've got a good joke for you now. Do you know the story of the rotten egg? ... It's stale. 5 Do you like going to school? ... Well, some boys do and others don't.
Now, if you can, tell me the answer.

(4) How many months are there in a year? Do you think Arithmetic should be taught in schools? ... 9 Little Jack Horner sat in a corner. Do you know the next line, yes or no? ... 6 Do you think all this is very babyish? ... Oh, well, next number coming up now 3 Did you know that an elephant never, ever forgets? ...
Now give me the answer.

(5) Do you know my name? ... 7 We're off again now and not much further to go. 5 She sells sea shells on the sea-shore. Wow, that's difficult to say. Have you ever tried to say it? ... 6 I hope you enjoyed all this - we've finished it now. Now give me the answer.

(c) Arithmetic Addition Visual Simple

Description : 18 addition sums each having 3 digits, set down on a sheet of paper which is presented to the subject. Score, which is the number of sums correct and the total time taken for the sums, reflects the level of visual concentration. Examiner starts timing from when the paper is handed out and the subject first looks at it, to the point where he starts to write down the first answer; timing is resumed from when the subject finishes writing down the first answer to the point of starting to write down the second answer, and so on. In both the Visual and Auditory Simple tests, distractions of an "internal" nature may occur, that is, distraction within the individual's mind, for no deliberate external distracting stimuli are presented, as in the Auditory and Visual Distraction tests.

Examiner says : Here is a sheet with some short addition sums on it. You will be able to do the sums in your head and I want you to add correctly as fast as you can. Write your answers clearly next to each sum and work from left to right. Ready ...

5 + 6 + 6 =	5 + 7 + 9 =
7 + 4 + 3 =	4 + 7 + 6 =
8 + 6 + 3 =	4 + 8 + 5 =
5 + 7 + 6 =	6 + 5 + 3 =
7 + 6 + 3 =	3 + 8 + 6 =
3 + 9 + 7 =	6 + 5 + 9 =
7 + 4 + 9 =	4 + 9 + 7 =
7 + 3 + 5 =	3 + 4 + 9 =
5 + 7 + 8 =	6 + 5 + 3 =

(d) Arithmetic Addition Visual Distraction

Description : 18 addition sums, each having 3 digits, presented to the subject on a sheet of paper which is covered with cartoon-like sketches, verbal comments and other miscellaneous doodles. Score is the number of sums correct and the time taken for each sum; this being recorded in the same manner as for the Visual Simple test. Concentration in the visual sphere with the presence of distracting stimuli is measured here, being reflected indirectly in the accuracy and speed of performance. In this test, deliberate visual distracting stimuli are presented to which the subject may either attend or not and which he may either disregard and exclude or not. The test is based on one devised by Ruggles, which is described by Cronbach[1] (1949) as " ... a test of self-control, requiring the pupil to work in the presence of attractive distractions". It is noteworthy that this is characterized as a test of self-control and is included by Cronbach in his section - "Measures of Persistence and Endurance". Strength of motivation and ability to persist; important factors in concentration, must surely play a part in this test.

Examiner says : Here is a sheet with some short addition sums on it and also lots of little pictures and other words on the paper, and you have to add correctly as fast as you can. You will be able to do the sums in your head. Write your answers clearly next to each sum and work from left to right. Ready ...

(See next page for illustration of test)

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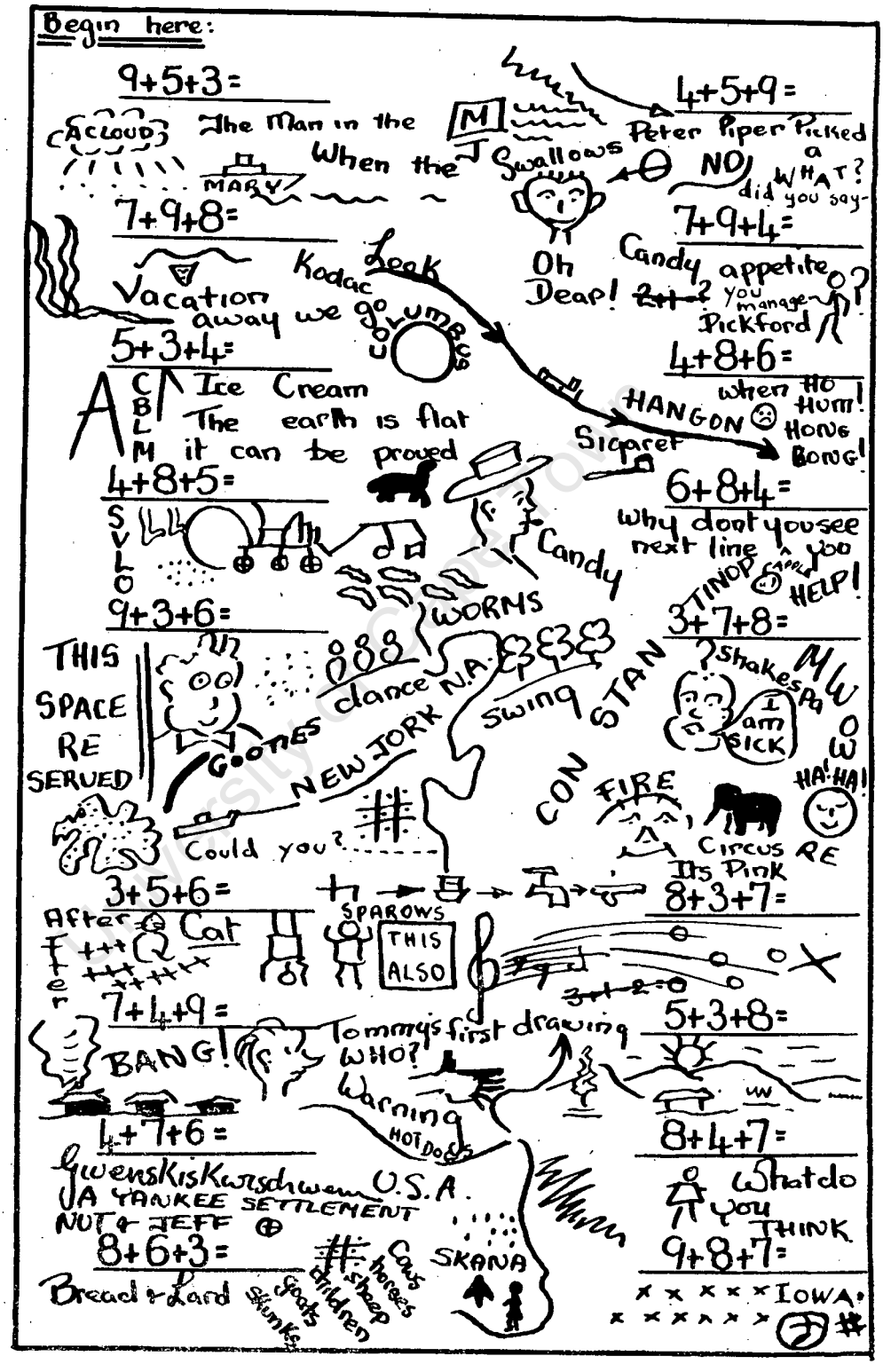
1. Cronbach, L.J. op. cit., pp. 419 - 420.

ARITHMETIC ADDITION VISUAL DISTRACTION



Three other of the individual tests are memory items but are nevertheless included in the attempt to test concentration for the following reason - Concentration and Memory are so closely related in the sense that the former leads to the latter so that a test of Memory may serve as a test of Concentration. This relationship between Concentration and Memory has already been discussed. One may note here William James[1] (1890) statement that " ... an object once attended to will remain in the memory whilst one inattentively allowed to pass will leave no trace behind". James actually says that the immediate effects of Attention are to make one perceive, conceive, distinguish and remember better than one otherwise could and that Attention also shortens the reaction-time. Thus, in the writer's opinion, any test that involves any one of these abilities to a marked degree, should involve the power of attention or concentration to a great extent as well. Memory involves the processes of assimilation, retention and reproduction and, in the writer's opinion, Concentration is important in the processes of assimilation and reproduction.

(e) Memory for Sentences

Description : A sub-test of the Differential Scholastic Tests used at the Child Guidance Clinic consisting of 35 sentences of increasing length which the examiner reads to the subject who has to repeat each one exactly. Any omissions or substitutions are counted as errors. Score is the number of sentences correctly repeated and this is assumed to be an indirect measure of the power of auditory concentration. It is recognized that performance on this test depends also upon capacity for remembering and that this method cannot be said to give a pure measure of concentration. However, as already explained, concentration is so closely related to memory that it may be that 'Memory for Sentences' will serve as a test of concentra-

1. James, W. op. cit., p. 427.

tion, differentiating between lesser and higher degrees of concentration. Concentration is necessary in that the individual must direct and sustain his attention in order for memory to function; thus the content that is absorbed will depend on the degree of concentration, as will reproduction of the content. A possible objection to the test is that the concentration is for short periods of time, ending with the end of each sentence and starting afresh with the reading of another. However, motivation and persistence are necessary for the test is lengthy and the items increase in difficulty. It is suggested that the concentration called for here approximates that necessary in the classroom when the teacher gives a lesson, tells the child something and asks him to repeat that fact; if he has not been concentrating, if irrelevant stimuli have not been excluded, he will be unable to repeat the fact for it has not been assimilated, it has passed unnoticed.

Examiner says : I want you to listen to the sentences I say and to repeat each one exactly after me. (Examiner continues until child fails on five consecutive sentences).

(1) I have a big car.
(2) In winter it rains a lot.
(3) The boy sits on the chair.
(4) We like to go to the park.
(5) His cat plays with the new ball.
(6) My friend was here today, he likes to play with me.
(7) He wants to go for a ride on his big tricycle.
(8) When the bell rings, the children must go out to play.
(9) Mary is going to look for her new penny.

(10) She wants to go for a walk with her little doll.

(11) John brought a strong wheel for his father's motor car.

(12) Fred has no time to help me with my broken spade.

(13) James asked his mother to come with him to the shop.

(14) Jack likes to sail his small boat when he has a bath.

(15) Tom always has a nice time playing with his friend.

(16) They were helping their mother they carried some plants.

(17) We can now begin to play our game, please give us the ball.

(18) George enjoyed himself at the party, he had sweets to eat.

(19) It was raining hard and so he put on his coat and hat.

(20) James has lost his pretty new ball he played with it all day.

(21) Jane asked her Mother to show her how to make a dress for her doll.

(22) John called his brother to tell him to kill the snake in the garden.

(23) Robert has made a strong model out of soft wood with his new tools.

(24) Betty will buy a white kitchen stove with the money she saved.

(25) His son has dug a very deep hole in the sand with his long spade.

(26) It has been a beautiful sunny day, this afternoon we went for a bathe in the dam.

(27) Early in the morning the birds sang merrily in the trees because they were happy.

(28) I expect you tomorrow, Tom, please come early because we leave at once after breakfast.

(29) We had a very fair voyage until we arrived in sight of the most dangerous rocks.

(30) They had eaten their dinner and they intended to sit at the door for an hour or two.

(31) All my fowls have everything they want, said the farmer, they have plenty of good food, fresh air and sunshine.

(32) John was too naughty at breakfast, he grumbled because his porridge was too salty, then he said the bread was too dry.

(33) When he reached the cottage, it was shut up snugly for the night but the people were getting very anxious.

(34) The dog seemed to understand what his master said and at once slackened his pace, keeping close beside the man.

(35) One very hot afternoon after a good dinner of fish, he was dozing there when he was disturbed.

(f) Memory for Simple Prose

Description : A short passage which the child has to read silently, then relating all that he has read that he can remember. Score is the number of facts correctly remembered. This is a test of visual concentration, the processes involved corresponding with those acting when the child has to read a passage silently in class and then answer questions on it or learn its content. This ability is essential in the learning of the "content" subjects and in the comprehension of reading material. The difference between a mechanical reading of words and a meaningful comprehension and retention of what is read has already been described. It is all too easy for day-dreaming or lack of concentration to occur in reading, manifesting itself in the inability to sustain and direct attention and to exclude irrelevant stimuli. Level of Motivation also is important in determining whether the passage will be read in a mechanical, inattentive and haphazard manner or whether it will be read carefully and with concentration. The test is a sub-test of the Stanford-Binet Intelligence Test found at the ten-year level. As with the 'Memory for Sentences' test, it may be said that the test also measures memory, and as with the Arithmetic tests, it may be argued that performance on this test

depends at least in part upon reading ability.

Examiner says : I am going to show you a card with a short story written on it. I want you to read it through once to yourself, just once and then put it down. (After reading the passage, the subject is asked to relate what he has read. Memories are scored according to the sections marked in the passage below.

Johannesburg, 5th September
/A fire/last night/burned/some houses/
/near the centre/of the city./It took
some time/to put it out./The loss/
/was fifty thousand/pounds/and 17/
/families/lost their homes./In saving/
/a girl/who was asleep/in bed/ a
fireman/was burned/on the hands/.

(g) Digit Span Modification

Description : 8 series of digits, each of which the examiner reads to the subjects at the rate of one digit per second, the subject having to repeat all the numbers read which were bigger than the number five. The test is based upon the 'Digit Span', a sub-test of the Wechsler-Bellevue Intelligence Scale. Rapaport[1] (1945) describes the test, on the basis of his clinical results, as a test of attention, rather than of memory. The test as used here is modified by making it necessary for the subject to discriminate between the digits and to select certain of the digits and not others - thus performance should be

1. Rapaport, D. op. cit., p. 179.

more dependent on auditory concentration than on attention. Score is the number of digits correctly repeated. The subject has to listen carefully and keep in mind the nature of the task, making the correct discriminations and excluding certain numbers.

Examiner says : I am going to say some numbers. Some of them will be bigger than the number 5, others will be smaller. When I have finished saying them, I want you to repeat to me only the numbers which are bigger than the number 5. For example, if I say 6-2-8, you must say only the numbers 6 and 8, because only these two numbers are bigger than 5. Do you understand? Ready? ...

(1) 1 - 7 - 9

(2) 6 - 4 - 7 - 1

(3) 5 - 6 - 4 - 2

(4) 8 - 3 - 6 - 7 - 5 - 1

(5) 3 - 7 - 9 - 2 - 8 - 6

(6) 4 - 2 - 9 - 1 - 6 - 3 - 8

(7) 1 - 3 - 4 - 5 - 2 - 4 - 1 - 3

(8) 6 - 1 - 4 - 3 - 5 - 7 - 2 - 1 - 5

(h) Picture-Card Exposure

Description : A card with 20 pictures of objects is presented for 30 seconds to the subject who is told that at the end of that period he will be asked to state all the objects on the card that begin with a particular letter of the alphabet, for example C. The card is planned so that 10 objects should begin with that letter. Thus the score is the number of objects correctly remembered. Performance on this test depends upon memory, keen visual observation and discrimination and concentration. James' explanation that one of the effects of concentration is to distinguish and to remember has

already been referred to. Concentration in the visual sphere is necessary here, for the subject, under pressure of a time-limit, must direct his attention to specific stimuli and select out of a large number only that group which is relevant, keeping in mind the criterion of relevancy of the stimuli.

Examiner says : I am going to show you a card with a lot of pictures drawn on it. When I take it away I want you to tell me what the things were on the card that began with the letter C, like cucumber. Ready.

(See next page for illustration of test)

(i) Knox Cubes

Description : Examiner places 4 one-inch cubes in front of the subject in a straight line and taps them in a certain order with a fifth cube. The subject then has to tap the cubes in exactly the same order. There are 10 series of presentation altogether and the score is the number of series correctly performed. Here performance is dependent on memory, visual perception, discrimination and concentration. The subject has to watch very carefully what the examiner does in order to recall the correct order of tapping the cubes. The slightest shift of attention or lessening of concentration and inclusion of other stimuli or failure in discrimination will result in incorrect performance. This test is based on the sub-test of the same name in the Stanford-Binet Intelligence Scale.

Examiner says : I want you to tap these little blocks in exactly the same way as I do, so watch me and then you do it for me.

(1) 1 - 2 - 3 - 4

(2) 1 - 2 - 3 - 4 - 2

(h) Picture-Card Exposure

(3) 1 - 3 - 2 - 4

(4) 1 - 4 - 3 - 2

(5) 2 - 3 - 4 - 1

(6) 1 - 3 - 2 - 4 - 3

(7) 1 - 3 - 4 - 2 - 3

(8) 1 - 3 - 2 - 4 - 1 - 3

(9) 1 - 4 - 3 - 1 - 2 - 4

(10) 2 - 3 - 1 - 2 - 4 - 2

(j) Card-Sorting

Description : A set of 100 2-inch cards, divided into 4 groups of 25 cards each on the basis of 4 different inscriptions on the cards - W4204, V4204, W2204 and V2204. These are presented to the subject in a standard, well-shuffled order with the instruction to sort them as quickly and as carefully as possible into the four separate groups. A time-limit of 3 minutes is imposed. Thus, lack of concentration will manifest itself in the accuracy of sorting, that is, the number of errors. The subject must employ visual concentration in order to observe carefully and differentiate between the cards, the distinguishing features of which are very similar to one another; the nature of the task must be kept clearly in mind. The test is similar to the 'Laundry-Sorting' Test used by the National Institute of Industrial Psychology. The weakness of this method lies in its partial dependence upon the manipulative dexterity of the individual.

Examiner says : Here are 100 cards, all mixed up. 25 have W4204 written on each of them, 25 have V4204, 25 have W2204 and 25 have V2204 written on each of them. I want you to sort them as quickly and as carefully as you can into 4 groups - all those of the same kind must be put in one pile. So you will have 4 piles altogether at the end, 1 pile for each kind. (Examiner demonstrates with 4 cards) Do you understand? ... Ready ...

(k) Presentation-Sorting

Description : 20 cards which are presented to the subject momentarily by means of a tachistoscope-type apparatus. These cards are inscribed in three different ways and the subjects response will differ according to the inscription on the card - this response is to put a blank card in one of three boxes, either the middle, left or right one. Score is the number of correct responses made or the number of errors, and the test attempts to measure visual concentration. Memory, rapid and keen observation and discrimination are all important factors. Concentration must be active and attention well-directed and sustained the whole time in order to ensure correct selection of response and clarity of the visual perception and in order to avoid confusion. The test is similar to those measures using a tachistoscope which Whipple[1] (1924) describes; however, the task is more complicated for the subject has not merely to observe each card carefully and recall its inscription but also to distinguish between a number of responses that may be made, thus relating inscription to response. Earle[2] (1931) raises the objection that the instantaneous exposures of the tachistoscope are not sufficiently like the practical procedures of everyday life to give much help in problems arising out of these.

Examiner says : I am going to show you some cards through this little window. Each card will have either a letter and a number, 2 letters or 2 numbers written on it. Here are some plain white cards in front of you. Each time

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1. Manual of Mental and Physical Tests, Part I.

2. Earle, F.M. "Tests of Distributed Attention". Br. J. Psychol., Vol. 21, 1931, pp. 215 - 241.

I show you a card with 2 letters of the alphabet on it, like A and B, you must put a white card into the box on the left; if I show you a card with 2 numbers on it, like 3 and 6, you must put a white card into the middle box, and if I show you a card with a letter and a number on it, like H and 4, you must put a white card into the box on the right. (Examiner demonstrates with a number of cards). Do you understand? ... Ready ...

Material : Tachistoscope apparatus, 20 white 2-inch cards numbered on the back to aid scoring, 3 square cardboard boxes and 20 white 2-inch cards inscribed in the following way:

(1)	XM	(11)	NT
(2)	63	(12)	Y2
(3)	LB	(13)	43
(4)	R4	(14)	RJ
(5)	25	(15)	D2
(6)	QK	(16)	N8
(7)	B2	(17)	TT
(8)	84	(18)	F6
(9)	59	(19)	G7
(10)	A7	(20)	HS

In scoring, the blank cards which the subject sorts have been numbered on the back, so that a mark is given for each card in the boxes as below :

Left box: Card number 1 3 6 11 14 17 20 - 2 letters

Middle box: Card number 2 5 8 9 13 - 2 numbers

Right box : Card number 4 7 10 12 15 16 18 19 - a letter and a number.

Group Tests

Ideally, the group tests of concentration should correspond to those that are administered individually in order that performance can be compared in both cases. However, this involves so many variations that the number of tests would have been far too numerous for this piece of research. Therefore 5 tests were chosen which would be easy to administer in a group and which would attempt to measure concentration. Although group tests may approximate more closely the class-room conditions in which the child is normally, the writer considered it more important to have more individual tests because if the results of the research should prove worthy of application, it would be probably to individual children who were referred to the Clinic, and not to a group. In each of the group tests, external distractions from persons around one may be particularly dominant.

(a) Instructions Visual

Description : 10 statements presented to the subject visually on a sheet of paper, each of which has to be read carefully and comprehended if the subject is to perform correctly the instruction contained in the statement. The items call for simple reasoning which is within the subject's ability provided that he concentrates. He should not find the statements difficult to read but will understand the instruction only if he suppresses all irrelevant meanings and responses to the words. The concentration called for here is that necessary in reading when the subject must not merely read and articulate words mechanically but also respond according to his comprehension of the material read. A time-limit of 3 minutes is given so that all subjects can begin and end at the same time, the administration therefore being identical for everyone. Ability to concentrate is therefore reflected in the number of items

completed and in the accuracy of performance. The test is a sub-test of the Columbian Mental Tests described by Ballard[1] (1934).

Examiner says : The sheet in front of you has some sentences written on it. Each sentence you read will tell you to do something with your pencil on the paper. Do this in the empty space after each sentence, for example, if you are told to write 1 2 3 4 5, then you must do that. If there is somthing that you cannot do, leave it out and go on to the next sentence. Write clearly and go on till I tell you to stop. Do you understand? ... Ready ...

(1) If a square is rounder than a circle, draw a circle in a square; if not, draw a square in a circle.

(2) Make a circle. In it put a W; outside on the right put a T, and on the left of the circle put a C.

(3) Write the capitals XYZ in a row. If eight is less than three, cross out Z; if not, draw a line under X.

(4) Draw three crosses in a row. Join the first with the last by a line which passes above the middle one.

(5) Draw side by side a triangle, a circle and a square. In the triangle put the letter T, in the circle put nothing, and in the square put any number that is the wrong answer to the sum two times four.

(6) There are seven boys and twelve girls in a room. If there are more boys than girls, write boys on the line below, but if there are more girls than boys, write girls on the line below.

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1. Group Tests of Intelligence, p. 104.

(7) Below are three lines. If the middle line is the longest, put a cross after the last line. If the last line is the longest, put a cross after the first line. If the first line is the longest, put a circle in front of the middle line.

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(8) Draw a square unless there are more days in the week than there are weeks in a month, in which case draw a circle.

(9) Write down the number of letters in the fourth word in this sentence. unless a cow is bigger than a rat, in which case write the word 'Rat'.

(10) If you would rather have a pound than a little stone, don't put a line under pound, but if you would rather have a pound than a pencil, put a line under stone.

pound stone

(b) Checking

Description : 42 items presented to the subject visually on a sheet of paper, the subject having to check each one and mark those in which errors are found. The items have been constructed so that 21 of them contain errors. The test is based on the Clerical "Checking Test", a sub-test of Group Test 25 of the National Institute of Industrial Psychology. Accurate performance on this test necessitates very close and sustained visual observation in order to perceive errors. As the perception of similarities

and differences may be said to depend upon concentration, thus concentration may be measured here by means of the accuracy and speed of the perception or observation. Thus the score is the number and accuracy of the items completed within a time-limit of 3 minutes. Memory does not enter here as the items of the test are constantly in view, and no special knowledge is required in order to interpret the object of the attention.

Examiner says : The sheet in front of you has 3 columns. The name and numbers in Column I have been copied over into Column II but some mistakes have been made in the re-copying. There can be mistakes in any of the names, numbers or titles. Look at the first two lines which have been done as examples for you. (Examiner explains these to the subjects). Put a cross next to each line in Column III if you find a mistake, and a tick or correct sign if it is quite right. Go on working until I tell you to stop. Do you understand? ... Ready ...

(See next page for illustration of test).

A-Test Visual and E-Test Auditory may be considered together. These are the cancellation tests which Pillsbury[1] (1908) regards as the most satisfactory of his first category of tests. Whipple[2] (1924) states that the cancellation test is a continuous task assigned under such conditions that maximal attention is demanded for the best work and that any reduction of attention is reflected directly in the speed or accuracy of the work. It was this rationale for the test given by Whipple that resulted in its inclusion in the battery as a method of measuring concentration. Here the subject must hold in attention the problem

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1. Pillsbury, W.B. op. cit., pp. 87 - 88.
2. Whipple, G.M. op. cit., p. 309.

CHECKING

COLUMN I	£. s. d.	COLUMN II	£. s. d.	COLUMN III
Miss Mary Lewis ...	5. 2. 3.	Miss Mery Lewis ...	5. 2. 3.	x
Mr. T. Book	6. 2.	Mrs. T. Book	6. 2.	x
(1) Mr. Tom Roberts ...	12. 2. 5.	Mr. Tom Roberts ...	12. 2. 5.	✓
(2) Mrs. B.S. Bon	43.18. 2½	Mrs. B.S. Ben	43.18. 2½	x
(3) Mr. Harvey	6. 7.	Mrs. Harvey	6. 7.	x
(4) Miss K. Davis	3. 3. 0¼	Miss K. Davies	3. 3. 0¼	x
(5) Mr. Harold Dixon .	127.19. 7.	Mr. Harold Dixon .	127.19. 7.	✓
(6) Mr. Snitcher	2. 6.	Mr. Snitcher	2. 6.	✓
(7) Mrs. Valentine	59.19. 0½	Mrs. Valentine ...	59. 9. 2.	x
(8) Miss A. McNab	8. 6. 8.	Miss A. McNab	8. 6. 8.	✓
(9) Mrs. T. Herne	122. 8. 3¾	Mrs. T. Herne	122. 8. 3½	x
(10) Mrs. Belinda	7. 2.	Mrs. Belinda	7. 2.	✓
(11) Mr. S. Higson	10. 0.	Mrs. S. Higson ...	10. 0.	x
(12) Mr. M. Stephen	344.17. 4.	Mr. M. Stephan ...	344.17. 4.	x
(13) Miss Brown	11. 9. 3.	Miss Brown	11. 9. 3.	✓
(14) Mr. Johnson	1. 0. 9½	Mr. Johnson	1. 0. 9½	✓
(15) Mr. K. Holmes	18. 2.	Mr. K. Holmes	18. 2.	✓
(16) Mr. Will Smythe ...	26. 5. 2.	Mr. Will Smithe ...	26. 5. 2.	x
(17) Mrs. H.M. Hall ...	2. 7. 8.	Mrs. H.M. Hall ...	2. 7. 8.	✓
(18) Miss B. Dome ...	13..4. 3.	Miss B. Dome ...	13. 3. 4.	x
(19) Mr. Sidney Harper ..	5.15. 1¼	Mr. Sidney Harper ..	5.15. 1¼	✓
(20) Lady Lewes	96. 6. 5.	Lady Lewes	96. 6. 5.	✓
(21) Miss Tomkins	17. 3. 0.	Miss Tomkins	17. 3. 9.	x
(22) Mrs. K.R. Hutchins .	3. 0	Mrs. K.R. Hutchins .	3. 0.	✓
(23) Mr. Sanders	75. 5. 7¾	Mr. Sanders	75. 5. 5¾	x
(24) Mr. Claude Franks ..	5. 8. 5.	Mr. Claud Franks ..	5. 8. 5.	x
(25) Miss Longdon	6.14. 3.	Miss Longdon	6.14. 3.	✓
(26) Miss White	18. 1.	Miss White	18. 1.	✓
(27) Mr. A. Taylor	9. 0. 4½	Mr. Taylor	9. 0. 4½	x
(28) Mrs. Jenkins	20.14. 3.	Mrs. Jenkens	20.14. 3.	x
(29) Mr. . N. Grover ...	5. 8.	Mr. N. Grover ...	5. 8.	✓
(30) Mrs. H. Sacks	143.12. 9¾	Mrs. Sacks	134.12. 9¾	x
(31) Miss Betty Price ...	17. 6.	Miss Betty Price ...	17. 6.	✓
(32) Mr. Rubin	3. 7.	Mr. Rubin	3. 7.	✓
(33) Miss G. Sutin	125.11. 8¼	Miss G. Sutin	152.11. 8¼	x
(34) Mr. Hains	7. 4. 0½	Mr. Heins	7. 4. 0½	x
(35) Mr. Lex Barker ...	19. 9. 9.	Mr. Lex Barker	19. 9. 9.	✓
(36) Miss Glass	3¾	Miss Class	5¾	x
(37) Mrs. R. Hall	10. 0. 7.	Mrs. R. Hall	10. 0. 7.	✓
(38) Mr. M. Wilson	15. 4¼	Mr. N. Wilson	14. 5¼	x
(39) Miss Winters	198. 9. 6.	Miss Winters	189. 9. 6.	x
(40) Miss Clarkson	6.	Miss Clerkson	6.	x
(41) Mr. J. Sorin	31. 6. 5.	Mr. J. Sorin	31. 6. 5.	✓
(42) Mrs. Ender	10. 9.	Mrs. Ender	10. 9.	✓

assigned to him, he must discriminate carefully and keep in mind the particular letter to be cancelled and what is to be done with it. A probable objection to the test is that a time-limit or limitation of the length of the test has to be imposed in order to facilitate group administration - thus conscientiousness and ability to persist, the non-intellectual factors present to which certain writers have objected but which are considered here to be extremely relevant in concentration, are not measured to their utmost. In addition, the visual and auditory forms of the test, as used here, are not strictly comparable, for the number of items done is different in each case as is the rate of performance; in the visual form the material is constantly in view and the subject sets his own pace whereas in the auditory form the material is of course not in view and the examiner sets the pace by reading aloud each letter. In the A-Test Visual, the subject must observe and discriminate carefully and work as quickly as possible, concentration being reflected in the accuracy and speed of performance. In the E-Test Auditory, the subject must listen very carefully, making auditory discrimination, concentration being reflected only in the accuracy of performance. However, in the auditory form motor quickness also enters for if the subject does not respond sufficiently quickly, he is unprepared for the presentation of the next stimulus by the examiner. This test may also be objected to on the grounds that it is concenned with mechanical and meaningless activities which are rather unrelated to the activities in the school in which the child has to participate.

(c) A-Test Visual

Description ; 10 rows of letters of the alphabet, 20 in a row, are presented to the subject visually on a sheet of paper, the subject having to mark each A with a plus sign and all other letters with a subtraction sign. A time-limit of 1 minute is imposed. Score is the number and accuracy of the letters cancelled.

Examiner says : The sheet in front of you has a whole list of letters of the alphabet. I want you to put an 'add or plus' sign under each A that you see, and a 'take-away' sign underneath all the other letters. Go on working till I tell you to stop and work across each row from left to right, finishing one row before you go on to the next. Look first at the examples at the top of the page - only the A's have plus signs underneath them, all the rest have take-away signs. Now do the rest of the examples. Do you understand? ... Ready ...

Example : M N A R P A L D G A Y R A N
- - + - -

O Y K A F I U D B H Y A G D A R C D I X

A M R R P A G O Z T A M C V A O W L Y X

B A N T H J B A N E L F A L M E A P C B

S V S K A L R P H A N R N P K A Z R J A

C I N E V B G A O F H A R P V E J C T O

Z A P J L E G W N A H R B U I A S S N Z

M W A R D W H A C A X H X O A X T D P U

T Y G S K A V K V L G K A M R N F V O F

A L K Y A F G T M B L Y Z I J A D V A V

A C X A T D V D A C J S I A F Y R O N O

(d) E-Test Auditory

Description : 5 rows of letters of the alphabet, 20 in a row are read to the subject at the rate of one per second, the subject having to record on a sheet of paper a plus sign for each E that he hears and a minus sign for all the other letters he hears. The examiner pauses at the end of each group of 20 letters to ensure that all subjects start the correct row. Score is the accuracy of the letters cancelled.

Examiner says : The sheet in front of you has 5 rows of numbers, 20 in each row, going right up to 100. I am going to read to you a whole list of letters of the alphabet. Each time you hear the letter E, you must put an 'add or plus' sign underneath the number you are on. For all the other letters you hear, put a 'take-away' sign underneath the number for each letter. Work across each row from left to right and if you miss one number, leave it and go straight on to the next one. I shall stop at the end of each row for a second or two and tell you which row we are doing next. Here are a few for you to try now - I shall read the letters and you put the right signs underneath the numbers in the example - (Examiner reads the following letters B E F R J L E N R E, subjects complete the example and the examiner checks). Do you understand? ... Ready ...

J E C I N E V B E A O F H A R L V J C T

E Z A P J L E Q W N E H R B U I A S E S

N Z E A E R D W H N C E X H X Q E R D P

U E Y G S K E V K V L E K I M R E F V A

F L K E Y F G R M T B L Y Z I J E D V Y

The subjects' paper is marked in the following way :

Example : 1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

(e) Reading Comprehension

Description : 12 short stories which the subject has to read, his response being dependent on his comprehension of the story. This is part of the Gates Silent Reading Test, Type A, which is described as a test of "Reading to Appreciate General Significance". The subject must concentrate visually on reading-material, inhibiting all irrelevant responses and excluding all irrelevant stimuli. A time-limit of $3\frac{1}{2}$ minutes is given, and score is the number of stories read and the accuracy of the responses; thus, both speed and accuracy will reflect the level of concentration.

Examiner says : Here are a number of short stories on this sheet of paper. Below each story are 5 words - one of the words tells correctly how some one described in the story feels - sad, or happy or cross, or anything. You should draw a line under that word, the right word. In each story, only one word out of five is the right answer. Now let us all try the first story (subjects read the story and the examiner discusses the correct answer with them). When I say 'begin', start reading the stories, each time underlining the word that tells best how the person in the story feels. Go on working till I tell you to stop. Do you understand? ... Ready ...

Example

Once upon a time a young fairy went down to the river to swim. She jumped in with a splash. She put out her hands and tried to swim. Something seemed to be dragging her down. Oh, it was her wings! She had forgotten to take them off. Fairy wings become heavy when they are wet. She cried for help as loudly as she could.

Draw a line under the word that tells best how the fairy felt.

cross angry tired afraid joyful.

(1) The children waited on the dock. The big ship was coming up the river. Its flag was flying in the wind. Slowly it came nearer and nearer. Now the children could see the people on the decks. They tried hard to see if they could find their father. Suddenly they saw him on the deck. They waved their hands to him and he waved back.

Draw a line under the word that tells best how the children felt.

sad afraid angry joyful worried.

(2) The little kitten was so cold! The wind blew around him and the snow fell on him. Suddenly the kitten heard a thud, thud along the street. A market boy was going by with a basket on his arm. He saw the cold little kitten. He picked him up and put him in his market basket. Soon the kitten was in a nice warm store. He purred loudly.

Draw a line under the word that tells best how the little kitten felt in the store.

angry sad afraid happy cross

(3) Tom and Betty had been walking a long way. It was hot and they were tired. Suddenly they came to an old house. In the front yard were two trees that made a lovely cool shade. Betty saw an old woman in the doorway. She asked timidly, "Please, may we rest under the trees?" "No", replied the old woman. "If you do, I'll set my dog on you!"

Draw a line under the word that tells best what kind of old woman Betty saw.

playful joyful homesick cross happy

(4) The feathered folk in the henhouse seemed cross and fretful. It is no wonder they felt that way, for they had had nothing to eat or drink since early in the morning. The fine-looking white rooster, however, seemed as happy as usual. That is saying a great deal. A jollier old fellow than he never lived in the farmyard.

Draw a line under the word that tells best how the rooster felt.

hopeful sad joyful anxious afraid.

(5) Betty loved her canary very much. He always sang when she came near and would eat sugar from her lips. Now he was sitting on his perch with his head on one side. When Betty came near he did not even raise his head. She put sugar on his lips but he would not go near it. Betty did not know what to do. If only she could help him!

Draw a line under the word that tells best how Betty felt.

angry joyful worried homesick happy

(6) The children had had a little red and white goldfish. They had fed him every day with his little white crackers. They had changed the water in his bowl, too, and were careful to see that he had plenty of green things. Now he was dead. The children stood around the bowl and the youngest one was crying.

Draw a line under the word that tells best how the children felt.

excited homesick sad playful happy

(7) Betty had gone shopping with mother for a whole morning. She had looked and looked at all the pretty things until her eyes ached. Then her feet began to drag behind her. She found that she could hardly lift them from the floor. She saw a nice soft chair over in one corner. Stumbling over to it, she sank down with a deep sigh.

Draw a line under the word that tells best how Betty felt.

hopeful tired happy playful afraid

(8) Ruth stood in front of the big Sunday School Chirstmas tree. Everybody else was getting presents. They were showing them to their friends and laughing and talking. Suddenly she felt someone press something in her arms. Ruth looked down and there was a beautiful doll with golden curls. She hugged it tightly to her and smiled at everyone.

Draw a line under the word that tells best how Ruth felt after she got the doll.

afraid sad happy homesick worried

(9) Jim could hardly believe his eyes. There was a little puppy before him and his father said it was his very own. The puppy was jumping up and down, rolling his eyes at Jim. Jim could wait no longer. Away they ran! The little dog leaped on ahead toward the woods. Now and then he would run back and bite at Jim's heels in fun.

Draw a line under the word that tells best how the puppy felt.

afraid sad cross tired playful

(10) Tom and Mary were going to sell lemonade to people who passed in motor cars. Mary rushed in the house to get the lemons and glasses from mother. Tom ran over to the tap to get some cold water. They both worked fast until all was ready. They could hardly wait for the first car to stop and buy their "Ice Cold Lemonade".

Draw a line under the word that tells best how Tom and Mary felt.

sad angry excited tired afraid

(11) Ben was a city boy who had never been to the country. He had lived all of his short life in city streets. One summer some friends took him to the country. He was shown the animals, the meadows and the woods. He looked at them all in silence. Suddenly he looked up with tears in his eyes and asked, "But where are the streets to play in?"

Draw a line under the word that tells best how Ben felt.

excited homesick happy joyful weary

(12) The children dug in the sand awhile. Suddenly one of them said, "Oh, let's make a tunnel!" Down they went on their hands and knees and began to dig in the sand near the water's edge. Soon they had two holes which almost met. "Now for the last bit", they shouted. Soon the tunnel was made. They sat back and laughed with joy.

Draw a line under the word that tells best how the children felt.

sad afraid angry happy cross

This, then, is the set of tests of concentration postulated. They are not, by any means, regarded as wholly satisfactory; the attempt to devise tests of concentration has at

least served to clarify and make known the numerous difficulties that arise in practice and that must be tackled in further studies dealing with the same problem.

(3) Determination of Validity of Tests

(a) Procedures

The set of tests of concentration had then to be administered to two groups of children, good and bad concentrators, in order to determine their significance. The co-operation of the staff in one school was obtained and the teachers were requested to offer the names of children aged ten or eleven years who had either good powers of concentration or who lacked concentration and whom they thought to be at least average in intelligence. Recognition must be made of the great difficulty in selecting a suitable and valid criterion of level of concentration. However, no choice or alternative was available and it was necessary to rely on the judgment of the teachers, the absolute reliability of which may be doubted.

All the investigations to test the validity of the tests of concentration were carried out at this one school in a special room provided by the principal. The class teachers were asked to describe briefly the level of concentration of each child and to give their opinion of the child's standard of work according to his position in the class - either average, bottom or top categories. An economical and reliable measure of intelligence had to be obtained, and for this purpose, a number of tests were selected for administration. Two sub-tests of the Wechsler Intelligence Scale for Children were employed because, according to Wechsler[1] (1949) they showed the highest correlations of all the single tests with the Full Scale Score, for 100 boys and 100 girls aged ten years;

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1. Wechsler Intelligence Scale for Children, Manual, p. 11.

Vocabulary showed a correlation of .87 and Information one of .82. Three sub-tests of the Differential Intelligence and Scholastic Tests of the Child Guidance Clinic[1] were also administered, in a group form - these were Mazes, Anagrams and Dissected Sentences. The average of the age norms on all these tests was taken to obtain a mental age and intelligence quotient for each child; this gave a rough measure of intelligence.

The tests of concentration were to be administered to ten bad and to ten good concentrators, on the assumption that if the test really did measure concentration, then good concentrators would achieve better scores than the bad concentrators. Because of the limitation in time, it was found possible to use only ten bad concentrators and seven good concentrators.

Presented below in tabular form are the results of all the investigations mentioned above. The children have been labelled numerically and their ages, standards, intelligence quotients based on the five tests administered and their positions in class are all given, as well as a very brief description by the class teachers of their powers of concentration.

BAD CONCENTRATORS

NUMBER	AGE	STD.	I.Q.	POSITION IN CLASS	DESCRIPTION BY CLASS TEACHER
1	10¾	II	101	Average	Concentration very poor. Child plays the fool, day-dreams a lot, seems timid.

1. Differential Intelligence and Scholastic Tests of the Child Guidance Clinic Manual.

BAD CONCENTRATORS

NUMBER	AGE	STD.	I.Q.	POSITION IN CLASS	DESCRIPTION BY CLASS TEACHER
2	10½	II	103	Bottom	Concentration bad. Child cannot listen, wanders around, does not seem to hear what is going on in class.
3	10½	III	106	Average	Attention-span very short. Child is lazy and has to be reprimanded and instructed to work continually.
4	10½	III	104	Bottom	Concentration very poor. Child is very fidgety, cannot sit still for five minutes and daydreams a lot.
5	10½	III	100	Bottom	Concentration very weak. Child seeks attention and plays around too much.
6	10½	III	118	Top	Child plays around and shows off, always wants to gain attention from the class and teacher, cannot work quietly.
7	11½	IV	106	Average	Concentration very poor, almost non-existent. Child plays the fool, always tries to attract attention, cannot sit still.
8	11½	IV	107	Average	Concentration poor. Child is very restless, fidgety and plays the fool.
9	11½	IV	100	Bottom	Child dislikes schoolwork intensely, always seeks attention and cannot sit still; is impudent and cheeky. Concentration very bad.
10	11½	IV	128	Top	Child is very intelligent but unable to concentrate, and is very mischievous. Resents authority. Has nervous mannerisms.

GOOD CONCENTRATORS

NUMBER	AGE	STD.	I.Q.	POSITION IN CLASS	DESCRIPTION BY CLASS TEACHER
1	11 6/12	II	107	Average	Work fair. Child is interested and tries hard.
2	10 10/12	III	95	Average	Good concentration. Child is keen to do well.
3	10 8/12	III	100	Average	Very hard worker. Work only fair but child's concentration is good.
4	10 8/12	III	103	Top	Good concentration. Child likes school work and always does as well as he can.
5	11 3/12	IV	113	Average	Concentration good. Child is very attentive and tries hard.
6	11 3/12	IV	104	Average	Child works well, is interested and attentive.
7	10 3/12	III	140	Top	Very good concentration and work.

(b) Statistical operations

Both the individual and the group tests of concentration having been administered as described above, their significance or validity had then to be determined by means of statistical operations. As the subjects were not ranked in any way according to intelligence and as level of intelligence might very well influence performance on the test, this fact had to be taken into account and the correlation between the scores on each test and the intelligence quotients of all the subjects had first to be determined. For this purpose, the product moment correlation coefficient for intelligence and scores on the tests of concentration was computed.

Following on this, a t formula was employed to test the null hypothesis, namely, that there is no difference between the scores obtained on the proposed tests of concentration by 'bad' concentrators and those obtained by 'good' concentrators. Since a correlation coefficient of .45 is significant at the .05 level for seventeen cases[1] (1956), r was used in the calculation of t only when it was .45 or more.

Where r was used, the following formula was employed :

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 3}\left(1 - r^2_{xy}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

Where r was not used, the formula employed was :

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

With the use of tables, the p values which corresponded to the computed t values were found.

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1. Edwards, A.L. Experimental Design in Psychological Research p. 408. Table VI. Values of r at the 5 and 1 Per Cent Levels of Significance.

(c) Results and Interpretation

The scores obtained on the group and individual tests by the 10 'bad' and 7 'good' concentrators are presented below in tabular form (see Table II).

TABLE II

VALIDITY OF TESTS

SCORES OF 10 BAD AND 7 GOOD CONCENTRATORS

ARITH. ADDITION AUDITORY SIMPLE		ARITH. ADDITION AUDITORY DISTRACTION		ARITH. ADDITION VISUAL SIMPLE		ARITH. ADDITION VISUAL DISTRACTION	
Total Time	No. Correct	Total Time	No. Correct	Total Time	No. Correct	Total Time	No. Correct
97	13	37	1	172	10	202	15
234	12	46	0	199	16	212	17
72	18	23	2	151	16	231	18
43	11	32	1	82	18	126	18
91	17	8	3	143	17	177	18
91	14	6	3	119	15	107	17
73	13	10	1	118	18	134	17
59	14	8	2	84	16	99	16
73	11	13	0	112	18	191	17
38	15	3	2	108	17	136	17
104	16	19	4	136	16	141	18
89	17	20	2	127	17	144	18
37	18	8	4	72	18	97	18
73	18	29	1	136	18	168	17
47	16	9	4	139	17	195	18
64	15	2	5	91	16	94	17
53	18	20	4	62	18	97	18

KEY :

Black Digits = Scores of Bad Concentrators

Red Digits = Scores of Good Concentrators

Total Time in Seconds

TABLE II (Continued)

VALIDITY OF TESTS

SCORES OF 10 BAD AND 7 GOOD CONCENTRATORS

MEMORY FOR SENTENCES	CARD SORTING	KNOX CUBES	PICTURE CARD EXPOSURE	DIGIT SPAN MODIFICATION	MEMORY FOR SIMPLE PROSE	PRESENTATION SORTING	E-TEST AUDITORY
No. Correct	No. Errors	No. Correct	No. Correct	No. Correct	No. Memories	No. Errors	No. Errors
23	1	3	5	7	6	2	5
15	30	3	2	5	8	14	0
26	2	5	5	7	7	3	12
16	35	5	4	8	10	1	4
24	1	4	4	8	7	2	3
22	8	3	4	8	15	2	1
9	3	5	6	8	0	11	2
22	1	6	8	6	6	4	24
17	51	1	5	5	11	9	17
18	6	5	5	6	9	12	0
27	2	8	4	8	9	0	3
24	2	7	5	6	12	3	10
21	45	6	5	8	5	2	0
22	2	7	3	8	8	3	0
18	2	5	4	8	6	9	12
21	5	5	5	7	14	0	7
27	2	7	6	8	16	0	10

KEY : Black Digits = Scores of Bad Concentrators

Red Digits = Scores of Good Concentrators

Total Time in Seconds.

TABLE II (Continued)

VALIDITY OF TESTS

SCORES OF 10 BAD AND 7 GOOD CONCENTRATORS

INSTRUCTIONS		CHECKING		A-TEST VISUAL		READING COMPREHENSION	
No. Done	No. Errors	No. Done	No. Errors	No. Done	No. Errors	No. Done	No. Errors
4	1	12	3	65	0	6	0
3	2	17	4	76	0	7	1
5	1	16	4	66	0	3	0
5	2	21	3	65	1	9	3
4	1	12	5	80	0	4	1
8	0	16	1	78	0	6	1
7	1	24	2	120	0	12	1
7	0	23	2	115	1	9	0
4	2	21	8	87	4	7	0
7	2	24	4	74	0	11	1
4	1	24	10	65	1	6	0
5	1	18	3	51	1	8	1
4	3	14	2	88	1	3	1
5	3	16	2	71	0	9	2
4	0	10	1	53	0	6	1
4	2	42	9	68	0	8	0
4	0	26	0	57	0	11	0

KEY : Black Digits = Scores of Bad Concentrators

Red Digits = Scores of Good Concentrators

Total Time in Seconds

TABLE III

VALIDITY OF TESTS : CORRELATION BETWEEN TEST SCORES AND INTELLIGENCE QUOTIENTS

INDIVIDUAL TESTS		
NAME OF TEST	SCORE	r
Arithmetic Addition Auditory Simple	Total Time	.27
	No. Correct	.19
Arithmetic Addition Auditory Distraction	Total Time	.23
	No. Correct	.33
Memory for Sentences	No. Correct	.16
Arithmetic Addition Visual Simple	Total Time	.38
	No. Correct	.13
Arithmetic Addition Visual Distraction	Total Time	.29
	No. Correct	.11
Card-Sorting	No. of Errors	.28
Knox Cubes	No. Correct	.18
Picture-Card Exposure	No. Correct	.21
Digit Span Modification	No. Correct	.24
Memory for Simple Prose	No. of Memories	.40
Presentation Sorting	No. of Errors	.04

TABLE III (Continued)

GROUP TESTS		
NAME OF TEST	SCORE	r
Instructions	No. Done	.28
	No. of Errors	.41
Checking	No. Done	.22
	No. of Errors	.36
A-Test Visual	No. Done	.16
	No. of Errors	.32
E-Test Auditory	No. of Errors	.02
Reading Comprehension	No. Done	.45
	No. of Errors	.52

TABLE IV

VALIDITY OF TESTS : t and p VALUES

INDIVIDUAL TESTS			
NAME OF TEST	SCORE	t	p
Arithmetic Addition Auditory Simple	Total Time	.955	.40
	No. Correct	3.15	below .01
Arithmetic Addition Auditory Distraction	Total Time	.516	.70
	No. Correct	3.21	below .01
Memory for Sentences	No. Correct	1.656	.20
Arithmetic Addition Visual Simple	Total Time	1.139	.30
	No. Correct	1.095	.30
Arithmetic Addition Visual Distraction	Total Time	1.281	.30
	No. Correct	1.821	.10
Card-Sorting	No. of Errors	.613	.60
Knox Cubes	No. Correct	3.627	below .01
Picture-Card Exposure	No. Correct	.343	.80
Digit Span Modification	No. Correct	1.453	.20
Memory for Simple Prose	No. of Memories	1.066	.40
Presentation Sorting	No. of Errors	1.668	.20

TABLE IV (Continued)

GROUP TESTS			
NAME OF TESTS	SCORE	t	p
Instructions	No. Done	1.657	.20
	No. of Errors	.50	.70
Checking	No. Done	.755	.50
	No. of Errors	.179	.90
A-Test Visual	No. Done	2.1	.10
	No. of Errors	.333	.80
E-Test Auditory	No. of Errors	.229	.90
Reading Comprehension	No. Done	.887	.40
	No. of Errors	.243	.90

Three of the individual tests of concentration showed a level of significance as high as 1 per cent. On the assumption that performance on the Arithmetic tests was not markedly affected by the operation of an Arithmetic factor, these three tests seemed then really to test concentration and could be considered highly valid - Arithmetic Addition Auditory Simple and Arithmetic Addition Auditory Distraction, the score in both cases being the number correct, and Knox Cubes. The failure on empirical grounds of the other tests must be considered in conjunction with the fact that it was extremely difficult to secure an adequate criterion of level of concentration - the judgment of the teachers had to be relied upon.

It was decided to include in the battery of tests others besides the three statistically significant ones, as they seemed, on logical principles at least, to be related to concentration, and some of these had, even on empirical grounds, a relatively satisfactory level of significance; it was considered important, also, not to change too radically, the order or duration of the testing period. Thus, Arithmetic Addition Visual Distraction was included because the level of significance was still relatively satisfactory and Arithmetic Addition Visual Simple, because it was felt that it might perhaps be of value to compare performance on these two tests. Three tests included on logical grounds were Presentation-Sorting, Memory for Sentences and Memory for Simple Prose; the latter two were chosen in preference to Digit Span Modification which showed a higher level of significance but which was not so clearly related to school work. Card-Sorting and Picture Card Exposure were omitted because of the very low level of significance.

Only one of the group tests, A-Test Visual, showed a statistically significant difference between the scores obtained by 'good' and 'bad' concentrators as selected by the teachers; however, it was decided to forego the probable value of this test and to exclude altogether the administration of group tests, thus simplifying and shortening test administration. The

difficulties in construction of tests which are to be administered to a group of children are peculiar and require more intensive investigation. Another of the group tests, Checking, despite its extremely poor statistical significance, was included in the final battery of individual tests, as the logical principles involved in it seemed sufficiently strong to relate the test to concentration; the detection of errors in this test seemed to call for concentration of a higher order than did the discrimination of a single letter in the A-test.

A few points are of interest and worthy of note. In Picture Card Exposure, the original assumption was that good concentrators would remember more objects than the bad concentrators; this was disproved, the Mean Score of the good concentrators being 4.57 and that of the bad concentrators being 4.8. Similarly, in the group tests, in Instructions, the good concentrators completed fewer items and had more errors than the bad concentrators, in Checking, the good concentrators completed more items but also had more errors than the bad concentrators, and in A-Test Visual and Reading Comprehension, the good concentrators completed fewer items than the bad concentrators. It is possible that in certain instances, where close observation is required, good powers of concentration are revealed in a slow pace of work whereas lack of concentration will manifest itself in a pace that is rushed and too fast; in this case the bad concentrators would complete more items than the good concentrators but the accuracy of their performance would be affected accordingly. The results as regards accuracy as found in certain of the tests mentioned above are, however, more difficult to explain and require further investigation.

The difficulties inherent in the construction of a valid set of tests of concentration must by now be clearly apparent to the reader. A great deal of research remains to be done before it can truly be said that 'Concentration may be measured by the following methods'.

The final battery of tests of concentration was as follows :

(a) Arithmetic Addition Auditory Simple

(b) Arithmetic Addition Auditory Distraction

(c) Memory for Sentences

(d) Arithmetic Addition Visual Simple

(e) Arithmetic Addition Visual Distraction

(f) Knox Cubes

(g) Memory for Simple Prose

(h) Presentation-Sorting

(i) Checking.

(4) Alternate set of tests

The first form of the tests of concentration has already been described and it remains now to describe the alternate set of tests which were to be administered after the training procedure. These tests were constructed on the same principles as the original ones, on the assumption that they would be as close to those as possible.

(a) Arithmetic Addition Auditory Simple

(1)	4 + 7 + 3	(10)	7 + 5 + 6
(2)	8 + 5 + 6	(11)	9 + 5 + 5
(3)	3 + 8 + 4	(12)	3 + 8 + 6
(4)	9 + 7 + 4	(13)	6 + 3 + 5
(5)	6 + 5 + 4	(14)	8 + 7 + 4
(6)	5 + 9 + 3	(15)	3 + 5 + 9
(7)	4 + 9 + 5	(16)	7 + 8 + 5
(8)	7 + 4 + 4	(17)	5 + 6 + 5
(9)	8 + 3 + 7	(18)	9 + 7 + 6

(b) Arithmetic Addition Auditory Distraction

(1) Now, Name, what school do you go to? ... I see. What's your principal's name? ... 4 What colour are your socks? ... That's easy so far, isn't it? ... 5 Do you play cricket? ... How often? ... I bet you prefer playing sport to doing homework. 6 Do you stay far from school? Have you got a bike?
Now, if you can, tell me the answer.

(2) Do you like eating watermelon? It's nice to eat in summer, isn't it? ... 4 Are you wearing a tie? ... You're doing O.K. so far. Do you think children should listen to their parents? ... 8 Are there girls in your school too? ... Now let's go on. Do you like girls? ... 2 Now I'm going to ask you a riddle : What is the difference between a hill and a pill? The one is hard to go up and the other is hard to go down.
Now give me the answer.

(3) Do you like learning Afrikaans? ... Do you like playing the fool in school? ... 9 Have you been swimming already this summer? ... I see. 7 Now I've got another joke for you. Do you know the story of the empty pail? ... there's nothing in it. ... 4 Do you go to Scouts? ... Do you like it?
Now, if you can, tell me the answer.

(4) How many days are there in a week? ... Do you think all children should be made to go to school? ... 8 Little Miss Muffet sat on a tuffet. Do you know the next line, yes or no? ... 6 That was kid stuff, wasn't it? ... Oh, well, here we go again ... 3 Did you know that a millipede has hundreds and hundreds of legs?
Now give me the answer.

(5) Do you know what this place is called? ... 7 This is the last sum now, so there's not much more ... 6 Peter Piper picked a peck of pickled pepper. Have you ever tried to say any of those? ... They're really tongue twisters, aren't they? ... 7 Well, that's all here, so now to end off.
Give me the answer.

(c) Memory for Sentences

The same sentences were used in the alternate form of the test, it being thought that with a time-interval of about three months, practice would not play any great role in influencing the test score.

(d) Arithmetic Addition Visual Simple

(1)	3 + 9 + 6	(10)	5 + 9 + 3
(2)	5 + 6 + 7	(11)	7 + 6 + 8
(3)	8 + 5 + 6	(12)	9 + 3 + 4
(4)	3 + 9 + 5	(13)	4 + 6 + 8
(5)	3 + 6 + 5	(14)	4 + 7 + 5
(6)	8 + 4 + 7	(15)	9 + 6 + 3
(7)	8 + 7 + 9	(16)	3 + 4 + 6
(8)	4 + 8 + 5	(17)	8 + 5 + 4
(9)	4 + 6 + 3	(18)	8 + 9 + 6

(e) Arithmetic Addition Visual Distraction

(f) Knox Cubes

The series of presentation of the cubes used here were the same as in the original form of the test.

(g) Memory for Simple Prose

Bloemfontein, 6th December.

/A river/last week/overflowed/its banks/
in a town/not far away/It took a
long time/to get things dry/The damage/
/was forty thousand/pounds/and 20/
/people/caught colds/In saving/
/a boy/who was caught/under a bridge,/a
man/was cut/on the hands/.

(h) Presentation-Sorting

Examiner says : I am going to show you some cards through this little window. Each card will have either a letter and a number, 2 letters or 2 numbers written on it. Here are some plain white cards in front of you. Each time I show you a card with 2 letters of the alphabet on it like R and S, you must put a white card into the box on the right. If I show you a card with 2 numbers on it, like 2 and 3, you must put a card into the middle box, and if I show you a card with a letter and a number on it, like B and 2, you must put a card into the box on the left. (Examiner demonstrates with a number of cards). Do you understand? ... Ready ...

(1)	N8	(11)	84
(2)	XM	(12)	NT
(3)	63	(13)	RJ
(4)	R4	(14)	59
(5)	LB	(15)	D2
(6)	25	(16)	HS
(7)	B2	(17)	TT
(8)	A7	(18)	F6
(9)	QK	(19)	43
(10)	Y2	(20)	G7

Left box : Card number 1 4 7 8 10 15 18 20 - a letter and a number

Middle box : Card number 3 6 11 14 19 - 2 numbers

Right box : Card number 2 5 9 12 13 16 17 - 2 letters

(i) Checking

	COLUMN I	£. s. d.	COLUMN II	£. s. d.	COLUMN III
	Miss May Jones ..	4. 1. 3.	Miss Mey Jones ..	4. 1. 3.	X
	Mr. N. Smith ..	6. 4.	Mrs. N. Smith ..	6. 4½	X
(1)	Mrs. Purves	58. 1. 4½	Mrs. Purves	58. 1. 4½	✓
(2)	Mr. B.N. Clarke ..	10. 0. 0.	Mr. B.N. Clark ..	10. 0. 0.	X
(3)	Mr. Tomkins . ..	482. 1. 9¾	Mr. Tomkins . ..	48. 2. 9¾	X
(4)	Mrs. S.I. Winter ..	10. 0.	Mr. S.A. Winter ..	10. 0.	X ✓
(5)	Mrs. James	9. 2. 5.	Mrs. James	9. 2. 5.	✓
(6)	Mr. Alan West ..	2.16. 1.	Mr. Alan West ..	2.16. 1.	✓
(7)	Mrs. Farley	2. 7. 4.	Mrs. Farley	2. 7. 4.	X ✓
(8)	Miss Sinsbury ..	2. 0.	Miss Sinsbury ..	2. 0.	✓
(9)	Mrs. Bishop	111. 6. 1.	Mrs. Bishop	11. 6. 1.	X ✓
(10)	Mr. A. Read	17. 6¾	Mr. A. Read	17. 6¾	✓
(11)	Mrs. R.J. Allen ..	5. 7¼	Mrs. R.J. Allan ..	5. 7¼	X
(12)	Mrs. Goode	3. 0. 0.	Miss Goode	3. 0. 0.	X ✓
(13)	Miss B. Sheldon ..	438.13. 6.	Miss B. Sheldon ..	438.13. 6.	✓
(14)	Mr. Black	47. 6 3½	Mrs. Black	47. 6. 3½	X ✓
(15)	Miss V. Grayson ..	59. 9. 0.	Miss V. Grayson ..	59. 9. 0.	✓
(16)	Mrs. Whites	27. 8. 8½	Mr. Whites	27. 8. 8½	X ✓
(17)	Mr. J.K. Barns ..	533. 2. 8.	Mr. J.K. Barns ..	533. 2. 8.	✓
(18)	Miss Lyons	546. 1. 4.	Miss Lyons	549. 1. 4.	X ✓
(19)	Sir Charles	4. 4. 2.	Sir Charles	4. 4. 2.	✓
(20)	Mrs. Links	47. 6. 3½	Mrs. Links	47. 6. 3½	✓
(21)	Mrs. M. Moss	7. 6.	Miss M. Moss . ..	7. 6.	X ✓
(22)	Mr. J.N. Smithers ..	76. 5. 4.	Mr. J.N. Smithers ..	76. 5. 4.	✓
(23)	Mr. Henry Griggs ..	14. 0. 2½	Mr. Harry Briggs ..	14. 0. 2½	X
(24)	Miss P.T. Coode ..	9. 6¾	Miss P.T. Coade ..	9. 6¾	X ✓
(25)	Mr. Jansen	5.12. 6.	Mr. Jansen	5.12. 6.	✓
(26)	Mr. Garvin	40.13. 4.	Mr. Garven	40.13. 4.	X ✓
(27)	Mrs. R. Price ..	17. 6.	Mrs. R. Price ..	17. 6.	✓
(28)	Miss Hains	7. 4. 0½	Miss Hains	7. 4. 0½	✓
(29)	Mrs. Sutin	125.11. 8¼	Mrs. Sutin	152.11. 8¼	X ✓
(30)	Mr. L. Rubin . ..	3. 7.	Mr. L. Rubin . ..	3. 7.	✓
(31)	Mrs. P. Jewell ..	19. 4. 2.	Mrs. P. Jewell ..	19. 4. 2.	✓
(32)	Miss Gorden	2. 6.	Miss Gordon	2. 6.	X ✓
(33)	Mr. A. Sachs . ..	136. 5. 1¼	Mr. A. Sachs . ..	163. 5. 1¼	X ✓
(34)	Lord Montagu . ..	5. 3. 3.	Lord Montagu . ..	5. 3. 3.	✓
(35)	Mr. Tim Smith ..	12. 2. 2.	Mr. Tim Smith ..	12. 2. 2.	✓
(36)	Miss Grass	6½	Miss Glass	6½	X ✓
(37)	Mrs. K. Bell . ..	11. 1. 0.	Mrs. K. Bell . ..	11. 1. 0.	✓
(38)	Mr. M. Brown . ..	16. 5¼	Mr. N. Brown . ..	15. 6¼	X ✓
(39)	Miss Summers . ..	178. 7. 8.	Miss Summers . ..	187. 7. 8.	X ✓
(40)	Miss Clarkman ..	7.	Miss Clerkman ..	7.	X ✓
(41)	Mr. P. Terman ..	42. 3. 9.	Mr. P. Terman ..	42. 3. 9.	✓
(42)	Mrs. Worth	11. 8.	Mrs. Worth	11. 8.	✓

5. Division into Experimental and Control Groups

In the discussion of the preliminary investigations, it has already been mentioned that twenty-five children were selected as subjects for the research. It was to this group of children that the final battery of tests of concentration was administered. The scores obtained by each child are presented in a tabular form (see Table V), the children being labelled according to letters of the alphabet.

In order to divide these twenty-five subjects among the Experimental and Control Groups, the subjects were ranked according to the scores they had obtained on the three most valid tests, that is, Arithmetic Addition Auditory Simple - number of sums correct, Arithmetic Addition Auditory Distraction - number of sums correct, and Knox Cubes - number correct. The three ranked scores were added and then divided by three to obtain a Mean Ranked Score so that the division into Experimental and Control Groups could be made on as fair and comparable a basis as possible. It would have been ideal to take into account the intelligence quotients of the children in making the division; however, this was not possible, nor was the writer able to consider such variables as age, standard in school, personality traits and emotional factors. It was found necessary to keep in mind such practical facts as whether the child would be able to attend regularly for the training in concentration, and the degree of co-operation on the part of the parents. Such aspects interfered with the division in certain cases.

TABLE V

TESTS A : SCORES OBTAINED BY 25 SUBJECTS, ALL LACKING POWERS OF CONCENTRATION

		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	V	W	X	Y	Z
I. ARITHMETIC ADDITION	Total Time	135	40	76	66	34	64	105	109	41	92	75	83	168	84	73	65	65	59	40	92	73	85	42	84	179
AUDITORY SIMPLE	No. Correct	14	18	15	17	16	18	15	18	17	16	15	15	13	11	17	15	17	17	18	14	17	15	18	14	11
II. ARITHMETIC ADDITION	Total Time	34	10	20	15	10	16	14	33	8	22	10	6	14	25	6	38	6	19	13	17	27	16	12	30	46
AUDITORY DISTRACTION	No. Correct	4	3	3	1	4	0	3	3	1	4	3	3	0	1	4	2	4	5	3	3	2	2	4	2	0
III. MEMORY FOR SENTENCES	No. Correct	23	22	21	17	22	25	22	27	24	21	20	24	17	20	24	22	27	25	23	18	19	21	25	23	16
IV. ARITHMETIC ADDITION	Total Time	164	111	114	127	60	118	171	147	72	133	119	111	189	121	85	133	88	102	84	140	94	109	79	168	155
VISUAL SIMPLE	No. Correct	18	18	17	17	18	17	14	18	17	18	18	14	15	18	18	18	18	18	18	17	16	18	16	18	16
V. ARITHMETIC ADDITION	Total Time	215	185	165	160	98	186	221	197	109	151	141	114	176	161	125	162	86	149	94	173	102	125	109	311	237
VISUAL DISTRACTION	No. Correct	17	18	18	18	14	16	17	18	16	18	18	15	18	17	18	18	17	17	18	17	18	18	18	18	16
VI. KNOX CUBES	No. Correct	5	4	6	5	4	4	4	4	6	4	4	2	6	5	6	4	4	6	5	6	5	4	6	4	5
VII. MEMORY FOR SIMPLE PROSE	No. of Memories	7	10	14	10	9	16	6	13	12	10	12	14	13	10	8	11	11	10	10	9	8	13	14	6	12
VIII. PRESENTATION SORTING	No. of Errors	8	13	2	3	3	0	15	0	0	18	10	2	0	9	5	0	13	0	1	0	14	0	0	1	4
IX. CHECKING	No. Done	12	19	18	12	17	17	38	17	20	23	16	17	16	19	18	11	18	14	14	16	13	12	21	9	8
	No. of Errors	1	1	3	2	0	5	14	0	5	5	0	0	3	4	3	1	2	3	0	1	2	1	0	0	0

Total Time in Seconds

TABLE VI

RANKS ASSIGNED TO 25 SUBJECTS ON 3 MOST VALID TESTS

ORDER OF SUB-JECTS	ARITH. AUDITORY SIMPLE No. Correct		ORDER OF SUB-JECTS	ARITH. AUDITORY DISTRACTION No. Correct		ORDER OF SUB-JECTS	KNOX CUBES No. Correct	
	Score	Rank		Score	Rank		Score	Rank
S	18	3	R	5	1	M	6	4
F	18	3	O	4	4.5	T	6	4
H	18	3	Q	4	4.5	O	6	4
B	18	3	A	4	4.5	R	6	4
X	18	3	J	4	4.5	C	6	4
V	17	8.5	X	4	4.5	I	6	4
O	17	8.5	E	4	4.5	X	6	4
Q	17	8.5	T	3	11.5	N	5	10.5
R	17	8.5	S	3	11.5	V	5	10.5
D	17	8.5	G	3	11.5	Z	5	10.5
I	17	8.5	K	3	11.5	S	5	10.5
T	16	13	L	3	11.5	A	5	10.5
E	16	13	H	3	11.5	D	5	10.5
J	16	13	B	3	11.5	W	4	19
W	15	17.5	C	3	11.5	Q	4	19
G	15	17.5	W	2	17.5	Y	4	19
K	15	17.5	V	2	17.5	G	4	19
L	15	17.5	Y	2	17.5	K	4	19
C	15	17.5	P	2	17.5	E	4	19
P	15	17.5	N	1	21	H	4	19
Y	14	21.5	D	1	21	F	4	19
A	14	21.5	I	1	21	B	4	19
M	13	23	M	0	24	J	4	19
N	11	24.5	Z	0	24	P	4	19
Z	11	24.5	F	0	24	L	2	25

TABLE VII

MEAN RANKS ASSIGNED TO 25 SUBJECTS ON 3 MOST VALID TESTS

ORDER OF SUB-JECTS	ARITHMETIC AUDITORY SIMPLE No. Correct	ARITHMETIC AUDITORY DISTRACTION No. Correct	KNOX CUBES No. Correct	COMBINED RANKING SCORE FOR 3 TESTS	MEAN RANKING SCORE
A	21.5	4.5	10.5	36.5	12.17
B	3	11.5	19	33.5	11.17
C	17.5	11.5	4	33	11
D	8.5	21	10.5	40	13.33
E	13	4.5	19	36.5	12.17
F	3	24	19	46	15.33
G	17.5	11.5	19	48	16
H	3	11.5	19	33.5	11.17
I	8.5	21	4	33.5	11.17
J	13	4.5	19	36.5	12.17
K	17.5	11.5	19	48	16
L	17.5	11.5	25	54	18
M	23	24	4	51	17
N	24.5	21	10.5	56	18.67
O	8.5	4.5	4	17	5.67
P	17.5	17.5	19	54	18
Q	8.5	4.5	19	32	10.67
R	8.5	1	4	13.5	4.5
S	3	11.5	10.5	25	8.33
T	13	11.5	4	28.5	9.5
V	8.5	17.5	10.5	36.5	12.17
W	17.5	17.5	19	54	18
X	3	4.5	4	11.5	3.83
Y	21.5	17.5	19	58	19.33
Z	24.5	24	10.5	59	19.67

TABLE VIII

25 SUBJECTS IN ORDER OF RANKING ON 3 MOST VALID TESTS

	SUBJECT	RANKED SCORE
1	X	3.83
2	R	4.5
3	O	5.67
4	S	8.33
5	T	9.5
6	Q	10.67
7	C	11
8	B	11.17
9	H	11.17
10	I	11.17
11	E	12.17
12	J	12.17
13	A	12.17
14	V	12.17
15	D	13.33
16	F	15.33
17	G	16
18	K	16
19	M	17
20	W	18
21	P	18
22	L	18
23	N	18.67
24	Y	19.33
25	Z	19.67

TABLE IX

MEAN RANKS AND INTELLIGENCE QUOTIENTS OF THE EXPERIMENTAL AND CONTROL GROUPS

CONTROL GROUP			EXPERIMENTAL GROUP		
Subject	I.Q.	Mean Rank	Subject	I.Q.	Mean Rank
O Oscar	99	5.67	R Roy	101	4.5
T Tom	96	9.5	S Simon	94	8.33
C Charles	128	11	Q Quentin	95	10.67
B Barry	114	11.17	H Harold	119	11.17
I Ian	123	11.17	E Elliot	114	12.17
J Jeremy	98	12.17	A Alan	103	12.17
V Vincent	100	12.17	D Derek	113	13.33
K Kenneth	112	16	F Frank	109	15.33
M Martin	96	17	G Gary	106	16
L Larry	99	18	P Paul	100	18
N Norman	94	18.67	W William	95	18

6. Case Histories

The information obtained from the interviews with the parents, teachers and children may now be dealt with. It was considered best to present this mass of material in two ways, first to give a very brief 'character sketch' of each child in the Experimental and Control Groups, and secondly, by combining all the data, to enumerate the main features found in all the children studied. Personal judgment of the writer naturally played a great role and frequently, such characteristics as the level of emotional development or of motivation and the attitudes of the parents to the child and school are recorded as a personal opinion on the basis of the results of the interviews. It must also be noted that the knowledge as to physical condition and health is not wholly satisfactory; the necessity for medical examinations, particularly with regard to vision and hearing, is recognized.

(1) Character Sketches of Subjects

(i) Alan, aged 10 5/12 in Std. III, attending School A

An immature child, socially and emotionally, with some feeling of insecurity and with a very low level of motivation for whom too high standards are set. In the writer's opinion, the immaturity and over-protection at home had prevented the child's acquiring the ability to do independent work and the proper habits of concentration.

(ii) Barry, aged 10 10/12 in Std. III, attending School A

A slightly immature, lonely child for whom high standards are set and who has not yet acquired the ability to function satisfactorily on his own - hence the child's talkativeness in class where he has all his friends and his inability to work well unless the teacher watches him. No severe emotional problem and the child could benefit from training in concentration.

(iii) Charles, aged 10½ in Std. III, attending School A

A very intelligent child with many interests but emotionally-disturbed and immature; marked behaviour difficulties in the school which appear to stem from the home circumstances and impair the concentration and motivation to a large extent so that the child is functioning well below his level. This child had been referred to the Clinic previously for difficult behaviour in school and therapy had been given with little success because of the mother's unco-operativeness. The boy's younger brother was referred some months later, for stealing.

(iv) Derek, aged 10½ in Std. III, attending School A

A slightly emotionally-immature child, greatly lacking in confidence and with a low level of motivation which is probably aggravated by the inability to keep up with his siblings - thus he gives up easily, needs much praise and is unable to perform well on his own. No severe emotional problem.

(v) Elliot, aged 10½ in Std. III, attending School A

An emotionally-immature child, of good ability, lacking motivation for whom perhaps too high standards are set in the home. The level of concentration had become particularly poor in the last year and appeared to be related to the parents' lessening of interest in the child's schoolwork and the subsequent feeling of rejection. The child's inability to work on his own with success seems to be due not so much to lack of habits of concentration as to his immaturity and lack of confidence.

(vi) Frank, aged 10½ in Std. III, attending School A

A child with very low motivation and possibly some emotional difficulties which were suspected but not fully discovered by the writer, the mother being rather evasive in the interview. The boy is described as a "dreamer".

(vii), Gary, aged 10½ in Std III, attending School A

A very immature child, socially and emotionally, over-protected, unconfident, undisciplined and with poor motivation, who does not come up to his parents' expectations and whose "disabilities" and difficulties have probably never been accepted by his parents or by himself. The writer felt that the extreme inability to concentrate was, perhaps, partially related to the poor physical condition of the child but that the emotional difficulties were certainly causative factors, and that intensive training in concentration was necessary, as well as further psychological investigation.

(viii) Harold, aged 10½ in Std. III, attending School A

A slightly emotionally-immature child, of good ability, a "dreamer" and not achieving as well as he can, whose level of motivation is determined very greatly by factors in the home, that is, the amount of attention and encouragement he gets from his parents. No severe emotional problem, but some sibling jealousy is apparent and the writer notes that the child's work deteriorated when his younger brother started school.

(ix) Ian, aged 10⅝ in Std. III, attending School A

A very intelligent child with many interests, somewhat over-protected in the past and for whom high standards are always set- thus, some inability to perform at his best without supervision, and a lack of motivation and subsequent talkativeness in class if the task is too easy. No severe emotional problem and the referring problem of lack of concentration is mild, compared with that of other subjects. Improvement is necessary in the narrowing of the field of attention and in the ability to do independent work successfully.

(x) Jeremy, aged 10⅝ in Std. III, attending School A

A slightly emotionally-immature child with a marked difficulty in certain interpersonal domestic relationships. The lack of concentration is not severe, compared with that of other subjects. Improvement is necessary in the ability to do independent work. The referring problem appears to be closely connected with the emotional difficulties which seem to need further investigation.

(xi) Kenneth, aged 10⅝ in Std. III, attending School A

A child with some insecurity and feeling of rejection, possibly lacking affection and for whom high and rigid standards are set. Some emotional disturbance seems evident but its nature was not fully ascertained. The writer considered that the child was given little opportunity for developing self-responsibility and proper habits of concentration had not yet been achieved; level of motivation in particular was low.

(xii) Larry, aged 10½ in Std. III, attending School A

A hyperkinetic, moody child who is lonely, unconfident and slightly immature - overdependent on his Mother and possibly rejected by his Father. The exact nature of the apparent emotional difficulty was not fully ascertained. The lack of concentration appears to be closely related to the poor level of motivation and the personality characteristics of the child - thus the child's talkativeness in class where he has his friends and his inability to work on his own without encouragement being given and interest shown by others.

(xiii) Martin, aged 10½ in Std. II, attending School B

An extremely unhappy and insecure child, having grown up in a rather unstable and unhappy environment, and living amongst unsympathetic and intolerant adults. The writer considers the marked lack of concentration to be just a small part of the much wider emotional problem of the child, and the need for psychotherapy seems to be indicated.

(xiv) Norman, aged 11½ in Std. IV, attending School B

A child with very low motivation a marked lack of interest in and dislike of schoolwork, and an inadequate relationship with his teacher, all aggravated by the lack of supervision at home and lack of incentive to do better work. There are also indications of a more general problem of an emotional nature and some maladjustment which had led to stealing incidents, but these were not fully ascertained. Training in concentration is needed very badly.

(xv) Oscar, aged 11⅝ in Std. IV, attending School C

An emotionally-disturbed child with extremely unfavourable home circumstances, possibly a psychopathic personality needing more intensive psychological investigation. The referring problem of lack of concentration is overshadowed by the emotional maladjustment of the child. This boy and his brother were later referred to the Clinic for stealing, and psychotherapy was given with some success, but the prognosis was considered poor because of the home background.

(xvi) Paul, aged 11⅜ in Std. III, attending School C

An emotionally-insecure child lacking affection and understanding, and a stable home-life. An emotional difficulty is evident and related to the lack of concentration, but further investigation of this is probably not necessary and child needs training in concentration.

(xvii) Quentin, aged 11⅝ in Std. IV, attending School C

A child with a low level of motivation and frustration-tolerance, whose parents give little positive encouragement and continually express their dissatisfaction, and also indulge him. There is some feeling of inferiority, in comparison with siblings and friends. No marked emotional problem and the concentration is not as poor as that of other subjects. Level of motivation needs to be raised as the child can, apparently, concentrate well if he is interested.

(xviii) Roy, aged 11⅞ in Std. IV, attending School C

A child of average ability with low motivation and very little interest in schoolwork, aggravated by a demanding, rigid and unsympathetic attitude on the part of his parents. The home offers little positive incentive for better schoolwork and there appears to be some emotional difficulty, the child's relationship with his Father, in particular, being very inadequate; however, its nature was not fully discovered.

(xix) Simon, aged 11½ in Std. IV, attending School C

An emotionally-immature, pampered and undisciplined child, used to having his own way, and with little self-responsibility - therefore he is unable to work well without supervision and has not acquired the correct habits of concentration. Some insecurity is evident in the child's relationships with his peers - he has always to be admired.

(xx) Tom, aged 11½ in Std. IV, attending School D

A very unhappy, insecure child with neurotic tendencies, lacking affection. The lack of concentration seems closely related to the emotional difficulties and craving for attention. More intense psychological investigation is needed, as well as training in concentration.

(xxi) Vincent, aged 10½ in Std. IV, attending School D

A slow, rather nervous child, kept socially and emotionally immature by his parents. There is a possible connection between the lack of concentration and the physical condition and history. In the writer's opinion, the immaturity and overprotection had prevented the child's acquiring the ability to do independent work and the proper habits of concentration.

(xxii) William, aged 10½ in Std. IV, attending School D

A child of low-average ability with low motivation and lacking the proper habits of concentration, particularly in reading - thus his weakness in content subjects and his need for very close supervision in class; no emotional problem is apparent. The home offers little educational stimulation or incentive for progress, and little supervision is given; the writer considers that this, as well as the lack of proper study-habits, account for the child's lack of concentration, his inability to persist at a task and his poor progress in school.

(2) Features Bearing on the Problem of "Lack of Concentration"

The letters of the alphabet seen below refer to the names of the children whose character sketches have been presented, for example, A = Alan, B = Barry, C = Charles. Where for a particular item, nothing was considered significant or no difficulty was found, nil has been recorded.

(1) Socio-economic level

Financial difficulty was reported in 3 cases -

N R W

In all other instances, socio-economic level was fair or high, as given by the parents and judged by the writer.

(2) Home Circumstances

Nil in 6 cases : D H J K L Q

Considered as a special "circumstance" in the home was a great emphasis on education and high intellectual standards, and this was found in 5 instances : A B E G I

Abnormal home circumstances of a minor nature, having some possible relation to the problem were present in 6 histories - half-sibling in V and W, deceased siblings in R and S, and in F and N the Mother worked all day and got home late.

Major abnormal circumstances were found in 5 cases :

C M P O T

The parents of C, M and P were divorced; C lived with the Mother who was reported to be alcoholic; M had, in the past, been away from his home for long periods of time, and P (whose Father had remarried and whose Stepmother was now deceased) had had very little stable home life at all. O had a Stepmother, there was extreme parental discord in the home, and both the Father and the Stepmother were considered "disturbed" personalities. Finally, in the case of T, the Father had committed suicide and a Stepfather and half-siblings were in the home.

(3) Status in Family

Nil in 14 cases : C D F G H J K N O Q R T V W

The following features were considered to be significant in 8 cases : A P B S E I L M

Both A and P were said to be lonely, had no siblings and were always among adults; B and S were virtually "only" children as their siblings were much older and away from the home, and they, too, were reported to be lonely. E I L and M were children who were surrounded by adults in the home or whose siblings were either much older or younger than they were.

(4) Interpersonal Relationships

(a) Child - Father

Relationship fair in 6 cases : A B H I N V

Father absent from home because divorced in 1 : C

Stepfather, impatient and strict in 1 case : T

Father "disturbed", very abnormal relationship in 1 case : O

Father strict and unsympathetic in 9 cases : D F G J L K M R W

Father spoils child in 4 cases : E P Q S

Child fears or dislikes father in 7 cases : C F G J L K W

Child feels rejected in 2 cases : D T

Child is unattached and cheeky in 2 cases : M R

Child has unfavourable, "disturbed" relationship in 1 case : O

Therefore, the relationship of Father to Son was found to be inadequate in some manner in 16 instances, being too rigid in 10, too lax in 4, "disturbed" in 1 and lacking, probably unfavourably in 1 case because of the Father's absence through divorce. Of these 16 children, 12 had poor and adverse attitudes to the father, these being mainly fear and dislike.

(b) Child - Mother

Mother absent from home because divorced or deceased in 2 cases : M P

M's mother-substitute, an elder sibling was impatient and unsympathetic, and similarly in the case of P, the mother-substitute, the Grandmother, was rigid and intolerant.

Mother alcoholic in 1 case : C

Stepmother, "disturbed" and undemonstrative in 1 case : O

Mother undemonstrative, rigid or impatient in 8 cases : E F H K N R T W

Mother overprotects or pampers in 7 cases : A B G I Q S V

Mother's handling of and attitude to child is good in 3 cases : D J L

Child's relationship with and attitude to Mother fair in 5 cases : E I K Q S

Child is undemonstrative in 1 case : F

Child over-demonstrative or over-dependent on, demands much attention in 11 cases : A B C D G H J L R T V

Child cheeky and disobedient in 5 cases : M N O P W

Therefore, the relationship of Mother to Son was found to be in some way unsatisfactory in 19 instances, being too rigid and unsympathetic in 11, and too indulgent or over-protective in 7 cases. The striking features of the child's side of the relationship where unsatisfactory were either over-dependence and excessive demand for attention, or disobedience and unruliness.

(c) Child - Siblings

No siblings in 2 cases : A P

Relationship fair, no difficulty in 5 cases : F K Q R W

Relationship fair, but child very aware of siblings' brightness in 3 cases : D E G

Relationship fair but siblings much older or younger, share few interests in 3 cases : B I L

Sibling jealousy, disharmony or dislike in 7 cases : C H J N O T V

Siblings are adult, impatient and unsympathetic in 1 case : M

Siblings are adult and indulge the child in 1 case : S

(d) Child - Peers

Relationships fair, child has sufficient friends and gets on well with them in 11 cases : D E F I J O Q R S V W

Few friends, child is unpopular, aggressive or shows insecurity in relationships with peers in 8 cases : A C G K M N P T

Few friends because of lack of opportunity, child craves friends in 3 cases : B H L

(e) Child - Teacher

Relationship fair in 14 cases : A B D E H I J K L P Q R S W

Relationship poor, teacher dislikes or is impatient, child dislikes or fears in 8 cases : C F G M N O T V

(5) Routine

(a) Sleep

Nil in 15 cases : A B C D F H I J K L M N P Q W

Insufficient sleep in 4 cases : G S T V

Difficulty in falling asleep or restless sleeper in 2 cases : E R

Sleepwalking in 1 case : O

(b) Diet

Nil in 16 cases : C D E F H J K L M N O P Q S T W

Poor eater or "food fads" in 6 cases : A B G I R V

(c) Extra-curricular activities

Nil in 12 cases : A B D F G H J K L M O P

Excessive, child has insufficient time for play in 3 cases : C E I

Time spent on sport is excessive in 5 cases : N Q R S W

Time spent on homework is excessive in 2 cases : T V

(d) Organization of routine after school

Nil in 9 cases : A C D E H I J Q V

Organization too lax, or too little supervision given in 10 cases : F G M N O P R S T W

Organization too rigid, Mother plans everything for child, in 1 case : K

Child demands excessive organization of routine by parents, is unable to occupy or amuse himself in 2 cases : B L

(6) Home Discipline

Nil in 9 cases : A B C D E F H I W

Generally rigid, strict and unsympathetic in 7 cases : J K L M P R T

Generally lax in 6 cases : G N O Q S V

In addition, disagreement between parents over discipline was evident in 5 cases : G J L O P, and the child was considered unruly and difficult to control in 4 cases : G M N O

(7) Health

Nil in 17 cases, as reported by parent : A B C D E F J K L N O P Q R S T W

Asthma, frequent ill-health or colds in 4 cases : G H I V

Slight stammer and slight hearing defect (one ear) in 1 case : M

(8) Emotional Development

(a) Child is sensitive and highly-strung, gets upset easily

Nil in 7 cases : D F N O Q R W

Traits present in 15 cases : A B C E G H I J K L M P S T V

(b) Child is strong-willed and obstinate, tempers if he cannot have his own way

Nil in 10 cases : D E F H I J K P T W

Traits present in 12 cases : A B C G L M N O Q R S V

(c) Self-confidence

Nil in 9 cases : B C F I N O R S W

Trait lacking in 13 cases : A D E G H J K L M P Q T V

(d) Fears

Nil in 16 cases : B C D F G H I J K L N O Q R S W

Present in 6 cases : A E M P T V

(e) Enuresis

Nil in 17 cases: A B C D F G H J K L N P Q R S V W

Present in 5 cases : E O T, I and M in the past, till a late age

(f) Dishonesty

Present in 4 cases (stealing or lies) : M N O P

In addition, aspects of the home life or domestic interpersonal relationships of 11 children seemed to indicate some degree of emotional insecurity : C E F J K L M N O P T

It must be noted that in F L and N, there was no certain evidence for this conclusion.

On the basis of all this information as well as that in the other categories, it was concluded that 8 children could be considered as emotionally-immature : A B D E H I S V and in 12 cases there appeared to be some emotional difficulty or maladjustment requiring further investigation : C F G J K L M N O P R T

This emotional difficulty or disturbance was suspected but with uncertain evidence in 5 of the above cases - F K L N and R. Only in 2 instances, was it considered that there were no signs of any marked emotional difficulty or immaturity : Q W

(9) School

(a) Standard of Work

Fair or good in 15 cases : B C E F H I J K L O P Q R S V

Below average in 7 cases : A D G M N T W
In addition, the work and performance of 8 children was specifically mentioned as being erratic : E F H J K L P S and all the twenty-two children were considered either by the teacher or parent, or both, to be capable of improvement.

(b) Specific Scholastic Difficulty

Nil in 8 cases : B E F I J L O P
Afrikaans in 8 cases : A C D G H K Q S
Reading or Comprehension in 2 cases : D R
Spelling in 3 cases : G N V
Arithmetic in 3 cases : H M T
Written work in 3 cases : M N T
Content subjects in 2 cases : T W

(c) Changes of School

Frequent in only 3 cases : M P T
Prolonged absences from school in 1 case : G

(d) Child's Attitude to School

Good, child likes, in 8 cases : D E I J K L P S
Fair in 3 cases : A B R
Poor, child accepts as a "necessary evil" in 4 cases : H Q R W
Bad, child dislikes, in 7 cases : C F G M N O T

(e) Child's Attitude to Homework

Fair in 5 cases : C E I J V
Dislikes and performs unwillingly, but does not evade in 7 cases : B F H L Q S T
Dislikes and tries to evade in 10 cases : A D G K M N O P R W

(f) Performance of Homework

Fair in 12 cases : B C D E F H I J K L Q V

Poor in 10 cases : A G M N O P R S T W

Child works very slowly in 5 cases : A D F T V

Child rushes through work quickly in 15 cases : B E G H I K L M N O P Q R S W

Rate of work fair in 2 cases : C J

In addition, 16 of the 22 subjects were said to need constant instructions or reminders to do their homework : A D F G H K L M N O P Q R S T W

10 children were reported to need and receive close supervision : A B D E H J K L S V

and 8 children were considered to require close supervision but did not appear to get it : G M N O P R T W

(g) Parents' attitude to school and teacher

Nil in 18 cases : A B D E F G H I J K L M O P Q R S W

Critical in 4 cases : C N T V

(h) Parents' attitude to schoolwork

Mother is interested, supervises and encourages in 6 cases : D H I J L V

Mother is interested, supervises but expresses dissatisfaction and tends to be unsympathetic in 4 cases : A B E Q

Mother is interested or concerned but gives little supervision or positive encouragement in 8 cases : F G K N P R S T

No interest shown or encouragement given in 3 cases : M O W

Attitude of parent unknown in 1 case : C

The attitude of the Father was especially mentioned in 7 cases as being unsympathetic : D F J K L R S

(i) Parents' aspirations for child

In line with child's ability in 11 cases : F H I L M N O P R T W

Too high in 9 cases : A B D E G J K Q S

Too low, parents satisfied with inferior work in 2 cases : C V

(10) Concentration

Fair in 4 cases : F I J Q

Poor in 9 cases : B C E H K L O V W

Extremely poor in 9 cases : A D G M N P R S T

(a) Manifested in Work

16 children were said to be untidy and careless : A B F G I J K M N O P Q R S V W

5 were reported to work very slowly : A D F T V and 14 to work too quickly : B E G H K L M N O P Q R S W

Concentration was said to be equally poor in all spheres of work in 6 cases : A D G M N T, especially poor when the child worked individually at his seat, this being often work of a silent nature, in 11 cases : C F H K L O P R S V W
and poor only when the child worked individually in 5 cases : B E I J Q

(b) Manifested in behaviour

13 children were described as being extremely hyperkinetic, restless and fidgety : A D G K L M N P Q R S T V
and 9 as being only slightly so : B C E F H I J O W

Talkativeness in class was ascribed to 16 cases : A B C D G I K L M N O P Q R S T

13 children were reported to be very easily distracted by things and people around them : B D G K L M N O P Q R S W

With the exception of 3 of these, B O and W, they were the children who were said also to be very hyperkinetic and restless.

Daydreaming and distraction by thought and association, that is, internal distraction, were said to be present in 8 cases : C E F H I J N T

Internal and external distraction were reported in 1 child : A

The interview with the teacher revealed that 14 children sought attention from teacher and children : A C D F G K L M O P Q R S T

2 from children only : B N

and 1 from teacher only : E

In addition, 11 children were stated to be disobedient in the class, all except the first two mentioned below being disobedient in order specifically to draw attention to themselves : M N A D F G K P R S T

Behaviour difficulties of a more serious nature were said to be present in 1 child, C, who had tempers and "spells" of refusal to do anything in class.

(c) Manifested in Level of Motivation

The poorest category here was a group of 10 children whose level of motivation was low primarily because they disliked schoolwork; thus this group were said to give up easily, their ability to persist was poor, their level of frustration-tolerance for a disliked task very low and their response to encouragement only fair. These were the children who seldom tried really hard because they simply did not want to : A F G K M N Q R S W

The second category consisted of 3 children whose level of motivation also was low, not because of a primary dislike of schoolwork but rather because of a marked lack of confidence. This group was thought to give up easily and cease to persist when the task was found to be somewhat difficult, and level of frustration-tolerance seemed to be low particularly when things were difficult. Encouragement here could result in greater effort : D L V

Finally came that group of children distinguished from the first two by virtue of the facts that their interest in the work was fair and that their level of motivation could be raised if an incentive was provided or attention and encouragement given to them. Here 2 children were thought to have a low level of motivation : P T, 6 to be fairly-well motivated : B C E H J O and 1 to have a considerably higher level of motivation, provided that the work provided a sufficient challenge for him : I

(11) Parents' attitude to problem

5 parents either did not admit to any problem or felt there was no cause for concern : C F H J W

3 were unconcerned but stated dissatisfaction with the child's schoolwork : B I K

10 were concerned, largely because of a very personal dissatisfaction with the child or his progress : A E G M N O Q R S T

1 parent, V was thought to be overconcerned in a manner corresponding to her over-protecting attitude to the child.

Only 3 parents were considered to have genuine concern about the child's progress as such and to have a good understanding of his needs : D L P

Finally, it was thought that insight into the problem, real or apparent, was definitely lacking in 15 cases : A C E G J K M N O Q R S T V W

The information obtained in the interviews indicates a number of important variables which appear to be related to the problem of lack of concentration.

A very striking feature is the degree of emotional maturity or level of emotional adjustment of the child. It has already been noted that 8 children seemed emotionally-immature, 12 appeared to have some emotional difficulty or disturbance, and only 2 of the 22 cases were considered to show no marked signs either of immaturity or maladjustment. Thus, it seems that the child who is emotionally-disturbed, is unable to concentrate although the habits of concentration may already have been acquired, whereas the child who is emotionally-immature cannot concentrate because he has not learnt the habits of concentration, by virtue of his immaturity.

It must be recognized that the assessment of emotional development is not considered fully accurate and that it depended to a large extent upon the personal opinion or judgment of the writer, with the information obtained in the interviews as a basis. The need is seen for a more detailed and restricted study of this particular relationship between lack of concentration and emotional development as well as for a more refined scale to assess the level of emotional development.

Home circumstances and the child's status in the family the main aspects of which have already been noted, appear relevant in so far as they contribute to the category of emotional development. In all 5 instances where there were major abnormal home circumstances, the children were thought to have emotional difficulties.

The field of interpersonal relationships is a large and significant one. Relationship with parents and the parents' handling of the child is clearly related to the referring problem. The two main aspects here were either rigidity, impatience and lack of sympathy, or over-protection and "spoiling" of the child; the former attitude could easily lead to an emotional difficulty in the child and results in lack of incentive and poor motivation,

while the latter could result in emotional immaturity and the inability to function satisfactorily without aid. In fact, all 12 children who were thought to be "emotionally-disturbed" had either one or both of their parents being rigid and unsympathetic, and 6 of the 8 subjects described as "emotionally-immature" were considered pampered or over-protected.

Sibling-jealousy or disharmony is the predominant feature of the child's relationship with his siblings and occurred in 7 cases. The importance of good relationships with peers must also be recognized as the child who lacks friends or is unpopular and unhappy in the class-room may be unable to concentrate on his work. It is maintained that a good relationship with the teacher is essential in order to secure good motivation - the significance of this relationship has already been noted in the review of the literature.

Organization of routine after school reveals one clearly faulty aspect, related to the field of interpersonal relationships and schoolwork; in all 10 cases where organization was too lax and toonlittle supervision was given, the parents either showed no interest or gave little positive encouragement to the child for good performance of schoolwork. The importance of this aspect has also been indicated in the review of the literature, in relation to motivation.

As regards schoolwork, although only 7 children were considered to be behind with their work, all 22 were thought to be capable of improvement. This is to be expected of children whose powers of concentration are at present poor.

The child's attitude to school proved to be less significant than the attitude to homework and schoolwork in general. Whereas only 11 children had unfavourable attitudes to school, 17 showed a dislike of and poor attitude to homework. Knowledge as to performance of homework is meaningless, it is thought, without a knowledge of the amount of supervision the child requires and receives. The 8 children, who were thought

to require close supervision and to be lacking it, were all said to do their homework badly. Out of the 10 subjects who needed and were receiving close supervision, 8 were performing their homework satisfactorily. The child's rate of work in the majority of cases was described as too fast, the work being rushed through as quickly as possible.

The parents' attitude to homework is, of course, extremely important, particularly the Mother's attitude. In all 6 instances where the attitude was good, homework was performed satisfactorily. In only 2 out of the 11 cases where the Mother's attitude was really poor and where little supervision was given or no interest shown, was performance of homework fair.

The manifestations of lack of concentration in work appear to be mainly untidiness and carelessness, too fast a pace of work and an inability to do individual work satisfactorily. The writer was unable to estimate with any accuracy spheres of work where concentration is worst, as the different fields of concentration are often closely inter-related and separation virtually impossible for the teacher. Most teachers were unable to state whether concentration was poorer in the visual or auditory sphere. More detailed investigation and accurate assessment of this aspect is necessary.

The most striking behavioural manifestations of lack of concentration appear to be hyperkinesis and restlessness which, when present in marked degree; are coupled with distractibility by "external" elements, day-dreaming and distractibility by "internal" elements, talkativeness and the seeking of attention. It is considered significant to draw a distinction between the two types of distractibility.

As regards level of motivation it appears extremely important to differentiate between the child whose motivation is really low and who dislikes schoolwork, and the child who lacks confidence or needs encouragement and incentive and whose attitude to work is not primarily one of dislike. The other distinctions between these two groups have already been pointed

out and the first group seems potentially by far the greater problem. It is to be expected that the manner of dealing with each type would surely differ.

The main features of the parents' attitude to the problem was the lack of insight and the rather selfish concern because of personal disappointment with the child's progress. The necessity is seen for dealing with the parents as well, and not only with the child.

The question of the practical application of all these points in a group-training in powers of concentration will be considered further.

(3) Results on Scholastic Tests of the Child Guidance Clinic

The final step of the preliminary investigations, it has already been mentioned, was the administration of the Graded Reading and Arithmetic Scholastic tests of the University of Cape Town Child Guidance Clinic. It was considered desirable that one of the bases for selection of subjects should have been results that were at least average and corresponded closely with standard placement; this was not possible in practice, the difficulties of variation of attainment being too great. It was decided, however, that at least as regards arithmetic addition ability, on which the performance of four tests of concentration depended to some extent, there should be an equal number of children who were weak in this ability in both the Experimental and Control Group. Analysis of the table of results (see Table X) indicates that :

(a) results in all 3 tests were average or above average in 9 cases : E I O Q R S T V W
5 of these children, E Q R S and W were in the Experimental Group.

(b) results on all three tests were below average in only 1 case : M

(c) Arithmetic Addition was the lowest result out of all 3 in 14 cases : A B C D F G H J M N O R S T

7 of these children, A D F G H R S, were in the Experimental Group and the other 7 in the Control Group Arithmetic Addition was noticeably low or behind the standard level in 6 of these 14 cases : A C D F H and J 4 of them, A D F H, were members of the Experimental Group

(d) Arithmetic Problems was behind the standard level in 5 cases : G K L M P

(e) Reading was behind the standard level in 2 cases : N and M.

It is possible that the poor achievement in Arithmetic Addition may be closely related to poor powers of concentration. Rapaport's use of Arithmetic as a test of concentration has already been referred to. 8 out of the 9 cases whose concentration was described above as 'extremely poor' achieved their lowest result in the Addition test, whereas only 4 of the 9 subjects whose concentration was said to be 'poor' did so. However, of the 4 subjects whose concentration was thought to be fair, 2 achieved their lowest result in Arithmetic Addition.

(See Table X on page 169)

(4) Results on the Wechsler Intelligence Scale for Children.

The scaled scores obtained by the members of the Experimental and Control Groups are presented below in tabular form (see Table XI). It would have been interesting to have compared the profiles of a group of good 'concentrators' with those of the group of twenty-two bad concentrators; for example, scores on Coding, which is generally considered a test of learning ability, might be expected to be lower in the bad 'concentrators' than in the good; similarly, Arithmetic, which in the Adult Scale, Rapaport maintains, is a test of concentration. It would also have been of value to know whether after training, there would be any significant change in the profiles of the bad 'concentrators'. However, the scope of this piece of work did not allow these investigations to be carried out, and they must be left to further research on the relationship between concentration and intelligence.

TABLE X

RESULTS ON SCHOLASTIC TESTS OF THE CHILD GUIDANCE CLINIC

NAME	I.Q.	AGE	STD.	READING GRADED		ARITHMETIC PROBLEMS		ARITHMETIC ADDITION	
				A.A.	STD. Q.	A.A.	STD. Q.	A.A.	STD. Q.
Alan	103	10 5/12	III	10 7/12	III end 1st	11 5/12	IV 1st	8 7/12	I end 1st
Barry	114	10 9/12	III	14 5/12	end VI	11 2/12	IV end 2nd	10 7/12	III end 2nd
Charles	128	10 2/12	III	13 7/12	VI end 1st	12 3/12	IV 4th	10 3/12	end II
Derek	116	10 3/12	III	10 7/12	III 3rd	11 7/12	III 4th	9 7/12	II end 3rd
Elliot	114	10 3/12	III	13 1/12	V 3rd	13 1/12	VI 2nd	14 3/12	VI end 3rd
Frank	109	10 1/12	III	13 7/12	VI end 1st	11 5/12	IV 1st	9 7/12	II end 3rd
Gary	106	10 7/12	III	12 5/12	end IV	10 1/12	II 4th	8 5/12	I end 2nd
Harold	119	10 9/12	III	14 5/12	VI end 2nd	12 3/12	IV 4th	9 5/12	I end 3rd
Ian	123	10 5/12	III	13 5/12	VI end 1st	11 5/12	IV 2nd	12 5/12	end IV
Jeremy	98	10 9/12	III	11 5/12	IV end 1st	10 5/12	III 2nd	10 1/12	II 4th
Kenneth	112	10 5/12	III	12 1/12	V 1st	9 9/12	II 3rd	10 5/12	III 2nd
Larry	99	10 6/12	III	14 5/12	VI end 2nd	10 1/12	II 4th	11 5/12	IV 1st
Martin	97	10 9/12	II	9 5/12	II 2nd	8 5/12	I 3rd	8 5/12	I end 2nd
Norman	95	11 5/12	IV	10 1/12	end II	10 5/12	III 2nd	9 5/12	II 3rd
Oscar	99	11 5/12	IV	13 5/12	V 4th	13 7/12	V 4th	11 3/12	IV 2nd
Paul	100	11 3/12	III	10 5/12	III end 2nd	9 5/12	II 3rd	9 11/12	II end 3rd
Quentin	95	11 5/12	IV	12 5/12	end IV	10 5/12	III 1st	13 5/12	end V
Roy	101	11 7/12	IV	11 3/12	end III	11 6/12	IV 1st	10 5/12	III end 1st
Simon	94	11 5/12	IV	12 5/12	IV 3rd	12 3/12	IV 4th	11 8/12	IV end 1st
Tom	96	11 5/12	IV	11 5/12	IV end 1st	11 3/12	III 4th	10 5/12	III 1st
Vincent	101	10 7/12	IV	12 5/12	IV 3rd	11 7/12	III 4th	11 6/12	IV 1st
William	94	10 5/12	IV	11 7/12	IV end 1st	10 7/12	III 3rd	11 7/12	IV end 1st

KEY : A.A. = Attainment Age
Std. Q. = Standard and Quarter
(for example, Std. III, 4th quarter)

TABLE XI

SCALED SCORES ON THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	V	W	
Verbal Scale I.Q.	103	115	113	105	114	116	108	116	120	101	106	110	91	91	100	97	101	103	100	95	106	101	
Performance Scale I.Q.	103	110	140	125	111	99	103	118	121	94	115	87	104	100	97	103	89	100	89	99	94	87	
Full Scale I.Q.	103	114	128	116	114	109	106	119	123	98	112	99	97	95	99	100	95	101	94	96	101	94	Mean Scaled Scores
Information	10	12	11	12	11	13	16	11	12	12	11	13	9	7	10	7	8	8	8	11	12	9	10.59
Comprehension	11	17	11	11	12	11	11	12	14	11	17	13	11	11	11	10	15	11	11	10	12	10	11.95
Arithmetic	9	11	10	12	12	14	11	10	14	8	7	9	7	7	6	8	10	10	9	10	13	10	9.86
Similarities	11	11	15	7	13	13	8	17	12	10	10	13	8	7	9	7	8	8	11	7	8	12	10.23
Vocabulary	13	12	14	12	13	12	12	13	12	11	12	13	11	10	10	11	11	10	9	10	12	9	11.45
Digit Span	8	11	11	11	12	12	9	12	15	9	9	8	6	10	14	15	9	15	12	7	9	11	10.68
Picture Completion	7	13	12	13	13	11	10	13	14	9	15	3	10	12	8	9	5	14	10	12	10	9	10.55
Picture Arrangement	13	11	17	16	12	8	8	8	13	9	7	9	8	5	8	11	10	7	10	11	9	7	9.86
Block Design	12	10	20	15	11	11	11	16	14	9	13	9	14	11	12	9	9	7	8	11	12	11	11.59
Object Assembly	12	14	18	14	10	12	14	16	14	12	16	11	11	11	15	14	9	13	6	7	10	10	12.23
Coding	8	9	12	10	12	7	9	10	10	7	10	9	10	11	5	9	9	9	8	8	5	4	8.68

Scaled Score of 10 is the norm

7. Training in Concentration

(1) Training Procedures

One major difficulty presented itself. The time available necessitated a group-training in concentration. Training in a group implies that the tackling of the problem will be identical for each child, and, indeed, it is inherent in the very nature of the experimental design that the time allotted to and the methods used with each child will be the same for all. The view adopted here is that concentration is a series of habits of behaviour which can be learnt or acquired. However, it has already been shown that in the group of children studied, the causes and manifestations of lack of concentration are many and diverse; the correct habits of behaviour may not have been acquired for a number of reasons - perhaps lack of knowledge of the correct habits, lack of motivation and interest due to lack of self-confidence or dislike of the work, or an emotional disturbance or immaturity - and the problem may manifest itself in a number of different spheres. It follows that the solution to the problem will depend then on both the causative factors and the manner of manifestation which differ from one individual to another. It must be made clear that the attempt to develop the powers of concentration of the children was limited to training periods in the Child Guidance Clinic in which all Experimental subjects participated, training which was administered in a group and which did not take account of individual factors outside this setting, for example, incorrect handling at home or unhappiness at school, to mention just two. No advice was given to parents or teachers about any difficulties in the home or school, although in many cases these difficulties were apparent and advice could have been helpful. It was indeed, very frustrating, in certain instances, to be unable to tackle the problem in its entirety and to avoid making suggestions and recommendations for changes, particularly to the parents of the child.

However, the primary consideration was a group-training in habits of concentration, the principles and methods used being the same for all the children who participated in the training.

Training took place over a period of approximately three months and nineteen sessions were held altogether, the members of the Experimental Group attending two afternoons a week at the Child Guidance Clinic for almost one hour at a time. The eleven children in the Experimental Group were divided into two classes, the primary consideration in the division being of necessity a practical one - that is, which children would be able to attend at a particular time.

The object of the training sessions was to develop powers of concentration, to assist the child in learning the correct habits of concentration.

Thus, it was necessary to provide situations which would demand concentration and then to attempt training in habits of concentration in those situations. The assumption was that any improvement in powers of concentration would be measured by an improvement in performance on the alternate set of tests of this ability. Effective concentration implies the inhibition of irrelevant responses, adequate selection of stimuli, the exclusion of irrelevant stimuli from the mind of the individual, the ability to resist distracting influences and to persist at a task with all possible energy until it has been completed as successfully as possible. Thus, these were the habits in which the child had to be trained. Concentration is considered to be essential in the ability to remember, to distinguish, to perceive similarities and differences and to discover facts and errors previously undetected - thus material which pertained to these abilities would demand concentration.

However, it was obvious that it would be futile merely to provide situations calling for concentration if the child was uninterested and unwilling to perform, for effective concentration implies also a high level of motivation and a keen

interest. The importance of the relationship between concentration and motivation has already been discussed. Therefore, at all times an attempt was made to induce in the child as high a level of motivation as possible, to keep his interest and to give some attractive incentive to encourage performance on what might well be an unattractive and disliked task, on the assumption that whether or not the child wished to, he would then begin using the correct habits of concentration which might at a later date become habitual; in addition, he might also acquire a more genuine interest in tasks of the same or similar nature once he had seen the effects of his efforts. Star-charts showing the achievement of each child were utilized frequently throughout the training, inter-group and - individual competition was encouraged and several material incentives were offered for good performance. The writer considered it important to include some simple exercises well within the child's ability so that the feeling of success and achievement might come into operation, and act as powerful driving influences upon the child. The relationship of the writer with the child was also felt to have much potential power as a motivating factor and incentive. Where possible, certain exercises were introduced as games so that the child would enjoy them, be interested and try his best. The difficulties of securing adequate motivation were foreseen, for the children were to attend after school hours, at a time when they might very well be participating in sport.

The problem of discipline was difficult to solve. It was thought best to avoid, if possible, a 'schoolroom' atmosphere so that the children should not develop adverse attitudes to the training sessions. However, discipline had to be maintained in some manner in order that the child should have a feeling of responsibility about his work and behaviour during the training-sessions. It was hoped that, by raising the level of motivation and by making the sessions as attractive as possible for the child, difficulties of disobedience could be avoided.

As an essential aim of the training procedures was that they should set up a tendency in the child to respond in the same way in the classroom and when doing homework, that is, that transfer of training should occur, it was attempted throughout the sessions to instil in the children a conscious awareness and understanding of the principles and techniques which could be put into practice in other situations, and to encourage application of these outside the Clinic.

In the planning of the training sessions, a choice had to be made from a large number of methods and a great variety of content. It was decided to devote eight of the nineteen sessions to some form of the 'silent-reading drill' advocated by Brooks[1] which had been particularly impressive for the following reasons - it was said to prove very effective in holding the child's interest and in forcing concentration on the matter being read, it was particularly suitable to group administration and was reported to compel practice in habits which would carry over into and improve the ability to do independent work, a feature which was considered to be particularly lacking among the subjects for the research. Brooks[2] actually states that " ... Despite the chief interest being in the spirit of lively competition engendered by these drills, the interested, active and enthusiastic co-operation of the pupils is secured under conditions that make for real improvement in ability to study and to concentrate ... " The method was as follows : A short passage was handed to the child and the writer, having prepared a list of questions beforehand, then asked the questions one at a time, letting the children read to find the answer; the idea here was to see which child could find the answer first. It was considered, however,

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1. Improving Schools by Standardized Tests, Chaps. XI, XIV and XV.

2. ibid., p. 251.

that more intensive study of the passages over a longer period of time was also required; thus the children were set to work individually or in pairs with the same passage, being told to keep in mind the fact that all statements in the passage they were reading were answers to questions that would be asked at a later stage. It was emphasized to them that if, after reading one sentence or statement, they were unable to repeat the fact contained or to present the answer to a question, it would mean that they had not been concentrating properly; thus they themselves would know when they had been concentrating and when they had been day-dreaming and would be able to deal with their lack of concentration by re-reading the sentence or statement until they could supply the answer or repeat the fact. In certain instances the children were asked to make a list of questions themselves which they would all have to answer after studying the passage, and the adequacy of each question was discussed in the group; in other cases, the writer presented the list of questions. An adequate period of time for reading was always allowed. This method impels not only visual concentration on the passage being read but also auditory concentration on the questions that are asked.

Six sessions consisted of various types of picture or verbal work which called for close observation, visual discrimination, detection of facts or errors, memory, and simple processes of thinking in which powers of concentration would have to be employed. These were interspersed among the other sessions, the material provided being attractive and very unlike schoolwork. It was decided to spend two sessions entirely on discussion of some sort, for example, homework, schoolwork, the effects and methods of concentration, and the generalization to other situations.

A brief plan of the training sessions is presented below, after which the material in each session will be described in detail.

Sessions I and II : Introduction
Sessions III, V, VII, IX, XI, XIV, XVI and XVIII : Reading-Drills
Sessions IV and XIII : Discussions
Sessions VI, VIII, X, XII, XV, and XVII : Miscellaneous
Session XIX : Ending.

Session I

Children were seated and introduced to one another. An exercise book and pencil was given to each child which would be his for all the sessions, and the subjects were allowed to write their names on the books. The following passage was then read.

Robin Hood and Friar Tuck

From ten o'clock in the morning until four o'clock in the afternoon, Robin Hood and Friar Tuck fought and both were such excellent swordsmen that neither could get in a blow at his opponent. At length, Robin went down on one knee and begged a favour of the friar. "Give me leave to blow three blasts on my horn", he asked. "That I will do", said the friar, "I am not afraid to thee and thy blasts". So Robin put his horn to his lips and blew three loud blasts and fifty yeomen clad in Lincoln green came running towards them. "Who are these men?" cried the friar. "They are my merrie men", replied Robin. "Now grant me a favour", said the friar. "Let me whistle three times". "Granted", answered Robin without hesitation. So the friar whistled three times and fifty fine powerful dogs came running up. "Here is a dog for every man", cried the friar, "and I myself am a match for thee". "Call off thy dogs", warned Little John, "or they are likely to be hurt". But the friar urged his dogs to attack. They sprang at the archers and caught the arrows in their mouths, but when half-a-score of the animals were shot dead, the friar cried, "Hold! your master and I will come to terms". "We are in need of thee in the greenwood"

said Robin, "and if thou wilt come to Nottingham to dwell with us, I will give thee a new livery and a weekly wage". So back went the friar with the outlaws and became one of the band, afterwards becoming famous in the song and ballad as "the jolly Frair Tuck".

The following questions were then read and the children were instructed to write the answers in their exercise books.

(1) For how long did Robin and the friar fight?
(2) Why did neither of them win?
(3) What favour did Robin ask of the friar?
(4) What happened after the favour was granted?
(5) What did the friar ask Robin to allow him to do?
(6) What was the result of the friar's action?
(7) What warning did Little John give the friar?
(8) How did the friar respond to his warning?
(9) What did the friar do after some of his dogs had been killed?
(10) Where did Friar Tuck go to live after the incident?

The children were asked to record the number of questions they thought they had answered correctly and were told that another passage would be read and that they should listen every single moment, concentrating as hard as they possibly could this time. The passage read was as follows.

Aladdin's Wonderful Lamp

When Aladdin asked for his breakfast one day, he found that there was no food in the house. "If you will wait a little, my son", said his mother, "I will sell some cotton I have spun, and then I can buy food". "No, mother", said Aladdin, "keep your cotton; I will sell my lamp instead". "All right", replied his mother, "but it will fetch a better price if I clean it". And with that she began to rub it. In a flash a genie

stood before her and roared with a voice like thunder, "What do you wish? I am ready to obey you as your slave". The poor woman was so frightened that she could not speak, but Aladdin, who had seen a genie before, took the lamp from his mother's hands and said in a firm voice, "Bring me something to eat; I am hungry". In a moment the table was spread with all sorts of good things in dishes of gold and silver. Enough food was left over from breakfast to last for two days, and when this was all gone, Aladdin sold one of the silver plates to a man who gave him some money for it. With this money, some more food was bought, and this went on for some time. Whenever food was wanted, a plate was sold, until at last there was only one fine large gold dish left. Aladdin was lucky enough to sell this for a large sum, and with the money he was able to live in plenty for a very long time.

Questions

(1) How did Aladdin's mother want to get money to buy food?
(2) What was Aladdin's plan for raising money?
(3) Why did Aladdin's mother start cleaning the lamp?
(4) What happened when she began to rub it?
(5) What did the person who appeared tell Aladdin's mother he was ready to do?
(6) Why was she unable to speak?
(7) What order was given by Aladdin?
(8) For how long did the breakfast food last?
(9) What did Aladdin do when he wanted more food?
(10) What did the money obtained for the large gold dish enable Aladdin to do?

The subjects were told that their marks would be given to them at the following session when the writer would also explain why they were coming to the Clinic.

A game was then played which necessitated the inhibition of a certain response. A child was asked many questions

and was instructed to avoid replying 'Yes' or 'No'. Thus if the child was asked whether he liked swimming and replied 'Yes', he was then disqualified. Each child was given a turn, the time until failure recorded, and the winner of the game announced.

Session II

The purpose of Session I may now be made clear. The aim had been to show the children the results of good concentration and thus in the previous session they had been questioned on the contents of two passages, the employment of concentration in the second being emphasized. In fact, the second story chosen had been intentionally an easier one in order that the children could achieve better results on it. The exercise books were returned to the subjects and much was made of the fact that without exception, every child had scored more correct answers on the second story and that this was because they had really tried their best and had been listening and attending well.

It had originally been thought that it might be best to avoid telling the children the real reason for their attendance. However, as certain parents and teachers had already informed the children of this, it seemed best to be as frank as possible and it was explained that the children were all going to come twice a week in order to improve their powers of concentration, that they had been specially selected and that it was very important that they did their best and co-operated so that they could not only learn something from but also enjoy the sessions.

Attendance and performance charts were then shown to the subjects who were told that marks and stars would be given for good attendance and performance, and that prizes would be awarded at the end of all the training sessions.

The group participated in a game which illustrated the importance of close observation and concentration. The following twenty objects were placed on the table and the subjects were allowed a period of twenty seconds to observe them and had then to record as many as they could remember :

key crayon fork dog rubber box of matches
sweet cat watch cigarette spoon shoe
car doll ruler shell train penknife
mirror penny

A book containing short articles pertaining to wonders of the world was given to each child and it was explained that the subjects could read one article every day at home, spending about ten minutes over it, reading two sentences at a time, and questioning themselves on the contents, answering correctly before they proceeded to the following sentence. The importance of the question - and - answer method was emphasized and it was explained that this could help them to see whether or not they had really concentrated on what they had just read. A short article on the 'Eiffel Tower' was then selected; the writer read one sentence at a time and then a question was asked, each child being given a turn to answer; it was ascertained that all children understood the method of reading.

Session III

This session consisted of reading-drill, the method used being as follows. Ten questions were read, one at a time, and the subjects read the passage to find each answer, he who found the correct answer first being the winner. The verbal answering of questions having been completed, the children were then set to work in pairs, reading the same passage sentence by sentence and questioning each other on it. A period of approximately quarter of an hour was allowed for this, after which each child was given the original list of ten questions to

answer in his exercise book.

Pinnochio and the Egg

It began to grow dark, and Pinnochio remembered that he had nothing to eat. There was an uncomfortable feeling in his stomach. In fact, after a few minutes he was so hungry that he could have eaten nails. So he ran about the room and searched in every dish and cupboard for a little bread - even dry bread - yes, he would have been thankful for a crust, or a bone left by a dog. Suddenly, in the pile of rubbish he saw something white and round that looked like an egg. Instantly he pounced upon it. It really was an egg. He rolled it from one hand to the other, he kissed it and patted it and said, "Now how shall I cook it? Shall I make an omelette? No, it would be better to poach it. But perhaps it would be more tasty if I fried it; or shall I cook it in the shell? No, the quickest way would be to poach it. I cannot wait to eat it".

No sooner said than done. He set a little stewpan over the brazier of lighted charcoal, put some water in it, instead of oil or butter, and when the water began to boil, tac! he broke the eggshell and held it over the pan. But instead of the yolk and white of an egg, a little chicken flew out gaily, and making a polite bow, said cheerfully, "A thousand thanks, Mr. Pinnochio, for having spared me the trouble of breaking the shell. Goodbye!"

With that the chicken spread its wings, and flying through the open window, was soon lost to sight.

Questions

(1) Why was there an uncomfortable feeling in Pinnochio's stomach?

(2) Where did Pinnochio look for something to eat?

(3) Where did he find the egg?

(4) What did he do with it after pouncing upon it?

(5) Which way of cooking the egg did Pinnochio consider the quickest?

(6) Which way of cooking did he think was more tasty?

(7) Why did he decide to poach the egg?

(8) What happened when Pinnochio broke the eggshell?

(9) Why did the chicken thank Pinnochio?

(10) How did the chicken get out of the house?

Session IV

This was a discussion session. After the marks obtained in the previous session had been presented, the group discussed homework, attitudes toward it, how much time was spent over it and how it was done. It was then explained that the subjects should try to use the same methods at home as they were learning to use at the Clinic; even if they disliked a certain subject, they should make themselves spend at least five minutes on it, trying their best and increasing the time of study gradually. Trying, it was emphasized, was half the secret; if they wanted to do something well, if they wanted to concentrate and do their best and show other people how much they could improve, then they would be able to do so. In trying to concentrate on their homework, they should set themselves a goal and see how well they could perform a certain piece of work within a set time, they should try very hard to shut everything else out of their minds and to take notice only of the work before them. In reading, their aim should be to understand everything that they read. Here, the method of reading and the formulation of questions during reading was explained in detail. It was stressed that the most important thing was to want to try - to want to show their parents, teachers, the writer and themselves that they could improve.

The value of concentration in noticing things was then pointed out. The writer asked, for example, how many of the subjects could remember what was written on a match-box or a penny, and noted that there were many things and objects always around one

to which one became so accustomed that they were never noticed. Concentration helped one to see and notice things, to remember things, to see mistakes and to understand things. The subjects were asked to be on the watch for objects everyday on their way home from school, objects that had always been there but that they had never taken notice of.

The session ended with a game - 'Do this, Do that', that is, certain actions were performed in front of the children in conjunction with the words 'Do this' or 'Do that'; whenever the words 'Do this' were said, the children had to imitate the accompanying action but if the words 'Do that' were said, they had to remain still and as they were. The game continued until only one child was left and it was indicated that this game depended upon listening and watching very closely and keeping in mind what had to be done.

Session V

Again, a passage for reading-drill was given to each child, but this time no prepared questions were provided and, under supervision, the group read aloud one sentence at a time and discussed appropriate questions that could be devised about the content, as well as a suitable title for the passage. A period of a quarter of an hour was then allowed for individual study of the passage, after which the list of questions agreed upon was read one question at a time and the subjects wrote the answers in their exercise books.

What Tom saw in the Room

Under the snow-white coverlet, upon thesnow-white pillow, lay the most beautiful little girl that Tom had ever seen. Her cheeks were almost as white as the pillow, and her hair was like threads of gold spread all about over the bed. She might have been as old as Tom or maybe a year or two older;

but Tom did not think of that. He thought only of her delicate skin and golden hair, and wondered whether she was a real live person, or one of the wax dolls he had seen in the shops. But when he saw her breathe, he made up his mind that she was alive, and stood staring at her as if she had been an angel out of heaven.

Questions

(1) Where was the little girl lying?

(2) How are her cheeks described?

(3) How is her hair described?

(4) What three things did Tom think about when he looked at her?

(5) What made him decide that she was alive?

(6) Why did he stare at her?

(7) Did he like the little girl, and why?

(8) What are the two colours mentioned in the story?

Session VI

The session began with comment on the progress of each child so far. The attendance and achievement charts were studied in detail, specific weaknesses or good points in the improvement of individuals were pointed out and the progress of both groups was compared. Remarks were made about the behaviour of the whole group.

The material for training was a black-and-white picture in which were many items beginning with the letter 'C'. The subjects were asked to write down as many objects beginning with this letter as they could find in the picture and it was stressed that there were at least thirty and that they would need to look very closely in order to find all of them. No special time-limit was given but all the subjects were urged to continue working as long as they could in order to get as many items as possible.

After the scores for this exercise had been recorded and the results discussed, the following material was then presented. A card with pictures of fifteen separate coloured objects on it was shown to the subjects for a period of thirty seconds and they were instructed to look closely at all the objects. A second card was then presented, also with fifteen pictures on it, and the subjects had to record all the objects which had also been present in the first picture. The pictures on Card A were as follows :

glove	cow	pipe	monkey	ship
doll	moon	dog	penknife	coat
collar	matches	tent	net	bottle

Card B contained the following pictures :

man	glove	poundnote	coat	moon
mop	bottle	tie	pipe	cat
matches	can	nuts	monkey	chop

Again, the scores for this exercise were recorded and the results discussed; it was explained that it had been necessary to notice, to see what was the same and what was different, and to remember, in order to do well; all these things involved the use of concentration.

Session VII

This session consisted of reading-drill, the subjects first reading to answer verbal questions which had been prepared by the writer, then studying the passage in pairs for a quarter of an hour and finally answering each question in their exercise books.

Tea

Tea is the dried leaves of the tea bush. This bush grows in hot countries that have enough rain. It usually grows on the sides of hills. It will not grow well if the water in

the soil cannot flow away quickly from the roots. Long ago the tea bush grew only in China and Japan. The Chinese and Japanese drank tea in shallow cups that did not have handles. They did not put milk and sugar in their tea. In China this drink was called cha. In 1658 traders brought tea to England and Europe from these Eastern lands. They sold a pound of tea in those days for £5. Only rich people had enough money to buy it. Two hundred years ago in England people had heard about tea, but many of them had not tasted it. Men then took tea bushes from China and Japan and planted them in other lands. The British planted tea on the sides of hills in India, Burma and Ceylon. The Dutch planted it in the East Indies. All these places are hot lands that have heavy rains for some months each year. Now there are big plantations of tea bushes in these lands. They send away many cases of tea each year to other countries. A lot of tea from India and Ceylon goes to the British Isles and Europe. Tea from the East Indies often goes to Australia and New Zealand. Tea from China and Japan often goes to America. England imports more than four hundred million pounds of tea each year. Tea is cheap now and men sell a pound of it for a few shillings.

Questions

(1) What is tea?

(2) In what sort of climate does it grow?

(3) Why are tea bushes planted on the sides of hills?

(4) Name the two countries in which tea grew first?

(5) What was the name for tea in China and how did the people there drink it?

(6) In what year was tea brought to England and Europe?

(7) How much did a pound of tea cost then and who drank it?

(8) In which three countries did the British plant tea?

(9) Where did the Dutch plant it?

(10) Why were these places chosen to plant tea in?

(11) Name two countries that send away tea and two countries that receive tea.

(12) How many pounds of tea does England import each year?

(13) What is the price of tea nowadays?

Session VIII

After the attendance and achievement charts had been displayed and studied, the following exercise was presented to the subjects on paper :

Word Puzzles

In these questions, numbers are used instead of letters.

Example : If 123 stands for BAT, what does 321 stand for? The answer is TAB. 3 stands for T because it is the last figure in the number standing for BAT. 2 is the second figure in the number standing for BAT and so it stands for A. 1 is the first figure in the number standing for BAT and so it is B. That makes 321 stand for TAB.

Now try these :

(1) If 1258 stands for LANE, what is 1825? _____

(2) If 2564 stands for LEAP, what is 4625? _____

(3) If 14227 stands for TABBY, what is 2427? _____

(4) If 34456 stands for APPLE, what is 4356? _____

(5) If 79425 stands for AFTER, what is 9224? _____

(6) If 627538 stands for PLANET, what is 8763? _____

(7) If 418572 stands for GATHER, what is 42718? _____

(8) If 51739648 stands for TRIANGLE, what is 83681? _____

(9) If 84196275 stands for FRIGHTEN, what is 264182? _____

(10) If 736626 stands for TERROR, what is 627736? _____

If 123456789 stands for HOUSEMAID, what words do the following numbers stand for?

(11) 62345 _____ (12) 4789 _____

(13) 9254 _____ (14) 1579 _____

(15)	74454	_____	(16)	41765	_____
(17)	1265	_____	(18)	4556	_____
(19)	67894	_____	(20)	417954	_____

The above exercise having been completed and the answers discussed, another exercise was given on paper to each subject as follows :

Animal Puzzles

In each group of mixed-up letters, you will be able to find the name of an animal if you change about the letters correctly.

Examples : What is the animal in GDO? The answer is DOG.

What is the animal in WOC? The answer is COW.

By changing the order of the letters in each one, the name of the animal was found.

Now try these :

(1)	TAB	_____	(11)	EDER	_____
(2)	TRA	_____	(12)	BALM	_____
(3)	PEA	_____	(13)	RHESO	_____
(4)	MAR	_____	(14)	LAMCE	_____
(5)	FLOW	_____	(15)	CDKU	_____
(6)	TOGA	_____	(16)	GIRET	_____
(7)	HEAR	_____	(17)	TEKNIT	_____
(8)	BRAE	_____	(18)	KEANS	_____
(9)	BRAZE	_____	(19)	OYKNEM	_____
(10)	ALES	_____	(20)	BAOBNO	_____

Session IX

This was the fourth reading-drill session, and as in Session V, the group devised the questions which they asnwered finally in their exercise books after a period of individual study.

The Ant and the Dove

There was once an ant who stopped at a fountain to drink of its waters but, leaning over too far, it tumbled in, and would have drowned. By chance, however, a dove was seated in a tree nearby, and saw the danger. It plucked a leaf from the tree and dropped it into the stream so that the ant, scrambling on it, was soon floated safely to land. A little later a snarer was spreading his net and would have caught the dove, but the ant bit his heel. This made him drop his net, and the dove, hearing the noise, saw the danger and flew safely away.

Questions

(1) Why did the ant stop at the fountain?
(2) How did it tumble in?
(3) Where was the dove when he saw the danger?
(4) How was the ant saved?
(5) What is a snarer?
(6) Why was the dove in danger?
(7) How did the ant save the dove?
(8) What is the moral of this story?

The group then participated in the following game - "I went to the toy-shop and bought ..." The first child to start had to mention the name of a toy he had bought, whereupon the second subject repeated the statement and added the name of a toy he had bought; each child in turn had to repeat all the toys mentioned previously and give the name of a new one. As soon as a subject excluded the name of any one toy mentioned previously, he lost his place in the game which, therefore, continued until one child was left. The importance of listening very carefully to and remembering what was said all the time was emphasized.

Session X

Here two types of material were used. First of all, the children were instructed to write in their exercise books as many words as they could, all beginning with the letter 'B'. A time limit of five minutes was imposed and the ability to persist and to keep on trying was commented upon.

Secondly, the following task which necessitated the detection of visual errors was presented to the subjects on paper :

In each sentence, cross out the part of one word which spoils the sense of the whole sentence.

Example : We like to eat rice-cream.

In this sentence the r in rice-cream should be crossed out so that the correct word will be ice-cream.

Now try these :

(1) Mother laid the stable and we had tea.
(2) I read a goodbrook last week.
(3) The scar went quickly along the road.
(4) He bought some crakes for tea.
(5) I play with a different story every day.
(6) The wind began to below hard.
(7) The lady fell and hurt here leg.
(8) The ship sailed far across the seal.
(9) He bought it fort fourpence.
(10) The boy wore a blue and red striped tile.
(11) He was out in the train and got wet.
(12) Mary said it was there coat.
(13) The dress was dripped from top to bottom by the nail.
(14) Every boy should story his hardest in school.
(15) She was a brig girl for her age.
(16) The baby was fast asleep in the carrot.
(17) I like to eat petals for my dinner.
(18) The plane took coffee for Johannesburg.
(19) The graceful was won by the fastest boy.
(20) The boy washed sick in bed with a very bad cold.

Session XI

In this, the fifth reading-drill session, the same method was used as in Session VII, a list of questions having been prepared previously.

Nat and Mr. Bhauer

When Nat went into school on Monday morning he quaked inwardly, fearing that he would have to display his ignorance before them all. But Mr. Bhauer gave him a seat in the deep window, where he could turn his back on the others, and Franz heard him say his lessons there, so no one could hear his blunders or see how he had blotted his copy-book. He was truly grateful for this and worked so hard that Mr. Bhauer said, smiling, when he saw his hot face and inky fingers :

"Don't work so hard, my boy; you will tire yourself out, and there is time enough".

"But I must work hard, or I can't catch up with the others. They know heaps, and I know nothing", said Nat.

"You know a good many things which they don't", said Mr. Bhauer, sitting down beside him.

"Do I?" asked Nat in great surprise.

"Yes; for one thing you can keep your temper, and Jack, who is quick at numbers, cannot; that is an excellent lesson, and you have learnt it well. Then you can play the violin, and not one of the lads can, although they want to very much. But best of all, Nat, you really want to learn, and that is half the battle".

Nat's face brightened as he listened. "Yes, I can keep my temper", he thought with a sense of comfort, "and I can fiddle, though I don't know where the Bay of Biscay is". Then he said aloud :

"I do want to learn and I will try my best. I never went to school before, but I couldn't help it; and if the fellows don't laugh at me, I'll get on first rate".

Questions

(1) On what day of the week did this incident occur?

(2) Why did Nat quake inwardly when he went into school?

(3) In what way did Mr. Bhauer help him?

(4) In what way did Franz help him?

(5) How did Nat show Mr. Bhauer that he was thankful?

(6) Why did Mr. Bhauer tell Nat not to work so hard?

(7) Why did Nat feel that he must work hard?

(8) What could Nat do that Jack couldn't do?

(9) What could Nat do that none of the other boys could do, although they wished they could?

(10) What was the most important thing that would help Nat with his work?

(11) Why was he so stupid?

(12) What did Nat fear the other boys would do if he made mistakes?

Session XII

In this session two types of material were used, performance on both depending upon close observation.

A black-and-white picture in which were many items beginning with the letter 'B' was displayed to the subjects who were instructed to write down as many objects beginning with this letter as they could find in the picture. The group was told it was possible to find at least forty to fifty objects beginning with 'B'.

The following exercise was then presented on paper to each subject :

Hidden Animals

The name of an animal is hidden in each sentence in this puzzle. If you look at the words and letters carefully, you will be able to find the animal. Underline the animal's name in each sentence.

Example : The word 'hare' could be hidden like this -
"Oh are you never going to stop!" thought Peter as his teacher went on and on scolding him.

Now try these :

(1) Jack stared at the bad ogre standing before him and felt very scared.

(2) "Mummy, can't you take me to the circus? I want to see all the animals", said the little boy.

(3) The teacher told John he would have to use all his brains to find the answer to the problem.

(4) The children thought it would be a really lovely party when they saw all the cakes and lemonade.

(5) "Ow", shouted the baby when the crab bit his toe.

(6) When Mrs. Jones saw how hard it was raining, she told Bobby to take his mac at once.

(7) "Would you like to get on the tractor and have a ride, Ernie?" asked the farmer.

(8) "Let go at once!" screamed Willie when his brother pulled his hair.

(9) Mr. Mac owns the shop on the corner that sells all sorts of sweets.

(10) "Jump on your bike and ride as fast as you can!" warned Tom as he saw the thieves coming nearer.

(11) The new bike was so beautiful that Fred thought it was altogether different from other bikes he had seen.

Session XIII

The purpose of this session was to review all the methods used and to remind the children of their application to situations outside the Clinic.

Each session was briefly mentioned and the material that had been employed, and the children were encouraged to talk freely and to give their opinions as to the value of each method. They were asked specifically to state whether they had been

putting these methods into practice in school and at home, how they had been doing so and whether they thought it had been helping them. Each child was given a turn to describe something that he had never before been aware of.

The attendance and achievement-charts were discussed, the latter being shown to the group for the last time prior to the ending of the training sessions. The subjects were reminded of the prizes that would be awarded.

The group then participated in a game - "I spy with my little eye something beginning with the letter ___". Here one child chose an object in the room and told the others only the letter with which it began; the other subjects had then to guess the name of the relevant object.

Each child was also allowed to make a drawing of anything he liked, it being suggested that if he wished to draw his impression of coming to the Clinic, he could do so.

Session XIV

A passage for reading-drill was presented, the group as a whole first devising the questions.

Ali Baba and the Forty Thieves

One day when Ali Baba was in the forest cutting the wood, which he sold for a living, he saw a number of horsemen coming towards him, and fearing that they might be robbers, he quickly climbed into a tree and hid himself.

There were forty in all, and when they had come near the tree where Ali Baba was hiding, they dismounted. After they had tied up their horses and fed them they all followed their captain to a rock nearby.

"Open, Sesame!" cried the leader, and a door opened in the rock. The men entered one by one, and the captain followed; then the door closed of itself.

Ali Baba waited, and after some time he saw the robbers filing out again. When they were out of sight he went up to the rock and called out, "Open, Sesame!" The door flew open at the words and Ali Baba, stepping inside, was surprised to find himself in a well-lighted cavern filled with bales of silk, rolls of rich carpeting, heaps of gold and silver ingots, and bags of money.

Ali Baba loaded his asses with some of the gold, and having covered the bags with his sticks hurried home to tell his wife of his good fortune.

Questions

(1) What did Ali Baba do for a living?
(2) What did he see coming towards him when he was in the forest?
(3) What was he afraid they might be?
(4) Where did Ali Baba hide himself?
(5) What did these men do when they came near the place where Ali Baba was hiding?
(6) What did they do to their horses after they had tied them up?
(7) What happened when the leader went up to the rock?
(8) Who was the last to enter?
(9) Where did Ali Baba find himself when he went through the doorway in the rock?
(10) What are four things which he found inside?
(11) What part of the treasure did Ali Baba take?
(12) How did he hide it?

Session XV

This was a session of miscellaneous material. First of all, a picture entitled 'The Smash-and-Grab Raid' was presented for three minutes and the subjects were told to observe everything they possibly could in the picture. The picture may be described as follows :

A thief, who has just broken the window of a jewellery shop in High Street, is seen running toward a car, the door of which is open. Inside the car sits a man. The number of the shop is 33 and the name of the owner, J.D. Mansell, is inscribed on the door. Next to this shop is a dress shop called Whitson and Company. To the left of the car stands a cart with bananas on it, and a boy is riding past the cart on a bicycle. A woman and a man with a newspaper in his hand are standing on the pavement opposite the shops, in the bottom left-hand corner of the picture watching the thief. In the bottom right-hand corner, a boy is sitting on top of a lorry.

After the time-limit of three minutes had elapsed, the picture was removed, and the children were asked to write the answers to the following questions :

(1) Describe the main incident that is taking place in the picture.
(2) Why has a window been broken?
(3) What is the name of the owner of the shop with the broken window?
(4) What is the number of that shop?
(5) What does Mr. Whitson sell?
(6) Why is the door of the motor car open?
(7) What is the name of the street?
(8) What is for sale on the cart?
(9) How many women can you see in the picture?
(10) How many people in the picture are sitting, and where is each one?.

The second exercise was presented verbally to the group. A list of the letters of the alphabet was given to each subject with sufficient space underneath for writing the answers to the questions which the writer asked.

A B C D E F G H I J K L M N O P Q R S T U

V W X Y Z

Questions

(1) How many letters are there in the alphabet?

(2) What is the sixth letter?

(3) What is the 24th letter?

(4) What is the 13th letter?

(5) What is the letter which follows the 25th letter?

(6) What is the letter which follows the 12th letter?

(7) What is the letter which comes before the 7th letter?

(8) What is the letter which comes before the 22nd letter?

(9) What is the 3rd letter after the 6th letter?

(10) What is the 4th letter after the 17th letter?

(11) If you draw a line halfway along the alphabet, between what letters is the line?

(12) What is the 4th letter after the halfway mark in the alphabet?

(13) How many capital letters in the alphabet use only round lines?

(14) How many use only straight lines?

(15) How many use round and straight lines?

(16) How many use only two straight lines?

(17) Make a word from the 2nd, 5th and 23rd letters.

(18) Make a word from the 22nd, 5th, 18th and 25th letters.

(19) If F comes before J, write Y for 'Yes'. If it doesn't, write N for 'No'.

(20) If L comes before Y, write Y. If it doesn't, write N.

(21) If P comes before O, write Y. If it doesn't, write N.

(22) If S comes before B, write S. If it doesn't, write B.

(23) If P comes before L, write Z. If it doesn't, write A.

(24) If K comes before both E and O, write 'Yes'. If it doesn't, write 'No'.

(25) What word can be made by using the 9th, 4th and 12th letters of the alphabet?

(26) What is the first letter in the alphabet which I can add to STO to make a word?

Session XVI

This was the seventh reading-drill session and a list of prepared questions was used which the group answered verbally, and then on paper, after a period of individual study.

Sinbad and the Elephants

We had been at sea only about three days when the ship was seized by pirates and I was captured and sold as a slave. The rich merchant who bought me treated me well, and finding I was able to shoot with a bow he took me out with him to shoot elephants of which there were numbers in the forest.

Having told me to climb a tree and to wait for the animals to pass by, he gave me a supply of food and went back to the town.

No elephants passed during the night, but in the morning I shot one out of a large herd. As soon as the others had gone I ran quickly to my master who, praising me highly, came back to the forest and helped me to bury the huge creature. This he did in order to get the tusks, when the flesh had rotted away from them.

Everyday for two whole months I shot on elephant; then one morning, as I waited in the tree for them, instead of passing by they came towards it. One great elephant tore up the tree in which I was by the roots, lifted me from the ground where I had fallen, placed me on his back and, closely followed by the others, carried me to a field some distance away, which I found afterwards to be covered with the bones and tusks of dead elephants.

Having laid me on the ground, they went away. It seemed as if they knew that it was only their tusks I wanted,

and they had brought me to their burying-place so that I could get all I wished without killing any more of their number.

Here, indeed, was a great treasure and I went quickly to tell my master of my good fortune. The next day we rode to the spot on an elephant which we loaded with as many tusks as it could carry, and on getting back home my master said that as he had become a rich man through me I should be a slave no longer.

Questions

(1) What happened to Sinbad after his ship had been at sea for about three days?

(2) To whom was Sinbad sold?

(3) What was Sinbad set to do when his master found that he could shoot with a bow?

(4) Where was Sinbad to wait for the elephants?

(5) What was done with the first elephant which Sinbad shot?

(6) Why was this done?

(7) For how long did Sinbad shoot elephants in the forest?

(8) Where was Sinbad carried by the elephant after he had been picked up from the ground?

(9) Why did Sinbad think the elephant had brought him to this place?

(10) What reward did Sinbad get for leading his master to this great treasure?

Session XVII

A sheet of paper with the word CONTEMPLATE was given to each child and the subjects were instructed to make as many words as they could by using the letters given; they were also told that if a letter appeared in the word only once, then they could use it only once.

Similarly, the children were asked to make as many words as they could from the letters in the word METAMORPHOSIS.

The second type of material used in this session was verbal. A nursery rhyme was chosen and the subject was asked to say it, stating the number of each word just after it, in the following manner :

Jack - 1 and - 2 Jill - 3 went - 4 up - 5 the - 6 hill - 7
To - 8 fetch - 9 a -10 pail - 11 of - 12 water - 13
Jack - 14 fell - 15 down - 16 and - 17 broke - 18 his - 19
crown - 20
And - 21 Jill - 22 came - 23 tumbling - 24 after - 25.

Each child was given a turn with a different nursery rhyme, ceasing as soon as an error was made.

Session XVIII

This was the final reading-drill session, the method using being exactly the same as in Session XVI.

Gulliver gets fed

Being famished with hunger, I showed my desire for food by putting my fingers to my mouth. Against my sides were placed several ladders up which a hundred of the little people climbed on to me and walked towards my mouth, carrying baskets of food. There were shoulders, legs and loins, shaped like those of mutton, but smaller than the wings of a lark. I ate two or three of these joints at a mouthful, and took three loaves at a time.

I then made another sign that I wanted drink, and they gave me their largest barrel. I drank it off quite easily, for the barrel did not hold half a pint. Theybbrought me a second barrel which I drank, and made signs for more; but they had none to give.

Questions

(1) In what way did Gulliver show that he wanted something to eat?

(2) How many of the little people climbed onto Gulliver?

(3) How did they climb onto him?

(4) In what direction did they go when they had finished climbing?

(5) What did the little people carry in their baskets?

(6) How many joints did Gulliver eat at a mouthful?

(7) How big were these joints?

(8) How many loaves did Gulliver eat at a time?

(9) How many barrels of drink were given to him?

(10) How much drink did the largest barrel hold?

Session XIX

The training procedures had now been completed and the final session was devoted to the announcement of marks and the distribution of prizes.

(2) Some Relevant Observations made during Training with regard to Motivation, Value of Group Training, Influence of Extraneous Factors and Manifestations of Lack of Concentration.

The two groups of children who participated in the training programme were as follows :

Group A : Harold, Elliot, Alan, Derek, Frank and Gary.
Group B : Roy, Simon, Quentin, Paul and William.

No attempt will be made to discuss in any detail the behaviour and other characteristics of each child during the training sessions nor is it necessary to give the marks obtained by the subjects on the numerous exercises as these were not of an equivalent level of difficulty and therefore could not reflect any real improvement in concentration. However, a number of interesting features emerged during the period of training and these may now be indicated.

It is maintained here that, apart from the greater or lesser value of the training methods which were applied, one basic condition was found to be of the utmost significance in determining whether or not the child was going to benefit from the training sessions - this was the level of motivation of each child. The relationship between concentration and motivation has been referred to several times already in this piece of work; its rôle became extremely lucid while the training was in progress. It was obvious that however much certain tasks might call for concentration, the child would not participate nor would he allow himself to be taught the correct habits of concentration unless he really wished to do so. The level of motivation determined the nature of the stimuli to which the child would attend and also whether he would be willing in the first place, to inhibit irrelevant responses.

Four children were considered to have a high level of motivation - Elliot, Alan, Derek and Paul. These subjects, although not enthusiastic at the start of the training programme, did, in fact, become very keen and eager to attend, at all times really did their best and co-operated and performed as well as they could. This, to quite a large extent, can be explained by the good rapport and close relationship that each of them established with the investigator. Each child considered it important to be approved of and wanted to perform well in order to receive praise from her. In addition, they all became convinced that they stood to benefit from the training, that they could really learn to concentrate and that it was highly important that they should. Their success on various exercises and the praise and encouragement they were given increased their self-confidence, this also having a good effect on their level of motivation. In Stephen's terms, the degree of 'ego-involvement' in these children was high. His explanation of the term

may again be quoted. He says :[1]

> "Ego-involvement means that the student feels and accepts a certain challenge. By saying that the student's ego is involved, we mean that, in his mind, failure in the assigned task will lead to some impairment of the ego, to some loss of self-respect, or to a reduction in his sense of worth. The ego is involved whenever the student feels that an important part of him is wrapped up in the outcome of the task ... Students will perform better and acquire more skill when they are made to feel that success in the assigned task is important to them, that in some way it is a measure of their real worth as persons ..."

Three of these children, Elliot, Alan and Derek, actually stated spontaneously at the end of the training that they thought they had really learned to concentrate and that their schoolwork had improved, and all four were unwilling to end their attendance at the Clinic.

In contrast to these subjects were three others, Gary, Simon and Quentin who remained poorly-motivated and whose attitude to attending was one of dislike. These children had a poor relationship with the investigator and openly expressed annoyance with the training sessions which in the case of Simon and Quentin, interfered with their sport activities in the afternoon after school hours. This, at least in part, accounted for their adverse attitude to the training; they were very keen on sport and their coming to the Clinic meant that two afternoons a week they were unable to be on the playing-field. All three children were frequently unco-operative, talkative and playful, they regarded attendance as an imposition and seldom did their

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1. Educational Psychology, pp. 299 - 300.

best, although when an effort was made, their work was good. The amount of 'ego-involvement' here was minimal and these subjects could not see any value in learning to concentrate or in trying their best. This was explainable in the light of the following fact - Simon and Quentin had reported that their teacher had said that their attendance could be of no value and that they could not learn to concentrate by attending; it was difficult to ascertain how true this report was or in what context the opinion was mentioned but there was no doubt that it had a great influence on the level of motivation of these children. In addition, encouragement, competition and the offering of incentives had little effect on the performance of all three; their level of frustration-tolerance, that is, their tolerance of things which did not give immediate rewards or which were not interesting in themselves, was very low indeed. In the case of Gary, the explanation for the low level of motivation was somewhat different. His behaviour indicated very marked emotional insecurity and lack of confidence; he adopted a 'defeatist' attitude from the very beginning and constantly sought to attract attention. It was felt that the presence of other children was far too stimulating for him, that a group-training was not the correct thing for this child and that further investigation was necessary into the apparently dominant emotional problem before the child could be taught to concentrate.

Particularly in the case of Simon and Quentin, it was considered that a sterner form of discipline might have been successful where the provision of positive incentives was not; however, a very difficult situation presented itself in the selection of effective discipline as the training-situation was in nature so far removed from the schoolroom.

There were also four other children, Harold, Frank, Roy and William, in whom the level of motivation was determined and complicated by other factors. Harold, far approximately the first twelve sessions, had been as eager and co-operative as the children with a very high level of motivation; however, during the remaining sessions, he became somewhat unwilling to attend, no longer seemed to be trying his best and appeared worried about something. This change in behaviour found its explanation later when an interview with the mother revealed that owing to the ill-health of the father, there had been much tension in the home and less interest had been displayed in and less attention given to Harold. Frank, throughout the sessions, had remained somewhat uninterested and apathetic, and his performance had been erratic. In drawing and conversation, much repressed aggression seemed evident although its direction was not fully ascertained; it was thought that there was some emotional problem having to do with the home circumstances of this child - the mother worked all day and Frank appeared to resent the fact that he received so little supervision. Thus, in both these children, the influence of extraneous factors is seen, as also in Simon and Quentin.

In Roy and William, the level of motivation and degree of co-operation seemed to be greatly affected by that of two other children in their group who exerted great influence over them and with whom they were very friendly, namely, Simon and Quentin. Roy and William were easily led by these two subjects, and the general atmosphere of this group offered less competition or incentive for good performance than did the other group. It was considered that had Roy and William been surrounded by more co-operative subjects, they could have benefited far more. In addition, Roy's schoolteacher was also the one who was reported earlier to have made such critical remarks about the training-programme, and Roy, too, was immensely fond of the sport which he was missing when he attended the Clinic.

It is maintained here that the members of a group may influence one another in a favourable or adverse manner. Some children will respond well to the competitive elements of a group-situation, others will not. The nature of the group-leader is highly significant - where the group-leader co-operates, the co-operation of the other members is facilitated; where the group-leader is unco-operative, the co-operation of the other members is made difficult.

It may be mentioned here that the attitude of the parents might also have been significant in determining the child's attitude to the training. For example, certain parents had not felt there was any problem or cause for concern; thus, in their opinion, there would have been no real need for the child to attend the training-sessions and the training would have been considered as being of little benefit to their child. Similarly, certain parents might have regarded the training as a form of 'punishment' for the child's poor progress at school; for example, in an initial interview, the mother of Roy had openly admitted that she had told Roy he was to participate in the training-programme because he was a dunce at school. Such attitudes on the part of the parents might very well have communicated themselves to the children. However, these are assumptions only and no definite knowledge is available as to whether or how the parents' attitude did influence the child's approach to the training.

One further observation may be offered. It became clear during the training-sessions that "lack of concentration" differs in its manifestation in two very striking ways - it is either 'overt' and easily observable by others, or 'invert' and unobservable unless the results of the child's behaviour are examined. In certain instances, where the child was restless, hyperactive, talkative and playful, it was obvious that he was not concentrating on the task before him; this was the case frequently in Simon, Quentin and Gary. However, in other instances, where the child sat quietly and still, the lack of

concentration was not obvious until his performance on the task was examined and it was found that he had either been day-dreaming or concentrating on a completely irrelevant aspect of the relevant object; Harold and Frank were found to manifest this type of lack of concentration on several occasions. It follows that the irrelevant response which needs to be inhibited is not the same in each case; some children may have to be trained to inhibit motor responses, others to inhibit thoughts and verbal associations. The method of training which will be effective in each instance needs further investigation.

(3) Determination of Value of Training

The significance or value of the training procedures was then determined by statistical examination of the scores obtained by the Experimental and Control subjects on the alternate set of tests of concentration. As in the determination of the validity of the tests of concentration, the influence of intelligence on test performance had to be considered as the subjects had not been ranked according to intelligence. Thus, the product moment correlation coefficient for intelligence and scores on the tests of concentration was computed as before.

A t formula was then employed to test the null hypothesis, namely, that there is no difference between the scores obtained on the alternate set of tests of concentration by the Experimental subjects, that is, those who had participated in the training programme, and those obtained by the Control subjects, that is, those who had not had any training in concentration. Since a correlation coefficient of .40 is significant at the .05 level for 22 cases[1] (1956), r was used in the calculation of t only when it was .40 or higher.

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1. Edwards, A.L. Experimental Design in Psychological Research p. 408. Table VI. Values of r at the 5 and 1 Per Cent Levels of Significance.

Where r was used, the formula employed was :

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 3}\left(1 - r^2_{xy}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

Where r was not used, the following formula was employed :

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{N_1 + N_2 - 2}\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

With the use of tables, the p values which corresponded to the computed t values were found.

The scores obtained by the members of the Experimental and Control groups on the alternate set of tests of concentration are presented below in tabular form (see Table XII). The scores are given in order for the subjects as follows :

Experimental Group	:	R	S	Q	H	E	A	D	F	G	P	W
Control Group	:	O	T	C	B	I	J	V	K	M	L	N

TABLE XII

TESTS B : SCORES OBTAINED BY MEMBERS OF EXPERIMENTAL AND CONTROL GROUPS.

ARITH. ADDITION AUDITORY SIMPLE				ARITH. ADDITION AUDITORY DISTRACTION				MEMORY FOR SENTENCES	
Total Time		No. Correct		Total Time		No. Correct		No. Correct	
87	66	18	15	10	7	4	3	26	25
55	118	18	14	5	9	4	4	27	14
28	99	17	16	5	14	5	4	30	19
86	50	18	17	29	7	3	4	28	20
20	32	18	14	7	7	5	4	27	26
162	101	17	14	25	13	4	2	24	22
93	64	12	18	5	27	3	3	21	17
65	71	18	12	12	6	3	0	27	19
127	170	15	8	24	7	3	0	26	16
50	101	18	10	13	7	4	5	29	24
73	71	17	12	7	9	4	3	26	22

ARITH. ADDITION VISUAL SIMPLE				ARITH. ADDITION VISUAL DISTRACTION				KNOX CUBES	
Total Time		No. Correct		Total Time		No. Correct		No. Correct	
127	106	17	15	152	105	16	17	6	6
68	111	17	16	75	179	17	16	5	4
79	114	17	18	72	134	18	18	7	7
147	140	17	16	188	209	18	18	5	6
73	68	18	17	73	80	18	17	7	7
176	150	18	14	213	173	18	12	6	4
124	70	16	18	193	103	18	18	6	4
127	137	18	16	156	133	18	16	6	5
235	189	14	14	342	209	14	17	4	7
132	98	17	17	147	120	18	15	6	6
104	119	18	15	126	141	18	15	8	7

Key : Black Digits = Scores obtained by Members of Experimental Group
Red Digits = Scores obtained by Members of Control Group
Total Time in Seco nds.

TABLE XII (Cont.)

TESTS B : SCORES OBTAINED BY MEMBERS OF EXPERIMENTAL AND CONTROL GROUPS

MEMORY FOR SIMPLE PROSE		PRESENTATION SORTING		CHECKING			
No. of Memories		No. of Errors		No. Done		No. of Errors	
14	15	0	2	20	19	2	2
12	15	0	0	19	17	0	0
19	13	2	0	27	22	2	2
17	7	2	1	19	26	0	1
12	10	0	4	22	30	1	3
12	6	0	0	14	23	1	5
15	11	0	0	22	16	0	0
20	8	0	1	23	18	4	3
12	5	3	3	42	15	15	2
14	18	0	2	23	23	2	1
7	8	0	4	20	22	1	3

KEY:

Black Digits = Scores obtained by Members of Experimental Group

Red Digits = Scores obtained by Members of Control Group

TABLE XIII

VALUE OF TRAINING : t and p values.

NAME OF TEST	SCORE	t	P
ARITHMETIC ADDITION AUDITORY SIMPLE	Total Time	.503	.70
	No. Correct	3.085	below .01
ARITHMETIC ADDITION AUDITORY DISTRACTION	Total Time	.781	.50
	No. Correct	1.685	.20
MEMORY FOR SENTENCES	No. Correct	5.161	below .01
ARITHMETIC ADDITION VISUAL SIMPLE	Total Time	.452	.70
	No. Correct	1.786	.10
ARITHMETIC ADDITION VISUAL DISTRACTION	Total Time	.508	.70
	No. Correct	1.627	.20
KNOX CUBES	No. Correct	.529	.70
MEMORY FOR SIMPLE PROSE	No. of Memories	2.518	.05
PRESENTATION SORTING	No. of Errors	1.569	.20
CHECKING	No. Done	.714	.50
	No. of Errors	.401	.70

The three most valid tests of Concentration on empirical grounds had been found to be Arithmetic Addition Auditory Simple, Arithmetic Addition Auditory Distraction and Knox Cubes. The p values, in the determination of the value of the training, were for these three tests respectively .01, .20 and .70. Thus, only on the first test, Arithmetic Addition Auditory Simple - number correct, does it seem that the training procedures were of value in improving powers of concentration, that is, they resulted in a significant difference between the scores obtained by the Experimental subjects and those obtained by the Control subjects. An explanation must be sought for the low p values obtained on the other two valid tests of concentration. One must assume either that these were not really tests of concentration and therefore could not reflect an improvement in concentration or that the training programme was of little value or that it was too specific and did not provide for training in related skills. Particularly in Knox Cubes, the low p value may well be explained by the fact that the training had no relation to the type of attention required for good performance on that test.

It may be noted that Memory for Sentences and Memory for Simple Prose showed significant p values. As performance on both these tests was greatly dependent upon the ability to remember, it would see that the training procedures were of value in improving methods of remembering. It must be remembered, of course, that the training was predominantly in these fields.

All in all, the results obtained were somewhat disappointing. However, one important fact has emerged, namely, that the possibility of a training programme for general powers of concentration is slight, and that the greater the specificity of the training, the more improvement can be expected in that specific sphere; generalization does not seem to occur. This point will be discussed further in the final chapter.

(4) Improvement in Level of Concentration as Reported by Teachers and Parents at the end of the Experiment.

After all the subjects had been re-tested on the alternate set of tests of concentration, interviews were conducted once again with the parents and teachers and they were asked to state their opinion as to the child's level of concentration and any observable changes in his work or behaviour. The description that follows is a comparison of the level of concentration of the matched subjects of the Experimental and Control groups, according to the information given by the parents and teachers. It would have been interesting to make a detailed analysis of the relationship between reported changes or improvements and the level of emotional adjustment of each child and the parents' original attitude to the problem. This has not been done but it may be noted here that on the basis of the information of the parents and teachers, there appeared to be some emotional difficulty or maladjustment requiring further investigation in the cases of

C F G J K L M N O P R T and that the parents of 5 children, C F H J and W had felt originally that there was either no problem or no cause for concern.

In addition, the information given below does not take into account any changes that might have occurred, concurrent with the training programme, in the parents' handling of the child, for example.

Control Subject O Oscar : I.Q. 99, Rank 5.67

and

Experimental Subject R Roy : I.Q. 101, Rank 4.5

Both the teacher and the parent reported no improvement in O's ability to concentrate. His work remained untidy and careless, his homework was performed poorly and his behaviour at home had become increasingly difficult. In addition, the child's delinquent behaviour had increased in severity.

R was said both by his mother and teacher to be less restless and fidgety, to be making more effort to perform well and to be showing more responsibility; he now required less supervision of his homework and his marks on tests had improved. However, both teacher and parents felt there was still much room for improvement.

Control Subject T Tom : I.Q. 96, Rank 9.5

and

Experimental Subject S Simon : I.Q. 94, Rank 8.33

The parent and the teacher said that T had not only not improved, but had in fact, got worse. He was never still for one minute, his work was very untidy and poor and he sought attention continually; he had also begun 'wetting' himself in the classroom. The teacher considered that he would be promoted only on trial. T's mother had by this stage, become very concerned about the child.

S's mother reported a definite improvement in schoolwork and marks brought home and said that S seemed to be taking more interest in his work. He studied better, would object to being disturbed and showed far more self-responsibility for performance of homework, whereas, previously, he had had to be instructed frequently to go and do his homework. The mother considered that S was trying harder and paying more attention to his schoolwork than ever before. The teacher, however, was of the opinion that the child's work and behaviour had not increased sufficiently and that his examination results could have been better.

Control Subject C Charles : I.Q. 128, Rank 11

and

Experimental Subject Q Quentin : I.Q. 95, Rank 10.67

The teacher considered that C, being a very intelligent child, could be performing on a higher level than he was;

he still needed close supervision when working on his own and frequently sought to attract attention. Thus no marked improvement had occurred in his level of concentration. The mother, repeated her original contention that there was no problem whatsoever.

Q's mother reported much improvement in the child's performance of homework and in his attitude to schoolwork in general, but his class teacher said that the child had not really changed much, although his lack of concentration was not severe.

Control Subject B Barry : I.Q. 114, Rank 11.17

and

Experimental Subject H Harold : I.Q. 119, Rank 11.17

B's teacher said that the child was trying harder than before and that his attitude to work had changed slightly for the better; however he was still very untidy and always in a great rush to get things over with, and his marks on tests had not improved. Mrs. B reported no change and stated that B still needed close supervision of his homework and tried to rush through it.

H's powers of concentration, the teacher remarked, were exactly the same as before the training and it did not take much to take his mind off the work. The mother said that his marks had been atrocious of late and that he tried to evade doing his homework. She offered, however, two explanations for this - first, that the father had been very ill and that this had been a cause of great concern to H, and secondly, that she had started doing clerical work at home and, as a result, was too occupied to supervise the child's homework or to give him as much attention as she had previously.

Control Subject I Ian : I.Q. 123, Rank 11.17

and

Experimental Subject E Elliot : I.Q. 114, Rank 12.17

The teacher reported some improvement in I's behaviour and attitude to work but felt that he was sufficiently intelligent to be performing at a higher level than he was; his marks on tests had not improved. The mother maintained that there was no noticeable change and that I's schoolwork could improve.

Both E's teacher and mother were delighted with what they called a remarkable improvement in the child. He had settled down completely and was now no trouble at all in the classroom; he was keen to do well and showed interest and great pride in his work. Mrs. E. confirmed this, stating also that E showed far more responsibility and enthusiasm for performance of homework, that his homework was neater and that his class place had improved; he had become more ambitious, wanted to get to the top of the class and showed much confidence in his ability to do so. In addition, E was said to be most upset if he had ever to be absent from school and whereas before he had disliked reading and had always been very aware of the number of pages that had to be read, he now loved reading and his main concern was how he would ever find sufficient time to read all he wanted to. A most interesting fact reported was that this child had for the last two months completely ceased 'wetting' his bed.

Control Subject J Jeremy : I.Q. 98, Rank 12.17

and

Experimental Subject A Alan : I.Q. 103, Rank 12.17

J's teacher maintained that he had settled down, was working steadily, had made good progress and no longer needed close supervision in the classroom. The mother said, however, that J remained much the same and that he had been doing some very poor work. As she had been ill and in hospital, she had been unable to give his work as much supervision at home as was necessary.

The class teacher summed up the status of the problem in A by saying that to have the child in the class now was "sheer heaven". She no longer had to shout at him and in fact, his behaviour was so much improved that she hardly noticed his presence in the classroom; he had ceased 'playing the fool' and displayed less attention-seeking behaviour, his work was much better and neater, and his attitude to it was more enthusiastic and confident. Mrs. A stated that she saw more determination, keenness and responsibility in A who now wanted to do well and was doing his homework and learning for tests willingly and on his own; he no longer wanted her to sit and watch him do it all the time and he would begin doing it without repeated instructions to settle down to it. In addition, whereas before he would simply ignore words that he could not understand when he read, he had now begun using a dictionary quite willingly.

Control Subject V Vincent : I.Q. 100, Rank 12.17

and

Experimental Subject D Derek : I.Q. 113, Rank 13.33

Both parent and teacher said that V was working harder, making more effort and was more confident and that his performance had improved; however he still worked very slowly.

D's teacher and mother reported a great improvement in the child's powers of concentration. He was said to be keener, more confident and interested, more willing to do homework and to show more pride in his performance. The teacher said that she no longer found him difficult to handle and that he was doing better work.

Control Subject K Kenneth : I.Q. 112, Rank 16

and

Experimental Subject F Frank : I.Q. 109, Rank 15.33

Both K's mother and teacher reported some change for the better. The teacher said that K's behaviour and work had improved to some extent but that he had still to be supervised and that when he worked on his own he was still at times playful and inattentive. Mrs. K. stated that the child now took more responsibility for doing homework but that he was untidy and impatient to complete his work.

F's mother reported little change except that F now made less fuss about doing his homework; she maintained her original opinion that there was no problem or cause for concern. The teacher, however, considered that the child had improved greatly, that his concentration was now average and that his class place and percentage showed the improvement. It may be mentioned that both F and K were in the same class and their teacher stated that F had improved to a greater extent than had K.

Control Subject M Martin : I.Q. 96, Rank 17

and

Experimental Subject G Gary : I.Q. 106, Rank 16

Both these children were reported to have made no improvement. M's teacher said that his lack of concentration had become worse; M made no effort, took no interest in his work, did not respond to encouragement, frequently created

trouble and continually tried to distract other children and to draw attention to himself. He was to be promoted to a higher standard only because of his age. M's sister said that he had become increasingly difficult to handle at home and confirmed the teacher's report.

G was said to have changed little; he was still a very difficult child in the classroom, continually 'played the fool' and tried to draw attention to himself. His mother remarked that he lacked much confidence, that he rushed through his homework as quickly as he could and that he still seemed very reluctant to do it on his own and wanted her to sit with him the whole time.

Control Subject L Larry : I.Q. 99, Rank 18

and

Experimental Subject P Paul : I.Q. 100, Rank 18

L's teacher and mother said there was no noticeable improvement. The child was still very restless and hyperkinetic, and had to be watched closely in the classroom else he would distract others and be playful.

P was described by his teacher as being more confident, seeking less attention and performing school- and homework far better than before; his behaviour at school had also improved. Mr. P. confirmed the teacher's report and mentioned that the child's home circumstances were now more stable as well.

Control Subject N Norman : I.Q. 94, Rank 18.67

and

Experimental Subject W William : I.Q. 95, Rank 18

N's teacher considered that there was no change; the child's performance was very erratic, he was restless, sought attention, his behaviour and his work was bad and he was to be promoted only on account of his age. The mother maintained

that N's concentration had become even worse - he was absolutely uninterested in his work, and performed his homework poorly and in a great rush.

W was said by his teacher to have improved quite a lot; he had settled down well, his marks on tests had shown that he had exerted more effort and his homework was now done perfectly. W's mother said that she saw no reason to change her original attitude, that is, that there was no cause for concern; she had observed no change in the child's attitude to homework.

The table presented below enables one to see, at a glance, the improvements in level of concentration as reported by the teachers and parents (see Table XIV). The two columns, Teacher and Parent, refer to the information given by each. A 'plus' sign signifies an improvement and change for the better; a 'minus' sign is recorded where no change was said to have been observed and where the child's level of concentration was said to be the same as at the start of the experiment.

TABLE XIV

IMPROVEMENT IN LEVEL OF CONCENTRATION AS REPORTED BY TEACHERS AND PARENTS AT THE END OF THE EXPERIMENT.

CONTROL GROUP					EXPERIMENTAL GROUP				
Subject	I.Q.	Rank	Teacher	Parent	Subject	I.Q.	Rank	Teacher	Parent
O	99	5.67	-	-	R	101	4.5	+	+
T	96	9.5	-	-	S	94	8.33	-	+
C	128	11	-	-	Q	95	10.67	-	+
B	114	11.17	+	-	H	119	11.17	-	-
I	123	11.17	+	-	E	114	12.17	+	+
J	98	12.17	+	-	A	103	12.17	+	+
V	100	12.17	+	+	D	113	13.33	+	+
K	112	16	+	+	F	109	15.33	+	-
M	96	17	-	-	G	106	16	-	-
L	99	18	-	-	P	100	18	+	+
N	94	18.67	-	-	W	95	18	+	-

Thus, in the Control Group, 5 children were reported to have improved in some manner. In all 5 cases, the teacher reported an improvement; in only 2 cases was the improvement reported by both the teacher and the parent.

In the Experimental Group, 9 children were stated to show a change for the better. Parent and teacher concurred in 5 of these cases; in 2, only the teacher stated that an improvement could be seen, and in 2 only the parent.

According to the judgment of the teachers and parents, there seems to be a reasonable difference in improvement between the two groups of subjects; yet the statistical results were not very significant. It is possible that the teachers and parents expected the children to improve and therefore reported that they did; for example, one teacher gave the impression in the first interview that her pupils would definitely improve whether or not they participated in the training, because she would get them more under control. It may be, also, that so many parents of Experimental subjects reported much improvement because the children seemed to be trying harder to concentrate and to perform well; thus the training programme may have effected an improvement in that the child's level of motivation was raised and he was keener and motivated to try harder, but this improvement may not have resulted in better performance immediately and may, therefore, not have been seen in performance on the tests. The difficulty of measuring level of motivation, an important factor in concentration has been indicated previously.

(5) Individual Improvement on the Tests of Concentration

As the number of subjects was small, it was considered that the true results might be concealed by a comparison of the two groups as groups. Consequently, it was decided that it might be of value to study more closely the improvements made by the individuals of the two groups.

Presented below are the scores obtained by each member of the Experimental and Control Groups on both the original and the alternate set of tests (see Tables XV and XVI). The table following that indicates the degree of improvement made from the original to the alternate test in each case (see Table XVII). A plus sign signifies an improvement in score, a minus sign signifies a deterioration in score and a zero means that the score on the alternate test was identical with the score on the original test. Table XVIII presents the total number of changes in performance on the tests of concentration, both for the Experimental and Control Groups.

TABLE XV

TESTS A AND B : SCORES OBTAINED BY MEMBERS OF EXPERIMENTAL GROUP

		R		S		Q		H		E		A		D		F		G		P		W	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
ARITH. AUDITORY SIMPLE	Total Time	59	87	40	55	65	28	109	86	34	20	135	162	66	93	64	65	105	127	65	50	85	73
	No. Correct	17	18	18	18	17	17	18	18	16	18	14	17	17	12	18	18	15	15	15	18	15	17
ARITH. AUDITORY DISTRACTION	Total Time	19	10	13	5	6	5	33	29	10	7	34	23	15	5	16	12	14	24	38	13	16	7
	No. Correct	5	4	3	4	4	5	3	3	4	5	4	4	1	3	0	3	3	3	2	4	2	4
MEMORY FOR SENTENCES	No. Correct	25	26	23	27	27	30	27	28	22	27	23	24	17	21	25	27	22	26	22	29	21	26
ARITH. VISUAL SIMPLE	Total Time	102	127	84	68	88	79	147	147	60	73	164	176	127	124	118	127	171	235	133	132	109	104
	No. Correct	18	17	18	17	18	17	18	17	18	18	18	18	17	16	17	18	14	14	18	17	18	18
ARITH. VISUAL DISTRACTION	Total Time	149	152	94	75	86	72	197	188	98	73	215	213	160	193	186	156	221	342	162	147	125	126
	No. Correct	17	16	18	17	17	18	18	18	14	18	17	18	18	18	16	18	17	14	18	18	18	18
KNOX CUBES	No. Correct	6	6	5	5	4	7	4	5	4	7	5	6	5	6	4	6	4	4	4	6	4	8
MEMORY FOR SIMPLE PROSE	No. of Memories	10	14	10	12	11	19	13	17	9	12	7	12	10	15	16	20	6	12	11	14	13	7
PRESENTATION SORTING	No. of Errors	0	0	1	0	13	2	0	2	3	0	8	0	3	0	0	0	15	3	0	0	0	0
CHECKING	No. Done	14	20	14	19	18	27	17	19	17	22	12	14	12	22	17	23	38	42	11	23	12	20
	No. of Errors	3	2	0	0	2	2	0	0	0	1	1	1	2	0	5	4	14	15	1	2	1	1

KEY : Black Digits = Scores on first set of tests of Concentration

Red Digits = Scores on alternate set of tests of Concentration

Total Time in Seconds

TABLE XVI

TESTS A AND B : SCORES OBTAINED BY MEMBERS OF CONTROL GROUP

		O		T		C		B		I		J		V		K		M		L		N	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
ARITH. AUDITORY SIMPLE	Total Time	73	66	92	118	76	99	40	50	41	32	92	101	73	64	75	71	168	170	83	101	84	71
	No. Correct	17	15	16	14	15	16	18	17	17	14	16	14	17	18	15	12	13	8	15	10	11	12
ARITH. AUDITORY DISTRACTION	Total Time	6	7	17	9	20	14	10	7	8	7	22	13	27	27	10	6	14	7	6	7	25	9
	No. Correct	4	3	3	4	3	4	3	4	1	4	4	2	2	3	3	0	0	0	3	5	1	3
MEMORY FOR SENTENCES	No. Correct	24	25	18	14	21	19	22	20	24	26	21	22	19	17	20	19	17	16	24	24	20	22
ARITH. VISUAL SIMPLE	Total Time	85	106	140	111	114	114	111	140	72	68	133	150	94	70	119	137	189	189	111	98	121	119
	No. Correct	18	15	17	16	17	18	18	16	17	17	18	14	16	18	18	16	15	14	14	17	18	15
ARITH. VISUAL DISTRACTION	Total Time	125	105	173	179	165	134	185	209	109	80	151	173	102	103	141	133	176	209	114	120	161	141
	No. Correct	18	17	17	16	18	18	18	18	16	17	18	12	18	18	18	16	18	17	15	15	17	15
KNOX CUBES	No. Correct	6	6	6	4	6	7	4	6	6	7	4	4	5	4	4	5	6	7	2	6	5	7
MEMORY FOR SIMPLE PROSE	No. of Memories	8	15	9	15	14	13	10	7	12	10	10	6	8	11	12	8	13	5	14	18	10	8
PRESENTATION SORTING	No. of Errors	5	2	0	0	2	0	13	1	0	4	18	0	14	0	10	1	0	3	2	2	9	4
CHECKING	No. Done	18	19	16	17	18	22	19	26	20	30	23	23	13	16	16	18	16	15	17	23	19	22
	No. of Errors	3	2	1	0	3	2	1	1	5	3	5	5	2	0	0	3	3	2	0	1	4	3

KEY : Black Digits = Scores on first set of tests of Concentration
Red Digits = Scores on alternate set of tests of Concentration
Total Time in Seconds.

TABLE XVII

INDIVIDUAL IMPROVEMENT ON TEST OF CONCENTRATION MADE BY MEMBERS OF EXPERIMENTAL AND CONTROL GROUPS

		1		2		3		4		5		6		7		8		9		10		11	
		E	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C
ARITH. AUDITORY SIMPLE	Total Time	-28	+7	-15	-26	+37	-23	+23	-10	+14	+9	-27	-9	-27	+9	-1	+4	-22	-2	+15	-18	+12	+13
	No. Correct	+1	-2	0	-2	0	+1	0	-1	+2	-3	+3	-2	-5	+1	0	-3	0	-5	+3	-5	+2	+1
ARITH. AUDITORY DISTRACTION	Total Time	+9	-1	+8	+8	+1	+6	+4	+3	+3	+1	+11	+9	+10	0	+4	+4	-10	+7	+25	-1	+9	+16
	No. Correct	-1	-1	+1	+1	+1	+1	0	+1	+1	+3	0	-2	+2	+1	+3	-3	0	0	+2	+2	+2	+2
MEMORY FOR SENTENCES	No. Correct	+1	+1	+4	-4	+3	-2	+1	-2	+5	+2	+1	+1	+4	-2	+2	-1	+4	-1	+7	0	+5	+2
ARITH. VISUAL SIMPLE	Total Time	-25	-21	+16	+29	+9	0	0	-29	-13	+4	-12	-17	+3	+24	-9	-18	-64	0	+1	+13	+5	+2
	No. Correct	-1	-3	-1	-1	-1	+1	-1	-2	0	0	0	-4	-1	+2	+1	-2	0	-1	-1	+3	0	-3
ARITH. VISUAL DISTRACTION	Total Time	-3	+20	+19	-6	+14	+31	+9	-24	+25	-29	+2	-22	-33	-1	+30	+8	-121	-33	+15	-6	-1	+20
	No. Correct	-1	-1	-1	-1	+1	0	0	0	+4	+1	+1	-6	0	0	+2	-2	-3	-1	0	0	0	-2
KNOX CUBES	No. Correct	0	0	0	-2	+3	+1	+1	+2	+3	+1	+1	0	+1	-1	+2	+1	0	+1	+2	+4	+4	+2
MEMORY FOR SIMPLE PROSE	No. of Memories	+4	+7	+2	+6	+8	-1	+4	-3	+3	-2	+5	-4	+5	+3	+4	-4	+6	-8	+3	+4	-6	-2
PRESENTATION SORTING	No. of Errors	0	+3	+1	0	+11	+2	-2	+12	+3	-4	+8	+18	+3	+14	0	+9	+12	-3	0	0	0	+5
CHECKING	No. Done	+6	+1	+5	+1	+9	+4	+2	+7	+5	+10	+2	0	+10	+3	+6	+2	+4	-1	+12	+6	+8	+3
	No of Errors	+1	+1	0	+1	0	+1	0	0	-1	+2	0	0	+2	+2	+1	-3	-1	+1	-1	-1	0	+1

KEY : Black Digits = Degree of Improvement made by Members of Experimental Group
Red Digits = Degree of improvement made by Members of Control Group
Plus Sign + = Improvement
Minus Sign - = Deterioration

TABLE XVIII

TOTAL NUMBER OF CHANGES IN PERFORMANCE ON TESTS OF CONCENTRATION SHOWN BY MEMBERS OF EXPERIMENTAL AND CONTROL GROUPS

NAME OF TEST	SCORE	GROUP	+	-	0
ARITHMETIC ADDITION AUDITORY SIMPLE	Total Time	E	5	6	nil
		C	5	6	nil
	No. Correct	E	5	1	5
		C	3	8	nil
ARITHMETIC ADDITION AUDITORY DISTRACTION	Total Time	E	10	1	nil
		C	8	2	1
	No. Correct	E	7	1	3
		C	7	3	1
MEMORY FOR SENTENCES	No. Correct	E	11	nil	nil
		C	4	6	1
ARITHMETIC ADDITION VISUAL SIMPLE	Total Time	E	5	5	1
		C	5	4	2
	No. Correct	E	1	6	4
		C	3	7	1
ARITHMETIC ADDITION VISUAL DISTRACTION	Total Time	E	7	4	nil
		C	5	6	nil
	No. Correct	E	4	3	4
		C	1	6	4
KNOX CUBES	No. Correct	E	8	nil	3
		C	7	2	2
MEMORY FOR SIMPLE PROSE	No. of Memories	E	10	1	nil
		C	4	7	nil
PRESENTATION SORTING	No. of Errors	E	6	1	4
		C	7	2	2
CHECKING	No. Done	E	11	nil	nil
		C	9	1	1
	No. of Errors	E	3	3	5
		C	7	2	2
TOTAL ON ALL TESTS		E	93	32	29
		C	75	62	17

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

1. Summary of findings

(1) The review of the literature made it clear that "lack of concentration" was a vague descriptive term implying a complex condition whichbwas by no means easy to define. After a fairly long period of relegation to a secondary position, Attention is once again being considered worthy of further investigation. The striking defect of the numerous tests which had, in the past, been designed to measure attention, was the lack of knowledge of their validity; and in many instances the definition of attention upon which these tests were based was no longer acceptable. Few methods were directly proposed as a means of improving powers of concentration and the value of any one method has not been sufficiently substantiated.

(2) An attempt has been made in the present study to define Attention as a process in terms of brain-functioning and to take into account the extremely significant rôle of motivation. 'Selection' is considered the most important feature of attending, and this has been described in terms of the neural processes of facilitation and inhibition which are thought to be a function of the 'reticular formation', and in terms of the processes of 'exclusion' and 'inclusion'. The rôle of motivation is to lower the resistance to the passage of certain impulses; as this must be done in terms of some kind of alteration of neural states in the central nervous system, it may be said that motivation probably affects the level of the 'arousal system' and so determines the degree of facilitation or inhibition. Attention and Concentration, it is held, can be distinguished only upon the basis of two features, that is, the degree of refinement of the selection of relevant stimuli, and the

duration of the precess of selection; in concentrating, the process of selection is sustained and intensified.

(3) Numerous difficulties presented themselves in the construction of a set of tests of concentration and it was queried at the ontset whether these could all be solved satisfactorily. Only three of the proposed tests of concentration showed a statistically significant difference between the groups labelled 'good' and 'bad' concentrators respectively. It is necessary to consider these results in conjunction with the fact that the independent criterion of level of concentration employed in the study was the teacher's judgment which, in itself, was probably not satisfactory.

(4) A number of training methods were employed in the attempt to develop in the child the correct habits of concentrating. The training programme resulted in an empirically significant improvement in performance on only one out of the three tests of concentration which had been found to show a high level of statistical validity. The assumption is either that the training was of little value or that it was too specific and little transfer of training occurred. However, there are indications that there was improvement in some aspects of concentration which were not measured by the tests; from the results reported by the parents and teachers, an after-training improvement seemed to have been effected in level of motivation which quite probably did not reveal itself immediately in better test performance. On the two tests of concentration which were related to Memory, there was a statistically significant difference between the scores obtained by the Experimental and Control groups; however, training was predominantly in this field. Thus, it would seem that very little transfer of training occurs and that training in a specific field leads to improved powers of concentration in that particular field.

(5) The training programme indicated the extreme importance of level of motivation in determining the degree of concentration or the extent to which the child could benefit from the habit-training. A striking diffefence was seen in the manner of manifestation of 'lack of concentration' according to whether it was easily and directly observable or not. The necessity was seen for dealing with the influence of associated factors and for questioning the value of a group training for every child.

(6) A number of variables which appear to be intimately related to the problem of "lack of concentration" emerged during the interviews with the parents, teachers and children - these were the significance of positive interpersonal relationships with parents, siblings and peers, of adequate organization of routine and supervision of homework performance, of the attitudes of important figures in the child's environment as affecting his level of aspiration and motivation, and of the degree of emotional maturity or level of emotional adjustment of the child. It is held that, in the group of children studied, the cause of "lack of concentration" was not always simply a lack of knowledge or practice of the correct habits of concentrating but also a lack of motivation and interest or the presence of an emotional difficulty. The limited results of the training may be an indication that the problem cannot, in all instances, be solved merely by pure habit-training in powers of concentration. It is maintained that, from the practical classroom point of view, there is a condition which, in spite of certain dissimilarities in behaviour, presents itself to the teacher as "Lack of Concentration"; however, the clinician cannot consider it as a simple or unitary condition and must be aware of the numerous and varied causes and features which make the condition so complex and which the teacher does not imply in the label "Lack of Concentration". Because of the complexity of the condition, it is considered that habit-training is not necessarily in

itself sufficient to ameliorate it but that other forms of treatment may have to run concurrently with it.

2. Conclusions and Recommendations for Further Study.

(1) The distinction between Attention and Concentration and the processes involved in both have, as far as possible, been clarified and made explicit. The definition of Attention proposed incorporates the most recent knowledge of the process and seems to be in line with the modern trends in psychology.

(2) Much work needs still to be done with regard to the measurement of concentration; numerous difficulties have been pointed out and many remain to be solved by further research. In a clinical setting there is a need for accurate tests to assess powers of concentration, or rather the expression of these powers in some kind of task performance, in order to rate the individual's standing in this respect and to evaluate the results of special training and other therapeutic procedures undertaken to improve these powers in one or more directions.

It appears from the present investigation that concentration is not unitary and therefore a general test of concentration cannot be devised; future research should concern itself with measurement in a number of more limited spheres, for example the auditory and visual spheres, or within the content of specific school subjects. The relationship between concentration and scholastic attainment in general and in specific school subjects, such as reading and arithmetic, requires further investigation. It is conceivable that the level of attention required for optimal achievement may vary from one school subject to another, as it almost certainly does for different stages in the acquisition of a learned skill.

Two other problems are the practicability of a set of tests which will not be too time consuming and yet will measure sustained attention, and the difficulty of equating testing conditions with the conditions in which the child's lack of concentration normally occurs.

(3) The relationships between Attention and Intelligence, Memory and Motivation respectively, need to be made more explicit. It appears also that ego-involvement and frustration-tolerance are closely associated with powers of concentration, but both these terms require more precise operational definitions before the rôle that they play can be clearly delineated. Interviews conducted in the present study indicated the importance of emotional behaviour patterns and personality traits; the administration of projective techniques might however, lead to further and more definite knowledge of the relationship between personality and "lack of concentration". One aspect of future research on the relationship between "concentration" and intelligence might be the comparison of a profile of 'good' concentrators with that of 'bad' concentrators on the Wechsler Intelligence Scale for Children, especially with regard to the Arithmetic and Digit Span sub-tests; it would also be of value to know whether after training, there would be any significant change in the profiles of the 'bad' concentrators .

(4) With regard to the solution of the problem of "lack of concentration", it seems that little transfer of training can be expected to occur. In order to determine more accurately the degree of transfer that is possible, two separate sets of tests should perhaps be devised, the material in one closely resembling that of the training and schoolwork, and the material in the other differing greatly. Furthermore, if attention is not a unitary and general process, the degree of specificity of training that is necessary must be determined.

The present study has clearly demonstrated that both the causes and the manifestations of the conditions labelled "lack of concentration" vary in detail and patterning from one individual to another. An important distinction is that which can be made between the child who manifests the condition overtly in wasteful motor responses, namely, the hyperkinetic, "fidgety" child, and the child who may appear attentive but in fact is preoccupied with irrelevant ideation, sub-vocal verbal associations and imagery, namely, the day-dreamer. Methods of training aiming at the inhibition of these two types of responses would probably need to be different and therefore group training could be undertaken only after the most careful consideration of cases.

In many instances, more will be needed than habit-training in concentration; the need for psychotherapy may be suggested in certain cases and one may have to 'work with' the parent as well, since the influence of the home background and of the attitudes of relevant adults in the child's environment have been shown to be associated factors.

SUMMARY

1. The Problem

The problem arose in the setting of the Child Guidance Clinic of the University of Cape Town where children were from time to time referred for "Lack of Concentration"; this appeared to be an extremely vague, descriptive term used to cover a variety of conditions.

The main purpose of the present study was to arrive at a clearer understanding of the term "Lack of Concentration" for the clinical psychologist. This implied :

(1) defining concentration and accounting for its lack in the group of children studied

(2) showing the inter-relationships and links between concentration and other variables

(3) (a) devising tests of concentration

(b) formulating a training procedure with the object of developing concentration

(c) devising a set of alternate tests to assess the effectiveness of the training programme

(4) evaluating the present status of the problem and emphasizing the need for further research and investigation.

2. Outline of Experimental Design

The subjects selected for the research were 35 boys from four schools, aged ten or eleven years of at least average intelligence and without any serious physical or scholastic difficulty, who were described by their teachers as "lacking in concentration". Preliminary investigations carried out were the administration of the Wechsler Intelligence Scale for Children, and the Graded Reading and Arithmetic Scholastic Tests

of the Child Guidance Clinic; interviews were conducted with the parent, class teacher and each child. The purpose of the interviews was to elicit information about the manifestations and causes of "lack of concentration"; knowledge was sought in the following fields - home background, interpersonal relationships, health, daily routine, home discipline, emotional development and maturity, schoolwork and behaviour, and level of motivation; the method of interviewing was as far as possible non-directive.

A tentative set of eleven individual and five group tests of concentration was then devised and administered to a group of ten 'bad' and seven 'good' concentrators, all attending one school, in order to determine the validity of the tests. The independent criterion of level of concentration was, of necessity, the judgment of the teacher. For each child an intelligence quotient estimate was obtained by administering three sub-tests of the Differential Intelligence and Scholastic Tests of the Child Guidance Clinic, and the Vocabulary and Information sub-tests of the Wechsler Intelligence Scale for Children which are reported by the author to correlate most highly with the Full Scale score. These seventeen children, having served for the pilot study, were not used at any other stage during the research.

Statistical operations were then applied; the product-moment correlation coefficient was used to give the correlation between test scores and intelligence, and the t formula to determine whether there was any significant difference between scores obtained on the proposed tests of concentration by the 'bad' concentrators and those obtained by the 'good' concentrators, namely, to determine the significance level or validity of each test.

The results of the pilot study having been both empirically and logically examined, the final set of tests of concentration was obtained and administered to the subjects who had undergone all the preliminary investigations. The division into Experimental and Control Groups was made on the basis of performance on the three most empirically valid tests of concentration. As some subjects had already been excluded because their intelligence quotients were below the predetermined criterion of I.Q. 94, the division resulted in eleven members in each group.

Training in concentration took place over a period of approximately three months, the members of the Experimental Group attending two afternoons a week at the Child Guidance Clinic for one hour at a time; the Control Group did not participate in any training. After an interval, both groups were re-tested with a set of alternate tests, and all the parents and teachers were interviewed finally at the end of the experiment. Statistical operations were applied as before to determine the significance of the training methods, the assumption being that any improvement in powers of concentration would be measured by an improvement in performance on the alternate set of tests of this ability.

3. Summary of Findings and Conclusions

(1) The review of the literature made it clear that "lack of concentration" was a vague term implying a complex condition which was by no means easy to define. After a fairly long period of relegation to a secondary position, Attention is once again being considered worthy of further investigation. The striking defect of the numerous tests designed, in the past, to measure attention, was the lack of knowledge of their validity, and in many instances, the definition of attention upon which these tests were based was no longer acceptable. Few methods were directly proposed as a means of improving powers

of concentration and the value of any one method has not been sufficiently substantiated.

(2) An attempt has been made in the present study to define attention as a process in terms of brain-functioning and to take into account the extremely significant role of motivation. 'Selection' is considered the most important feature of attending, and this has been described in terms of the neural processes of facilitation and inhibition which are thought to be a function of the 'reticular formation', and in terms of the processes of 'exclusion' and 'inclusion'; motivation probably affects the level of the 'arousal system' and so determines the degree of facilitation or inhibition. The distinction between Attention and Concentration is one of degree; in concentrating, the process of selection is sustained and intensified. The theories of Hebb, Bugelski, and Cameron and Magaret were of value in formulating the definitions of Attention and Concentration which incorporate the most recent knowledge of the process and are in line with the modern trends in psychology.

(3) Numerous difficulties presented themselves in the construction of a set of tests of concentration and many remain to be solved by further research. Only three of the proposed tests of concentration showed a statistically significant difference between the groups labelled 'good' and 'bad' concentrators - these were Arithmetic Addition Auditory Simple and Auditory Distraction, and Knox Cubes. It is necessary to consider these results in conjunction with the fact that the independent criterion of level of concentration employed in the study was the teacher's judgment which, in itself, was probably not satisfactory. Six tests other than the three statistically significant ones were included in the final battery as they seemed on logical principles to be related to concentration and some of them had, even on empirical grounds, a relatively satisfactory level of significance.

(4) In a clinical setting, there is a need for accurate tests to assess powers of concentration, or rather the expression of these powers in some kind of task performance, in order to rate the individual's standing in this respect and to evaluate the results of special training and other therapeutic procedures undertaken to improve these powers in one or more directions. It appears from the present investigation that concentration is not unitary and therefore a general test of concentration cannot be devised; future research should concern itself with measurement in a number of more limited spheres or within the content of specific school subjects. The relationship between concentration and scholastic attainment in general and in specific school subjects requires further investigation; it is conceivable that the level of attention required for optimal achievement may vary from one school subject to another, as it almost certainly does for different stages in the acquisition of a learned skill.

(5) A number of training methods were employed in the attempt to develop in the child the correct habits of concentrating. Nineteen sessions were held in all and the children attended in two groups of six and five. Training in the correct habits of concentration was attempted in situations which would demand the exercise of concentration for optimal performance. Exercises were presented as games and material incentives were offered in order to keep the child's interest and raise his level of motivation. Wherever possible, the child was made aware of the principles and techniques involved and was encouraged to put these into practice in situations outside the Clinic; discussion sessions were held with this purpose in mind.

(6) The training programme resulted in an empirically significant improvement in performance on only one out of the three tests of concentration which had been found to show a high level of statistical validity. The assumption is either that the training was of little value or that it was too specific and little transfer of training occurred. However, there are indications that there was improvement in some aspects of concentration which were not measured by the tests; from the results reported by the parents and teachers, an after-training improvement seemed to have been effected in level of motivation which quite probably did not reveal itself immediately in better test performance. On the two tests of concentration which were related to Memory, there was a statistically significant difference between the scores obtained by the Experimental and Control groups; however, training was predominantly in this field.

(7) Thus, with regard to the solution of the problem of "Lack of Concentration", it would seem that little transfer of training can be expected to occur. In order to determine more accurately the degree of transfer that is possible, two separate sets of tests should perhaps be devised, the material in one closely approximating that of the training and schoolwork, and the material in the other differing greatly. Furthermore, if attention is not a unitary and general process, the degree of specificity of training that is necessary must be determined.

(8) The present study has clearly demonstrated that both the causes and the manifestations of the condition labelled "lack of concentration" vary in detail and patterning from one individual to another. An important distinction is that which can be made between the child who manifests the condition overtly in wasteful motor responses, namely the hyperkinetic, "fidgety" child, and the child who may appear attentive but in fact is preoccupied with irrelevant ideation, sub-vocal verbal associations

and imagery, namely, the day dreamer. Methods of training aiming at the inhibition of these two types of response would probably need to be different and therefore group training could be undertaken only after the most careful consideration of cases.

(9) The relationships between Attention and Intelligence, Memory and Motivation, respectively, need to be made more explicit. The importance of the latter, particularly, was seen during the training period; the terms, ego-involvement and frustration-tolerance require more precise operational definitions before the rôle that they play can be clearly delineated. The administration of projective techniques might be of value in substantiating the impressions gained in the interviews of the importance of emotional behaviour patterns and personality traits in "lack of concentration".

(10) It is held that in the group of children studied, the cause of "lack of concentration" was not always simply a lack of knowledge or practice of the correct habits of concentrating but also a lack of motivation and interest or the presence of an emotional difficulty. The limited results of the training may be an indication that the problem cannot, in all instances be solved merely by pure habit-training in powers of concentration; the need for psychotherapy may be suggested in certain cases and one may have to 'work with' the parent as well since the influence of the home background and of the attitudes of relevant adults in the child's environment have been shown to be associated factors.

(11) It is maintained that, from the practical classroom point of view, there is a condition which, in spite of certain dissimilarities in behaviour, presents itself to the teacher as "Lack of Concentration"; however, the clinician cannot consider it as a simple or unitary condition and must be aware of the numerous and varied causes and features which make the condition so complex and which the teacher does not imply in the label "Lack of Concentration". It is because of the complexity of the condition that it is considered that habit-training is not necessarily in itself sufficient to ameliorate it but that other forms of treatment may have to run concurrently with it.

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