THE NATURE OF TEMPERAMENT:

A Study of Some Fundamental Factors.

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Much time has been devoted in recent psychological research to the Temperament problem. The success of the work has hardly been commensurate with its volume. Widely divergent theories have been propounded, some of which are still profoundly influencing current work on the subject. Some investigators, such as McDougall[1] and Bloor[2] confined their treatment of the problem to general analysis and definition. By far the greater number have, however, aimed at detailed classification, and numerous "typologies" have resulted. Some of these are based on psycho-pathological studies, some on endocrine functions, and some on a number of variables such as Perseveration. Will, Surgency, the magnitudes (values) of which have been estimated by means of "Tests", questionnaires or direct measurement of sensory and physiological processes. These approaches to the problem have resulted in a variety of theories and classifications of temperament, such as: the "analystes et esprits synthetiques" of Paulhan; the "subjective - objective" types of Klages; the Primary - Secondary Functioning of Gross, Pfahler, Muller, Heymans, Wiersma and the Groningen School; the Introvert - Extravert Mechanisms of Jung; the "Schizothyme - Cyclothyme" types of Kretschmer; the "Integrated - Disintegrated" of Jaensch and.....

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(1) McDougall - "Outline of Psychology."

(2) Constance Bloor - "Temperament." London, 1928.

and the Marburg School; the Glandular Types of Berman; the Will-Temperament of Downey; Webb's Conative 'W' factor; and Cattell's recent "Surgent - Desurgent" division.

The fact that fundamentally new researches continue to appear suggests that the solutions offered so far are inadequate. It is not practicable to analyse here all the main Temperament theories. As a preliminary to new research, the investigator should, however, inquire in the first place, exactly in what respect previous work fell short; in the second place, what elements or concepts most frequently emerge from the welter of theories. This is the only sound approach to a subject so vaguely and variously defined.

We shall, therefore, give a brief critical discussion of some of the more noteworthy definitions, theories, typologies, experimental and clinical approaches, explaining incidentally the plan of the present research.

We shall have to pay particular attention to the definition of the problem, noting what factor or factors, cognitive, conative or affective, are singled out as of special importance in temperament study. Do the factors that have been selected as constituting the basic principle in any Temperament theory account for such behaviour qualities [1] as have at one time or another been designated as Temperamental? Failing this, has a satisfactory case been made out that such behaviour qualities as can be accounted for are the only ones relevant to a study of Temperament?

A decision.....

(1) In this introduction, reference will often be made to "Temperamental behaviour qualities," "traits", or merely "Temperamental behaviour" or "behaviour". Except where closer definition is appended, we are referring to the kind of behaviour that is described in such terms as "works by fits and starts". "Changes from one mood to another." "impulsive" "quickly offended", "readily enthusiastic", "always occupied in spare time","gets down to a job and finishes it there and then", "finds it difficult to get rid of unpleasant thoughts or to break off an unfinished job", "quick, restless or jerky in movement" and the like.

A decision on the latter point can obviously only be made after a thorough review of all the important Temperament theories now current.

McDougall,(1) in attempting to define Temperament, first distinguishes between Disposition, Temper and Temperament. Of the last he says: "The Temperament of a man may be provisionally defined as the sum of the effects upon his mental life of the metabolic or chemical changes that are constantly going on in all the tissues of his body." "Some of these chemical substances seem to influence all parts of the nervous system; others seem to be highly selective, influencing some special parts or centres exclusively, or much more powerfully, than others." This tells us nothing at all about the nature of the changes so produced. But the definition implies that all behaviour is coloured by this general chemical factor and hence that a study of Temperament cannot be confined to mere differences in affective processes which is the case in so many researches. Much more important from the point of view of understanding behaviour is his treatment of "Temper". This is defined as "the expression of the way in which the conative impulses work within an individual." There are three principal ways in which this "working of the impulses" varies from man to man namely in respect of (1) strength, intensity or urgency, (2) persistency, (3) affectability. Affectability indicates the degree to which impulses are influenced by pleasure or pain, and seems to contain some emotional element. Volitional Behaviour is also covered by these aspects of Temper, for McDougall refers to steadfastness and persistence, irrespective of motives, as resulting from certain combinations or "Temper patterns." Different behaviour patterns result from different "Temper"

patterns. .....

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(1) McDougall - Outline of Psychology pp. 351 - 361.

patterns. By statistical methods the former could be worked out in detail, provided accurate measurements of the three factors involved in the latter were possible. It only remains to be seen whether all qualities of behaviour, at some time or other thought relevant temperamentally, can be deduced from the combinations of these three factors. Is it possible that McDougall's Temperament is the diffuse bio-chemical factor which, in acting on the constituent factors of Temper, produces individual differences in Temperament? His definition of Temperament by itself is of little practical value. In combination with Temper, however, it could serve as an adequate starting point for a complete Temperament theory. It is relevant to stress here, in view of our emphasis on "practical value", that an adequate solution of the Temperament problem should satisfy the requirements of both General and Individual Psychology. The data gathered by General Psychology are ultimately used by Individual Psychology in the accurate assessment of individual differences. On the one hand we have to state the nature of Temperament in terms of behaviour and its physiological foundations; on the other hand we have to devise suitable clinical tests, whereby we can determine the position of the individual in the Temperamental scale. It is important to keep this dual purpose clearly in mind. McDougall's General Temperament definition is obviously useless from the point of view of Individual Psychology. We have not advanced far enough to measure accurately in individuals the metabolic changes that go on in all parts of the body, and even if we could, McDougall has not explained what their "sum-total effects on the mental life" are in terms of behaviour. His "Temper concept, however, introduces three variables - measurable

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factors. It is the function of General Psychology to enquire into the organic nature of these variables, and into the behaviour connotations of each separately and in combination with the others. Only when this has been done can a measurement, made by means of specially designed clinical tests for the purposes of Individual Psychology, have any meaning and any practical diagnostic value. In our opinion this is one of the essential conditions of a satisfactory solution of the Temperament problem.

Shand (1) also speaks of Temper and Temperament, Temperament being the "Sum of the innate Tempers of the different Emotions." He seeks the solution in differences in susceptibility to specific emotional stimulation, and in discharge of specific emotional reactions. No attempt is made to account for differences in the duration of emotional after-effect, or rapidity of emotional discharge on the grounds of the existence of speed or persistence factors as such. Shand also denies the existence of a central Emotional core, or "General Emotionality Factor."

The findings of Burt (2) are in direct contradiction to this view. In a group of delinquent children, excessive liability to one form of instinctive expression or emotion was often accompanied by greater liability to other forms. He contends that a General Emotionality factor may exist. (3)

The number of investigators who would limit Temperament to differences in Affective processes is large. Yet differences in the frequency, speed, persistence and continuity of actions, other than affective responses are

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(1) A. F. Shand. "The Foundations of Character." 1914
(2) C. Burt. "The Young Delinquent." pp. 506-507.
(3) D.Oates. "British Journal of Psychology.
"GROUP FACTORS IN TEMPERAMENT QUALITIES"
Oct. 1929.

equally important and contributed as much as similar differences in moods and emotional expressions to the meaning of such classical and literary epithets as "Choleric", "Sanguine", "Cautious", "Impulsive", "Melancholic".

Most frequently the explanation of "Just Temperament"[1] has been sought on the organic side. Throughout the history of Psychology, Temperament has always been closely identified with physiological, bio-chemical processes. The classical concept of the Humours of the body has its modern scientific counterpart in Endocrinology and its relation to Temperament. The difficulty regarding the organic theories is one, however, to which we have already referred when dealing with McDougall's definition. We must be able to relate bio-chemical processes to behaviour either in terms of general qualities which throughout characterise the behaviour of an individual, such as speed, duration, intensity of reactions, or in terms of "gestalten" of these qualities, equivalent to more complex forms of Temperamental behaviour such as "optimism", "enthusiasm", "introversion", "liveliness". The weakness of Temperament typologies on the classic pattern is their vagueness in the description of these subjective Temperament phenomena. No attempt is made to carry out a Systematic Study of the subjective field. Glancing at random through some of the older endocrine typologies, we come across such terms as "ambitious", "suspicious", "persistent", "successful", "not subject to fatigue", "great self-control", "excellent brain power", "rapid perception and volition", "imaginative", "excitable", "enduring in work". The meaning of most of these terms is vague. There is no proof or attempted proof,

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(1) As opposed to anything related to personality and character.

that any of them are basic, or even that they are functions of basic factors. There are all kinds of ambitions, with all sorts of motivations. The "persistence" concept is very complex, and a good deal of research has had to be devoted to it alone. "Excellent brain power" encroaches on the field of intelligence, which by now is clearly defined and quite remote from Temperament. It is impossible to form from these classifications a general idea as to how an individual will act under a variety of circumstances. This type of knowledge of an individual's Temperament is similar to knowing a few phrases or themes, of a symphony, without knowing how they are constructed, what variations occur elsewhere in the work, what other themes there are, and how the whole is put together.

Nevertheless there is no inherent flaw in the method of studying Temperament as a phenomenon of bio-chemical function. But it is essential that a correlation be sought between known endocrine or other physiological functions and simple forms of behaviour which can be treated as behaviour units, capable of accurate evaluation. The study of the more complex behaviour patterns and their resolution in terms of these unitary factors is essentially a psychological problem. Should it prove impossible to reduce all important behaviour forms in this way, then one would be forced to conclude that endocrine factors do not constitute the sole basis of temperament.

The systematic study of endocrine function is still a very new branch of physiology. The psychologist has very few methods of obtaining material directly, and further investigations must be left to the experimental physiologist; yet important contributions have been made by clinical studies in Psychopathology. The psychiatrist is able to throw light on the bio-chemical foundations

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of Temperament through a study of deranged endocrine functions and their accompanying subjective morbid phenomena. We shall have to say more about this type of endocrine work in due course.

Very much more is needed to complete our knowledge of the interrelations and mutual influences of the ductless glands. L. F. Barker (1) remarks in this connection: "There has been a tendency to attempt to push the clinical applications of the scientific advances in endocrinology further than is warranted and much confusion has arisen both in the profession and among laymen because of failure to distinguish between mere speculations and well-established facts." Interesting possibilities of further endocrine research in relation to Temperament are suggested by J. B. Watson. (2) One looks in vain for the term 'Temperament' in the index to "Psychology from the Standpoint of a Behaviourist". In an earlier work, however, he suggests a possible behaviouristic equivalent in the following manner: " The evidence is fair for holding that in the whole bodily process we call conditioning the ductless glands are intimately involved- that conditioned stimuli may bring about both over-secretion (hyperactivity) and undersecretion (hyposecretion) of the ductless glands. If these theories should prove eventually to be justified, and if ever the conditioning of responses in respect of ductless glands is worked out in scientific detail, then such reactions might be said to constitute the temperamental determinant of individual behaviour". All this is very hypothetical and again does not tell as much about temperamental behaviour. But some day a "physiological index" of the

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(1) L. F. Barker. Encyclopaedia Britannica. ENDOCRINOLOGY.
(2) J. B. Watson. "Behaviourism" p. 69.

kind suggested would no doubt be very valuable for the study of temperament, but as yet it is not measurable.

The next group of Temperament theories we propose to discuss are those resulting from the psychiatric approach. Here we find the great Temperament typologies, best known of which is the Extravert-Introvert Theory of Jung.(1) Types have often been criticised as artificial and useless; artificial because they involve a cutting-up and mere classification of the human personality; useless because they are unable to account for the majority of people who are of mixed type. There is, however, nothing against the type system as such provided certain conditions are fulfilled. The success of a typology, more even than of a general Temperament theory, depends on the delimitation of the Temperament field. The typology is the tool of individual psychology, and nowhere will inability to account for important behaviour qualities emerge more clearly. The test of the theory lies in its practical usefulness. When, in the case of a typology, we have reduced all Temperament behaviour phenomena, whether directly or introspectively observable to a number of unitary factors and when we have divided our experimental subjects into a number of groups according to the relative strengths of the factors, then we should expect to find quantitative but not qualitative variation within each group. In such groups, all Temperament qualities an individual possesses, follow from the interrelation of fundamental variables within him. The resulting typology should be a dynamic one. In a dynamic typology there is no clear-cut break where one type ends and another begins. The variables, on which the typology is based, must occur in all individuals, but in

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(1) C. Jung "Psychological Types". 1923

independently varying values. The type name is merely a convenient term to designate a set of variable configurations in which one or more variables remain above or below a certain average value. If we have three variables, A,B,C, (each capable of varying from + to -), then A+B+C- would designate that group of individuals characterised by more than an average amount of A and B, less than an average amount of C. In the course of this thesis, the dynamic nature of this concept, especially in terms of behaviour, will become abundantly clear. It will be sufficient to remark here that an individual possessing the ratio A B C, is not just a mixed unclassifiable average type, but one with definite qualities which can be deduced from the known functions of each of the variables, and the effect they have on each other.

We shall see in our review of Typologies that usually a too narrow definition of Temperament has led to the occurrence of unclassifiable behaviour qualities in a random fashion throughout the range of different types. These qualities do not follow from the type - premises and they reveal both the theoretical and practical failure of the typology.

Looked at from this point of view, the Extravert - Introvert typology of Jung has some obvious weaknesses. It is based on the theory of the libido discharge Mechanisms. Radical differences in the nature of the Emotional discharge exist, and can be correlated with marked subjective characteristics. But the groups which result from this distinction have no general Temperamental validity. They result from a predominantly

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psychiatric outlook and are useful only in the study of emotional disturbances. A general Temperament scheme, based on this distinction, would yield a bi-modal distribution of the population and a large variety of pertinent differences would be unaccounted for. Are not the qualities, generally understood as Introverted or Extraverted merely the result of a certain configuration of fundamental variables? Suppose all Temperament phenomena could be reduced, in the manner we have suggested, to three factors, X,Y,Z, each capable of being present in a maximal or minimal degree.

Introversion and Extraversion might now arise with, let us assume, the patterns $Y+X\pm Z+$ and $Y-X\pm Z+$ and be the result not of the presence or absence of any one of these factors, but of the particular interrelation of the three. By concentrating on Introversion and Extraversion we would therefore be dealing with <u>two</u> of the many <u>configurations</u> of fundamental variables, which themselves would not emerge at all. Their existence would obtrude itself by a number of contradictions, variations within the groups, and frequent overlap of qualities. To get over these discrepancies, which he actually found, Jung introduced his factors of "Thinking", "Sensation", "Feeling" and "Intuition". But these are not variables. They are of an "all or none" type. The Extravert - Introvert Mechanisms at any rate satisfied our stipulation that a typology must be dynamic. The introduction of the four additional factors converts it into a static one. One cannot, in varying degrees, be Thinking, Feeling, Intuitive and Sensational all at once.

Jung made no attempt to ascertain statistically

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what qualities belong exclusively to one type, what to another; whether any interaction is possible between the four subsidiary faculties or whether there is any overlap in the qualities belonging to each. Being static, these types are unable to account for the majority of people from a behaviour point of view. In actual practice we find people belonging to one type in some of their reactions, to another type in others. Spearman remarks:(1) "Such a name as Introversion only serves in the first place to bring together an indefinitely large class of mental tendencies. It does not, pending further evidence, indicate that all the tendencies falling within this class will vary proportionally in any individual. Yet such correlation it is that we need if the whole class of tendencies is to be treated as a single behaviour unit and measured, or even described for this individual, by a single value or statement". As a result of extensive intercorrelations of Intro - and Extravert traits, J. R. and R. B. Guilford(2) state: "Introversion and Extraversion in the sense of a single general dimension of personality represented in every item of the typical test is a myth". This evidence bears out our contention that Introversion and Extraversion are possibly particular configurations of a number of variables, but that they themselves are not basic variables at all. We know of no attempted inter-correlations of sub-type qualities. The actual clinical measurement of individual differences proves a final obstacle, as anticipated by Prof. Spearman. No simple

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(1) C. Spearman. "The Abilities of Man," p.53. London, 1927.

(2) J. R. and R. B. Guilford. Psychological Bulletin Vol. 29. No. 9, p.635.

organic or psycho-physical measurement can be made to determine the type an individual belongs to. One can only note the presence or absence of certain subjective qualities, and as the existence of sets of these qualities correlated with the types, has not yet been demonstrated, even this examination cannot yield valid results. A final criticism is that, apart perhaps from the libido mechanisms, the fundamentals of the types are unintelligible physiologically.

The work of Kretschmer (1) and his followers has recently reached great prominence. We shall deal with it very fully in the course of this research, so that a few general remarks will suffice here. His approach is based on Jung's libido concept and is psychiatric in character. We shall find it subject to similar weaknesses. Again only part of the Temperament field has been covered. Undue emphasis on Affectivity has led to a disregard of other possible basic factors, so that in each type qualitative differences occur, which do not follow from the type premises. The significance of this is that Kretschmer implicitly admits the temperamental nature of such qualities; otherwise there would have been no need to include them in the description of each type. Hence he justifies our criticism that only part of the Temperament field has been covered. We refer to frequent citation of such qualities as speed, vigour, frequency, persistency, and continuity of actions, unconnected with emotional behaviour or emotional motivations. Mention is often made of the differences in volitional action between certain types, but their organic connection with these types is nowhere very clear.

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(1) E. Kretschmer. "Physique and Character"

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His further treatment of Temperament behaviour forms is, however, much more practical and valuable than Jung's, being dynamic throughout. He makes no attempt to to draw up formal typological distinctions which it is difficult to relate to physiological function and still more difficult to grasp in terms of actual behaviour qualities. Instead, he studies differences in fundamentally determined behaviour patterns, classified under three headings: Mood, Psychomotility (qualitative nature of an individual's reactions such as their adequacy or inadequacy to the stimulus, jerkiness, smoothness etc.,) and Psychic Tempo (covering qualities such as speed and fluidity of movement). It is a pity that he conceived these entirely as functions of the affective impulse and its discharge, variations under one heading being accompanied by parallel variations under the other. Had he enquired whether at least two of them, Psychic Tempo and Psychomotility could not exist as separate and independent variables, the Kretschmer typology might have formed the basis for a satisfactory solution to our problem. As it stands, it has no general Temperamental validity. This view is also held by E. R. Jaensch:(1) "The great and lasting significance of the Kretschmer Theory must in my opinion be found in the contribution it makes to the Etiology of the chief classes of psychoses. On the other hand its meaning becomes falsified and attention is led away from this chief

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(1) E. R. Jaensch: Auseinandersetzungen in Sachen der Eidetik und Typenlehre, VIII. Zeitschrift fur Psychologie. Bd 126. Heft 1 p.51.

point, if one tries to make out of this theory a Normal Typology, which it definitely is not".

Kretschmer's work is indeed a notable contribution to the study of endocrine functions and their relation to subjective phenomena. He states:[1] "The possibility must be left open that the activities of internal secretion are spread over the anatomical structures of the brain, as well as over the rest of the body, so that the question assumes almost a dizzy complexity." He replaces the parallel "Brain and Mind" with "Soma and Mind"[2] As differences in endocrine secretion, except in pathological cases, are not easily ascertained, Kretschmer has found an intermediary stage, to act as an index. By means of an exhaustive study of the syndroma of endocrine pathology, he has determined the correlation between certain physique characteristics and the excessive or defective functioning of particular glands. Variations in physique qualities are grouped under three headings: Pyknic, Asthenic and Athletic. All sorts of mixtures and gradations of these are possible and can be accurately determined by a detailed clinical examination along definite lines. Even though Physique types, as we shall show in this thesis, do not correspond with basic Temperament types, the direct connection between endocrine function and physique, if corroborated by further research, is bound to prove extremely useful. The work of E. R. Jaensch and the Marburg School on Eidetics

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(1) Physique and Character: p. 253
(2) op. cit. p. 255

has yielded a further typological Temperament theory, founded partly on Psychopathology, partly on a wealth of experimental psychophysical findings (1).

His first classification was into Basedowoid and Tetanoid types. The "B" type shows the qualitative characteristics - in a normal degree of course - of Grave's Disease, the other of tetany (hypothyreosis) Calcium feeding has an effect on the second type, not on the first, while the two could also be distinguished by means of microscopic examination of the skin capillaries at the base of the fingernails. Jaensch found later that they were only different forms of a more fundamental type, which he called the "Integrated" type, and his division was henceforth between the Integrated and Disintegrated. The typology becomes now extremely complex and the concepts involved difficult to follow. Actually Jaensch did not find any "disintegrated" types in Germany, though he suspected there must be some in America.(2)

His integrated types depend on differences in the degree and direction of the integration of the subject with his environment. The basic property of the personality is a "Closer intermingling of inner and environmental experiences and stronger integration i.e. stronger mutual interpenetration, of all psychological functions whatever. The eidetic images are merely a particularly evident symptom (stigma) of these characteristics. For, when these images are more or less closely related to ideas (memory

images) .....

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(1) "Eidetic Imagery" E. R. Jaensch.
transl. O. Oeser. London 1930.
"Grundformen menschlichen Seins" Berlin 1929.
"Uber den Afbau der Wahrnehmungswelt" Leipzig 1923 & 1927.

(2) H. Klüver : Eidetic Phenomena.
Psychological Bulletin Vol 29. No. 3 page 186.

images) being at the same time actually visible, the inner and outer experiences of ideation and perception are in a condition of coherence, and functions that otherwise are separate are in a condition of mutual interpenetration or "integration'." (1) It is possible to have an outwardly directed integration, a close coherence between personality and outside world, "corresponding to the mutual interpenetration in the inner life of those functions through which external reality is presented to the individual." The emotional tone in one type can depend on inner, in another on outer circumstances. Some are reception, some projection types. It is impossible to treat the erudite but complex writings of Jaensch at all fairly in this necessarily brief and haphazard manner. We would lay ourselves open to a charge of superficiality if we were to attempt any fundamental criticisms.

But even if we admit that differences in integration exist, and that these are measurable by various eidetic tests, that there is, moreover, a bio-chemical basis to variations in integration, we still need a much more detailed statement as to the actual Temperamental behaviour produced, before we can evaluate the general and individual validity of the typology.

Furthermore, however much the various forms of integration may be based on experimental findings, we yet find it extremely difficult to translate such purely descriptive and subjective concepts into terms of organic function or actual behaviour. References to "definite conceptual and emotional complexes, ideas and ideals", forming "a nucleus for the personality which is permanent in time" suggest that we are here dealing with something much

more than ....

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(1) Eidetic Imagery page 58.

more than functional factors; in fact with a system of sentiments, a personality superstructure erected on some simpler elements whose character is not clearly revealed. The fact that Jaensch had not yet found a disintegrated type, that he therefore could not have verified or established its existence experimentally, leads us to believe that there has been a great deal of inductive reasoning behind the establishment of certain forms of the types, and that much of the typology is speculative. Some scepticism towards Jaensch's claim that the eidetic types are "basic", "bio-types", definite psycho-physical reaction systems, seems justified.

If they are basic, what of the personality qualities which we quoted above? How did they develop? If we subtract them, exactly what is left over? Jaensch's typology involves personality concepts, altogether too remote from the simple, Unitary Temperamental factors we are seeking to be of any assistance in the elucidation of our problem. The great contribution of the Marburg School is the discovery of the Eidetic Image and some entirely new methods of psycho-physical measurement. About this aspect of Eidetics, H. Kluver[1] writes: "There is no question that more experimental studies on Eidetic phenomena themselves are a desideratum. Instead of new hypotheses concerning the function of E.I., we need new factors on E.I."

The last typology we need to consider is that of Heymans, Wiersma and the Groningen School. It is based on Primary - Secondary Function, Emotionality, and Volitional Activity. As their approach was, however, eventually adopted as a starting point for the present research, their work will be ...

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(1) H. Kluver. "Eidetic Phenomena"
Psychological Bulletin Vol. 29. No. 3. page 196.

work will be treated separately and in detail in the next chapter. The reason for our choice will be stated at the conclusion of this introduction, where a summary and conclusions of this analytic study are presented.

Performance and kindred tests (speed and writing tests, measurement of sensory and galvanic phenomena) constitute another important aspect of Temperament research.

In the absence of any clearly formulated Temperament theory this attempt to discover and at the same time measure Temperament variables has not been too successful.

The June Downey Tests[1] which are among the best known in this category, attempt to measure the activity or dynamic level of personality. The Temperament pattern of an individual is taken by Downey to differ in respect of (a) the amount of nervous energy available to the individual, (b) the tendency of such nervous energy to discharge immediately into the motor area that innervates the muscles or glands, or to find a way out by a roundabout pathway of discharge.[2] She excludes emotional reactions from her Will-Temperament studies and attempts to give the basis on which character is formed, not character itself. The general dynamic nature of her basic hypothesis, involving a "nervous energy" concept, is promising. Her subsequent methods are, however, open to grave errors. The tests she uses are largely handwriting tests, involving various forms of muscle control and coordination, as well as speed. A few of the tests, such as those intended to measure "Finality of Judgement", "Speed of Decision", involve situations which are extremely artificial. There is further no proof that i.a. "Finality of Judgement" or "Freedom from

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(1) June Downey - "The Will-Temperament and its Testing"

(2) quoted from Bloor "Temperament".

Load" are unitary functions at all. Exactly what all these qualities mean in terms of subjective behaviour it is difficult to say. Downey throws no further light on this. The author states that the tests can be arranged in three groups, each determined by a fundamental 'tendency' namely "speed", "aggressiveness", and "persistence". Excellence in any of these makes an individual respectively a "mobile", "forceful", or "deliberate" type.

Intercorrelations of the Downey tests fail to reveal the existence of underlying unitary factors. No group factors emerge and the intercorrelations generally are poor.(1)

There is no proof that each performance test actually measures the quality it claims to measure. This is a very serious weakness, for in the absence of positive and significant intercorrelation among tests a measure of any artificially named function does not even become an index of the strength of a known underlying variable.

The "profile" of a battery of these tests is therefore completely meaningless.

June Downey's is the first research we have dealt with in which emphasis is on volitional action. We must note its connection with a General Activity Level, or fund of Nervous Energy. The further aspects of the Downey

Theory.....

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(1) In an unpublished investigation conducted by Dr. J. D. Sutherland of the Psychological Laboratory at the University of Edinburgh, the tetrad differences of a set of intercorrelations of the Downey battery were worked out. Their distribution pointed to 'g' as sole determinant. Intercorrelations of the same test given to a group of 60 school-children at the University of Cape Town Psychological Laboratory failed to reveal the existence of the three group-factors.

Theory are, as we have seen, too crude, to make it a fair index of the usefulness of introducing volitional factors in the study of Temperament.

Nevertheless, the approach by means of the specific test is far from useless in the study of the General Temperament problem. The experimental work on Perseveration (for details see Ch. IX) illustrates how by means of repeated experimentation and careful statistical work the existence of a fundamental variable and its function can be proved or disproved. Yet even here the attempts to devise suitable clinical tests have not yet been successful. Investigators have at any rate realised that the solution of the General Problem is the first requisite.

The Temperamental importance of the Perseveration concept itself is great. Here we have a general neural factor, determining both speed of reaction to stimulation and a tendency for the result of this stimulation to persist neurally and unconsciously, and hence to recur spontaneously to consciousness or to influence reaction to new stimulation.

Webb, Cattell and Lankes have shown that this factor is quite distinct from Volitional Persistence and hence is not a conative but a cognitive concept.

The most useful data, in addition to those supplied by the psychiatric method, have been yielded by questionnaire technique. When handled carefully, questionnaires and rating scales can supply reliable information on very large groups, which is an important consideration where the differences to be measured are so diffuse and vaguely defined. With their aid, the investigator is able to make an extensive survey of all forms of behaviour and all qualities that have been designated, whether in popular or in scientific usage, as temperamental.

Statistical enquiry will then reveal which behaviour qualities are linked together, which are basic, which complex, what unitary factors are responsible for the groupings, and the number of such variables. Only then can the devising of clinical tests to measure these variables be taken in hand, while an attempt can also be made to determine their organic nature.

This completes our review of current Temperament theory.

What can be inferred from this review as to the direction which further research should take?

We have seen that the universal weakness of all the theories we have considered, irrespective of their other merits or demerits, was an inability to give a clear, unambiguous, and practical analysis of Temperamental behaviour and behaviour qualities. Hence it is to this aspect of the problem that further research must be mainly directed.

It is difficult to deal adequately with detailed behaviour qualities by means of the more general psychological treatment of Temperament of McDougall, the 'profile' method of Downey and by means of the work on single variables such as Perseveration. A typology is the most convenient form of dealing with a fairly wide range of behaviour qualities, and a satisfactory solution of our problem will most likely assume this form.

This typology must, however, be dynamic as defined earlier in this chapter. The behaviour of an individual will be determined by the ratio in which the fundamental Temperament variables occur in him. It will not be determined by reference to a standard set of qualities, which is the common conception of the function of a type. The variable ratio is the important element, the type name a mere convenience. This implies as a further requirement that the function of each variable is known in terms of behaviour, and that the influence variables have on each other is similarly known.

In a discussion of the questionnaire method, we have seen how a wide range of Temperamental behaviour qualities could be shown by means of intercorrelation and statistical analytic technique to be functions of a few simple variables. This method was followed with advantage by Webb and Cattell. An alternate method is to start with a few simple variables, identified tentatively with simple forms of behaviour and to work out the correlations of these variables with as many behaviour qualities as possible. This admittedly involves the a priori assumption that the behaviour qualities started with are indeed functions of the supposed variables. The resulting correlations will, however, leave no doubt as to whether this assumption was justified, whether the variables are real fundamental behaviour units, whether they are mutually exclusive and whether there are any others.

This method we eventually adopted. Although this procedure is not as mechanical as the other, and will therefore not give results with the same unfailing mathematical precision, yet it gives scope for some analytic and constructive work. The investigator is able to utilise the positive contributions already made by previous investigators and the work can be usefully directed, without the need of sacrificing the advantages of statistical procedure to any great extent.

Our review of Temperament theory and method was intended to reveal regularities which might suggest tentative variables. These regularities do indeed occur and can be grouped under four headings:

a) Differences in respect of general stimulability, and of speed, continuity, perseveration of responses.

b) Differences in susceptibility to and intensity of affective behaviour.

c) Differences.....

c) Differences in strength and frequency of Volitional Action.

d) Differences in direction and subsequent integration of some general psychic energy, referred to as Libido by Jung.

a) In some form or other, differences of this type occur in all typologies and Temperament theories, even in those where the chief emphasis is on another factor such as Emotionality. In two individuals, equally susceptible to Emotional stimulation, the emotional excitement or its after-effect will persist for a long time in the one, a short time in the other. The Emotional response may be speedy and explosive in the one case, passionate and intense in the other. The difference must be found in the nature of the discharge, not in the strength of the instinctive energy involved. Both McDougall's and Shand's definition of Temper involve these differences in the discharge of an instinctive energy.

Richerand[1] made variability in speed and continuity at a certain level of reaction the basis for a classical typology.

Kretschmer's Psychic Tempo covers speed and fluidity of movements, his Psychomotility the adequacy and smoothness of responses. Similarly we find speed, fluidity, co-ordination of movements an important element in the Downey theory.

In the concept of Perseveration or Secondary Function we find this same general response factor again, as a separate variable, a functional quality of the nervous system. As instances of the operation of a Perseveration factor we may mention (a) the phenomenon of persistent after-effect of a sensory experience, (b) spontaneous recurrence, without new stimulation, of a past experience and (c) a physiological continuation of past experience which can profoundly influence new stimulation. There is an extensive literature on the

concept.....

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(1) Richerand. "Physiology."

concept. Gross,[1] Müller,[2] Heymans, Wiersma,[3] Pfahler[4] have subjected perseveration, or Secondary Function, as it was first called by Gross, to detailed examination. Its exact neurological nature is not quite clear. We can, however, identify it with the excitation - inhibition mechanism of Pavlov.[5] Under certain experimental conditions - long delayed trace reflexes - the "excitatory" types among his dogs developed hysteria, the "inhibitory" types sleep, or general inhibition. The predominantly Primary functioning among men are similarly liable to hysteria, the Secondary functioning to Dementia Praecox. Whatever its ultimate neural nature, the Perseveration - Secondary Function - Inhibition factor has been held responsible for marked differences in the neural response, in the cognitive, affective and conative fields.

There is no relationship between this factor and 'Persistence", a conative function. It is that neural quality which determines the manner in which such 'psychic' energies as may exist are discharged. Its nature is cognitive and Spearman looks upon it as expressing the inertia of his postulated nervous energy.[6]

Constance Bloor, who made an admirable summary of Temperament theories, in the hope of discovering a suitable definition, may be quoted in conclusion;[7] "We have seen evidence of a belief, constant in its essence though varying widely in its basis, that physiological functioning - possibly connected with physical structure - produces variation in reaction to environment. Such reaction we have found to be clearly associated with initial speed of reaction, and maintenance of

original.....

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(1) O. Gross. "Die Cerebrale Sekundärfunktion."
(2) Müller. "Gedachtnis." 1900.
(3) Wiersma. "Die Sekundärfunktion bei Psychosen." 1906
(4) Pfahler. "System der Typenlehren." 1929
(5) Pavlov. "Conditioned Reflexes." 1927.
(6) Spearman. "Abilities of Man." P. 306
(7) C. Bloor. "Temperament" P. 93.

original reaction level. But we have also seen that such factors are profoundly affected by the degree of Emotional disturbance and that if therefore evidence can be established for variation in susceptibility to emotional stimuli, it must form part of the Temperamental equipment."

b) This brings us to our second possible variable, based on differences in the susceptibility to or discharge of emotional responses. We have seen that such a factor was the sole determinant of a large number of theories; it constituted the core of the psychiatric theories, except that of Jaensch. Some of the differences in respect of Emotional Behaviour are due to the general neural factor we have already discussed. But this factor can merely modify the manner of arousal and discharge of the instinctive impulses.

Burt postulates a general Emotionality factor. Shand observed differences in respect of susceptibility to particular Emotions. McDougall states that the working of the impulses which he has called Temper can vary from man to man as regards affectability or susceptibility to pleasure or pain. We have found that endocrine secretions, which profoundly determine emotional reactions, are of great Temperamental importance. These secretions are in fact the most likely organic equivalents of the 'instinctive impulses' or 'energy' to which references are frequently made in connection with Emotion. It is impracticable to enquire here further into the nature of this emotional factor. This would lead us into a subject as controversial and confused as Temperament itself. We must content ourselves with observing that Emotional behaviour, as defined by the authors we have quoted, has been considered a necessary constituent of Temperament, that in fact many have thought it the only constituent.

c) Differences....

c) Differences in Volitional Behaviour are generally observed and stressed, even by those investigators who do not incorporate a volitional factor in their ultimate theoretical statement on the nature of Temperament. Kretschmer for instance mentions tireless energy and great volitional persistence as a characteristic of his pyknic type. McDougall[1] states: "There can, I think, be little doubt that.....the man who is naturally steadfast and persistent in respect of some impulses, will show the same quality, no matter what motives be at work in him." This persistence is unconnected with the strength and urgency of impulses and desires.

Webb's[2] W.factor determines perseverance in the face of obstacles. Among the qualities correlated with the W.factor lately isolated by Cattell[3] energy and perseverance are mentioned. Volitional action is the basic factor in the Downey scale, measuring a Will - Temperament, while Ach's typology[4] is based on differences in "feeling and willing capacity."

In Watson's work we do not find these three specific factors. Instead there is an Activity Level, the attributes of which correspond with those of the three generalities we have described. There is an Emotional Activity Level, varying from excited to depressed. The more external features of the primitive pattern types of emotion are partially inhibited, but the "implicit, mainly glandular side of the pattern remains". Internal secretions, released by emotionally exciting objects, are responsible for changes in level. Different individuals have different normal levels.

There is.....

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(1) "Outline of Psychology." Page 354
(2) "Character and Intelligence". B.J.P. Monograph Vol. I.Part 3.
(3) B. J. P. Vol. XXIV.
(4) See Bloor op. cit.

There is also an Activity Level of work, under which heading frequency, persistence, intensity of actions, also in the face of obstacles, are studied, as well as their continuity, regularity, and perseveration. ("Can he put his work aside or must he take it with him, conversationally at least, into his social life and moments of recreation? Are his movements in good form, or is he awkward in gait and speech? Are his work and talk systematic and logical in character? Does he complete work undertaken promptly and neatly; or is he a procrastinator, a maker of excuses and in general a temperamental worker?")(1) We find here both our cognitive Perseveration factor and the conative willed - action factor.

d) The fourth important element is the direction of discharge of the libido, which is but another name for the 'instinctive' or 'psychic' energy of other writers. This direction involves also the element of integration, integration inwardly or outwardly with environment. Jung, Jaensch and to a lesser extent Kretschmer have stressed its Temperamental importance. Watson deals with a similar concept(2) in his discussion of outlets to implicit glandular responses, the explicit response having disappeared or having been suppressed.

Yet it is doubtful whether we are dealing here with a true variable; we have given our reasons for this opinion in connection with our criticism of Jung. We may, in due course, be able to express this difference in direction in terms of the other three variables.

After her comprehensive review of Temperament theory, Constance Bloor offers a summary which is substantially the same as ours.(3)

"We cannot.....

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(1) "Psychology from the Standpoint of a Behaviourist." pp. 420 - 421.
(2) do. p. 217; pp. 236 - 240.
(3) "Temperament"

"We cannot fail to notice how again and again the widely different accounts of the writers we have considered have tended to reduce themselves to a classification on the basis of speed of reaction, persistence of reaction, and what we may agree to call the disturbing effect of emotional experience."

She also conceives of some Activity Level, or "flow of psychic energy." Emotionality and Volition would be special aspects of this activity level. Being averse of the concept of psychic energy, which it is convenient to use, but to which no very clear meaning can be attached, she replaces it by a simple factor which she terms 'tempo'(1). She further defines the Tempo of an individual as "the factor which influences his reactions to non-specialised situations in respect of speed of initial response and duration of activity level." (2)

The inclusion of 'non-specialised' is as "a safeguard against an obvious criticism which must be met when we come to consider the nature of those situations which present themselves as suitable for experimental investigation of the 'tempo' of any given individual." Apparently she prefers to study a wide range of behaviour qualities as functions of a neural factor, differently discharging an instinctive force of varying intensity. But for the unspecified nature of this instinctive force - although Miss Bloor's analysis makes it quite clear that she considers both affective and volitional behaviour Temperamentally important - her summary of Temperament theory agrees with the main aspects of ours.

This introduction.....

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(1) op. cit. p. 152.

(2) op. cit. p. 152 - 153.

This introduction does not attempt to give clear-cut definitions of these factors, or to speculate on their basic origin. All it sets out to do is to determine a starting point, to find some direction in the maze of Temperament theories.

DIRECTION AND PURPOSE OF PRESENT RESEARCH.

The purpose of the subsequent investigation is to prove or disprove the existence of these variables tentatively revealed by this analysis and accurately to determine their function in terms of behaviour.

Only when this has been done shall we be in a position to inquire into their organic physiological basis.

The research embodied in this thesis is an attempt to carry out this verification. As far as possible, this will be done by experimental means. Only where experimental data are not available shall we venture to make tentative explanations on the grounds of such evidence as we possess, or suggest further investigatory work on specific points.

Up to now, we have only made one or two references to the work of Heymans. There is, however, such marked agreement on essentials between his Temperament and character work and the results of our analysis that we decided to follow up his line of investigation, making use of his theoretical background and tentative suggestions; but adapting procedure and theory to our own special requirements and purpose. Much of his material and speculations on character are irrelevant to the present enquiry; much of his temperament work too general, speculative or descriptive. It is, however, capable of development along the lines and by means

of the.....

of the methods we have indicated. We have therefore reserved a special chapter for the discussion of the Heymans typology and the principles on which it is founded.

The advantage of following up a definite investigation is that the new data, collected for further analysis, can be compared with a previous set, so that some idea can be formed as to their general validity.

GENERAL OUTLINE OF PRESENT RESEARCH.

It will be convenient to give here a general outline of the present research, with a short description of the successive stages in the analysis of the validity, function, and foundation of the three fundamental Temperament factors.

CHAPTER II. - Contains a critical study of the Heymans typology. The origin, definition, function and measurement of the variables used are described. This is followed by a study of the resulting typology and its usefulness from the point of view of General and Individual Psychology. How does this typology satisfy our requirements, and in what direction could, or should it be further developed?

CHAPTER III - Gives an outline of the first and most important part of our own experimental work, how the material for the study of the three variables and their function was collected by means of a questionnaire adapted from the Heymans school. The chapter consists mainly of a detailed description of the questionnaire; of the subjects to whom it was applied; of the method adopted to 'measure' the variables. The further scoring of the questionnaires, and the statistical procedure are finally described and a note is appended regarding the reliability of the material so collected.

CHAPTER IV - The collected material, consisting of a number of correlations of Temperament qualities and behaviour forms with a series of combinations of variables is ready for detailed examination.

A description.....

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A description.....

A description of the attributes of the types which result from this typology cannot be given until the general validity of the basic factors on which the typology rests has been proved, and their functions have been accurately determined. We have seen that this procedure is the only one, consistent with the requirements of a dynamic typology. To this end the following steps are taken:

1) By statistical examination the validity of the criteria, by which the variables were measured, is examined.

2) The reality of the variables themselves, as distinct units, is demonstrated by a statistical analysis of their function.

3) A preliminary attempt is made to show that the variables are qualitatively distinct units, without any overlap between them. (Further proof to follow.)

4) A detailed study of the function of each variable, and the functions of patterns of variables, in terms of behaviour, is made. Again and again we have pointed out in the introduction the necessity of determining the behaviour connotations of any variable as fully as possible. For this purpose, the various behaviour qualities, covered by the questionnaire, are grouped under convenient headings, so that the function of variables can be stated in terms of broad categories of situations, as well as in terms of detailed qualities.

CHAPTER V - Only now will it be convenient to discuss the types and their qualities. Having ascertained what the functions of each variable are singly, as well as what modifications result when the variables occur in patterns - which they necessarily must in practice - we can discuss the types without having to make basic assumptions. The study of types then becomes a logical deduction from known premises. The types, it may be remembered, are nothing but the behaviour patterns, corresponding to specific groups of variable combinations.

CHAPTER VI.....

CHAPTER VI - The making of some assumptions was, however, unavoidable. We assumed that certain behaviour patterns correspond to definite variable patterns, even to the extent that one could logically deduce the one from the other. We have had, however, to consider such factors as age, sex and environment to be constant. Chapter VI deals with the relation between these three factors and Temperament as we have conceived it. The hereditary nature of Temperament and its immutable character have often been asserted. The material available in the present research is inadequate to provide clear answers to the many vexed questions that arise in this connection. Such explanations as are ventured must therefore be taken tentatively and subject to further experimental corroboration. The fact that we have not followed up these various avenues is not due to oversight or failure to grasp their importance but solely to lack of time and opportunity.

CHAPTER VII - Traces the relationship between Intelligence and the variables. The practical interest in this investigation lies in its educational application, the theoretical interest in the further light which is thrown on the nature of the Activity variable.

CHAPTER VIII - Having thus considered the part played by both organic and environmental influences in an individual's Temperamental make-up, it is important to ascertain the distribution of Temperament types in the population as a whole. Comparisons can be made with data from other researches. The results prove to be of a curious nature. Some types are found to occur much more frequently than others, an inequality in distribution which emerges characteristically from all researches. The reasons for this phenomenon are not immediately clear. A number of correlations which are worked out suggest that the solution may be found in the organic nature of the variables.

CHAPTER IX.....

CHAPTER IX - Hence a study should be made of such evidence as is obtainable on the organic basis of the three variables, an investigation which we were bound to make in terms of our definition of an adequate solution of the Temperament problem. Experimental evidence, both from previous researches and from the present investigation is examined. The problem is extremely intractable, in view of the experimental methods at our disposal, and again only tentative answers can be given.

CHAPTER X - The three variables and the typology to which they give rise have now been studied from all relevant aspects. We stressed in this introduction the importance of a systematic study of physique, as a measurable index of the equally important endocrine functions. Can we trace any connection between physique qualities and the three Heymans variables? This chapter contains an analysis of the Kretschmer typology and an attempt to state its fundamentals in terms of our variables. Direct experimental evidence from a physique research conducted by Wiersma will be adduced. As a result of our comparison, the exact relationship between physique and the three variables can be determined so that we are able to bridge the gap between two important typologies and at the same time vindicate the usefulness of the analysis made in Chapter I.

A general summary concludes the thesis.

CHAPTER II.

The Heymans Typology.
Its practical usefulness.
Its general validity.

It is rather surprising that among British psychologists, so little attention has been paid to the very thorough and detailed work, carried out by Heymans, Wiersma and their followers on the subject of Temperament. Apart from some passing references to Secondary Function experiments, their contributions to the problem are completely ignored. Yet they gathered most comprehensive data on large groups, one of which numbered as many as 2523 adults in the Netherlands.[1.]

It was not at first their intention to develop a Temperament Typology, and its characterological and personality components. Rather was it an attempt to determine the part played by Heredity in Temperament and character qualities; hence the group was made up of parents and their adult children. The earlier articles in the Zeitschrift für Psychologie (42-49) deal with this research.

Their first publication[2.] on Temperament types was based on the biographical study of 110 historical personages, drawn from different countries and different levels of society. Subsequently in order to check the validity of the conclusions drawn from this limited material they decided to subject to a similar analysis the 2523 character and temperament studies they had obtained in their heredity enquiry.

The final general summing up of the entire research on this subject, with detailed studies of the types discovered, was published by Heymans, shortly before his death, in Dutch.[3.]

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1. Heymans und Wiersma, Beitrage zur speziellen Psychologie auf Grund einer Massen Untersuchung. Zeitschrift für Psychologie 42, 43, 45, 46, 49, 51, 52, 80.
2. Heymans. Ueber einige psychischen Korrelationen. Zeitschrift für Angewandte Psychologie I. 1908.
3. Inleiding tot de Speciale Psychologie. Erven F. Bohn. Haarlem 1929.

The material was gathered by means of questionnaries which were applied in a manner that obviated many of the weaknesses of that method. Copies of the questionnaire were sent to every medical practitioner in Holland, with the request to rate adult individuals, in families thoroughly well known to him, on the items in the questionnaire; to indicate by double underlinings wherever any quality was very strikingly observed, and to leave blank all those questions on which they had any doubt at all. Answers were received from 458 practitioners yielding over 2500 temperament and personality studies.

It seems safe to conclude that the 458 who filled up the questionnaires were the more interested and scientifically minded of an already fairly select group of men, whose daily calling brings them into intimate contact with people, and who have fair scope to acquire an insight into personality. This ensures some uniformity and competence among those doing the rating. The very large group is a safeguard against random errors, so that even though mistaken judgments were bound to be made, they would not be likely to obliterate an existing factor. And after all judgments are made on the basis of objectively given reality.

From our point of view, the greatest interest was attached to three, supposedly fundamental, variables which were being put to the test in this research.

These are (1) Secondary Function (2) Activity (3) Emotionality.

Heymans discusses these concepts very fully.

Mental processes, cognitive, affective or conative, exercis a Primary Function while they are in the centre of consciousness a secondary Function when they are no longer conscious. In the mental life of an individual, either the Primary Function or the Secondary Function can be habitually predominant.

Experimental.....

Experimental data gathered by Wiersma point to some innate quality of the nervous system as responsible for the predominance of either one or other function.

Differences in the after effect of sensory experiences proved measurable (See our chapter IX on Perseveration). In these experiments it was found that high Secondary Function as indicated by long neural 'perseveration' was found in Dementia Praecox patients, high Primary Function in Manic patients. These psychoses are respectively characterised by the subjective phenomena on the observation of which the formulation of the Secondary - Primary concept was originally based by Gross. A direct relation was thus established between a quality of the nervous system, measurable in sensory and in aesthetic fields, and subjective - ideational, affective or overt behaviour.

Activity means 'Volitional Activity' for Heymans. It can be both overt and ideational. If two individuals are both equally aware of the implications of a certain action, and the result of that action is equally desirable to both, & has an equal emotional value, then we may say that the motive for their action is similar in both cases. Yet we might find the one much more readily performing that action than the other. Again some people are always bustling about, while the motivation for their many actions is very weak, while others can only be brought to act, if at all, through dire necessity, by powerful motives, and at the expense of a more or less strong conscious act of will. The first are Active in Heymans' sense, the second Inactive.

By Emotionality Heymans means "Susceptibility to Emotional Behaviour".

Explicit and implicit emotional reactions are frequently and readily aroused in some people by a variety of situations,

while.....

while others are indifferent to anything but a cataclysm. The strength of the Emotional drive is unrelated to the duration of an Emotional experience or to the length of the latent period between the emotionally stimulating situation and the emotional response. These differences are largely due to the operation of Secondary or Primary Function.

So far, there is no satisfactory method of measuring this Emotionality experimentally; mere observation of behaviour according to Heymans, is the only reliable method at the disposal of the investigator. A large range of intermediate grades is possible between the extremes of Secondary and Primary Function, Emotionality and Non-Emotionality, Activity and Inactivity, which constitute the positive and negative poles of real variables.

To obtain circumscribed definitions which would serve to select one way or another, he sums up as follows:[1] "In general we call someone Emotional on the basis of the frequency and strength of his affective reactions, in proportion to their causes; active on the basis of frequency and energy of his activities, in proportion to their motives; Primary or Secondary Functioning according to the degree in which cognitive and affective processes "perseverate" (German: "nachwirken") in proportion to their importance".

The questionnaire contains 90 questions, each with a number of subdivisions and alternatives. Only the first 26 of these are intended to measure Temperament qualities, the rest, concerned with Intellect, Inclinations, and miscellaneous qualities belonging to the realm of character and personality.[2] Of the Temperament qualities, some indicate Activity or Inactivity (1-8) some Emotionality (9-16) some Secondary or

Primary.....

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1. Heymans - Imleiding tot de Speciale Psychologie Vol. 1 p. 19 Direct quotations from Heymans and Wiersma are unauthorised translations by the writer from the Dutch and German texts.
2. The complete questionnaire can be found in the "Inleiding" (op.cit.) and Zeitschrift für Psychologie 42.

Primary Function (17-26).

In each of these groups, Heymans took some to be his criterion questions, so that an individual was rated as Emotional or Non Emotional, Active or Inactive, Secondary or Primary functioning, if he was shown to be so on the majority of each set of criterion questions. This involved the a-priori assumption that such questions were in fact criteria, that they all measured the same thing, and that they correlated in the same direction with the non-criterion questions in their own group.

The questions serving to diagnose differences in Activity were:

2a. Works with application and steadily at his occupation, studies, tasks.

b. Works only by fits and starts.

c. Frequently lazy.

3a. Usually occupied in spare time with hobbies, gardening, repairs etc.

b. Inclined to idle and take things easy.

5a. Inclined to procrastinate (e.g. writing of letters, making arrangements etc.)

b. Used to get down to a thing, tackle a task and finish it there and then.

The assumption that these criteria do measure what has been defined as 'Activity' seems reasonable.

The emotionality criterion is <u>one</u> straight question:

9a. Emotional (quickly stirred, sensitive to mere nothings.)

b. Non Emotional (cool, controlled, undemonstrative).

On a small group, and for individual cases, this question would have been worse than useless, but in this huge group it did roughly segregate the more emotional from the less, as will be discovered if one refers to Heymans' and Wiersma's complete figures.[1.]

Those who possessed a majority of Secondary Function criterion...

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1. Zeitschrift fur Psych. 51.

criterion qualities were judged to be Secondary Functioning, those possessing a majority of Primary Function criterion qualities as Primary Functioning. The criteria were the following:

17a. Comparatively quickly comforted after a loss (soon regains interest in life and work.)

b. Deeply impressed, (remains for a long time under a cloud, cannot get over it.)

18a. Completely and quickly reconciled after burst of anger (forgets and behaves as before, as if nothing had happened)

b. Continues to cherish a grudge or sulk.

19a. Inconsistent in affection (adulation may turn into hatred)

b. Constant.

20a. Clings stubbornly to a pet idea.

b. Open to new points of view and arguments (has an open mind

c. To be talked round very easily (easily led.)

21a. Attached to old memories (place of birth, graves of relations, old friends).

b. Engrossed in new impressions and new acquaintances.

22a. Keen on change (of domicile, course of study, occupation, never in a rut.)

b. Prefer routine (likes usual daily round, amusements and belongings.)

23. Gone over : a. repeatedly, b. once, c. never, from one course of study or sphere of work to another.

24. Inclined to make ambitious plans which in the end never materialise.

25. Guided in course of action a. by thought of the future, b. Immediate and tangible results.

Our first consideration, in the present research, will be to set the question of criteria on a somewhat sounder and statistically more controlled basis, and to demonstrate clearly what Heymans simply leaves one to infer from his figures.

Having thus determined for each individual in his group whether he is Active, or Inactive, Emotional or Non Emotional, Secondary or Primary Functioning, and having thrown out those

it.....

it was impossible to place either way, he sorts them into eight groups:

1.	Secondary Function,		Active,	Emotional
2.	"	" ,	"	Non-Emotional
3.	Primary	" ,	"	Emotional
4.	"	" ,	"	Non-Emotional
5.	Secondary	" ,	Inactive,	Emotional
6.	"	" ,	"	Non-Emotional
7.	Primary	" ,	"	Emotional
8.	"	" ,	"	Non-Emotional

These are the eight possible combinations of the three variables. He then calculates the percentage incidence of every quality in the whole questionnaire, for each of these eight groups, works out the average for the whole group, and hence the extent to which any one quality is present, above or below the general average, in each of the groups.

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E	S.I.N.	P.I.E.	P.I.N.	AV.
1. Restless & Always on move.	46.1	16.6	77.4	33.7	38.1	12.8	70.7	29.6	41.3
Number in each group.	597	439	257	95	113	94	174	98	2523

For example, in the S.A.E. group (in future S will stand for Secondary, A. for Active, E for Emotional, P. for Primary, I. for Inactive and N for Non-Emotional) which numbers 597 cases, 46.1% of these cases are "restless and always on the move", in the S.A.N. group, numbering 439 cases, 16.6% are characterised by that quality, in the P.A.E. group 77.4% of cases are etc.

The figures so obtained are very striking indeed; on analysis Heymans is able to show that the eight groups, which he has thus selected on arbitrary criteria, each have a distinctive character.

The other questionnaire qualities correlate within each group in a manner which is consistent with the variables that particular group contains. In the Emotional group for

instance, ...

instance, the effect of Emotionality becomes noticeable in the percentage incidence of a number of relevant traits, as compared with the percentage incidence of the same traits in the non-Emotional group. One is therefore justified in concluding that this Emotionality factor is a real Temperamental one, which can be traced throughout the make-up of the individuals in the Emotional groups. And so with the other variables. Similarly it is possible to establish the behaviour patterns which result from a combination, in any proportion, of the three variables, and to show that the nature of these behaviour patterns is consistent with the functions of the constituent variables. It is not our purpose here to detail the correlates which Heymans found with each of the combinations, nor, at this stage, to go into further proof of the reality of these variables. Heymans is more interested in the description of what he actually found, than in the exact analysis, or careful proof of the fundamental nature of his variables. He allows things to speak more or less for themselves. Nor did he attempt to extol the virtues of his scheme from a comparative point of view; in what ways it favourably differs from other typologies, and how it avoids their pitfalls.

Here again it will be the function of our research to corroborate, if possible, and then to carry analysis as far as we can. It will be more convenient to refer to the detailed findings of Heymans, in comparison with our own, at that stage.

To each of the eight possible combinations of the three variables, Heymans applied a type name. To quote him directly: "For the eight groups which it was possible to differentiate in this way, I borrowed names from every day speech or from literature on the subject, only after having of course made certain that the types, for which these names are used

elsewhere .....

elsewhere, agree in principle with those which sprang from our division. It should not be lost sight of, however, that these names have here been applied, strictly subject to the intrinsic nature of the division and that the decision whether a person belonged in any one group or not, was only made on the ground of the presence or absence in greater or lesser degree of the three variables." (1) Hence these names are merely generic titles, used more for convenience than anything else, and do not denote a unitary quality, which the persons in each group possess. They indicate the general tenor of the dynamic unity of qualities, correlated with any one of the eight variable combinations.

They were called accordingly:

Secondary Function, Active, Emotional (S.A.E.)

PASSIONATE TYPE.

Secondary Function, Active, Non-Emotional (S.A.N.)

PHLEGMATIC TYPE.

Primary Function, Active, Emotional (P.A.E.)

CHOLERIC TYPE.

Primary Function, Active, Non-Emotional (P.A.N.)

SANGUINE TYPE.

Secondary Function, Inactive, Emotional (S.I.E.)

SENTIMENTAL TYPE.

Secondary Function, Inactive, Non-Emotional (S.I.N.)

APATHETIC TYPE.

Primary Function, Inactive, Emotional (P.I.E.)

NERVOUS TYPE.

Primary Function, Inactive, Non-Emotional (P.I.N.)

AMORPHOUS TYPE.

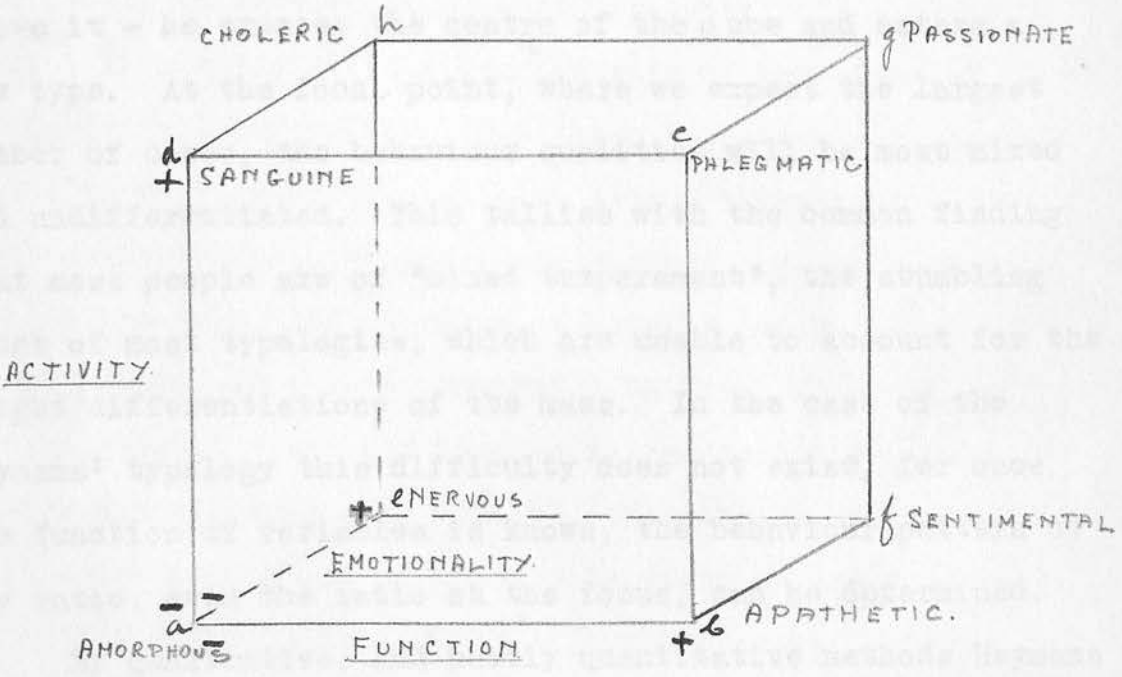
The significance of these names, in terms of their correlates, will become sufficiently clear when the differentiations produced by the present research are discussed.

We have ...

(1) Heymans, Inleiding tot de Spec. Psych. p. 191.

our italics.

We have stressed the essentially dynamic nature of this typology, the fact that there are three variables which can come together in any given proportion. An individual is quantitatively typical, in so far as he tends towards, or away from, any one of the eight limiting positions, there being a kind of general average, where Activity and Emotionality occur in a middling degree, and there is no decided bias towards either Primary or Secondary function.



Professor Heymans illustrates this dynamic nature, the outstanding characteristic of the typology, by means of the above diagram, which shows how a type can be referred to as a "Combination of three bi-polar variables."

A cube here represents any given population. Along ab we have the Function distribution, with Primary predominating at a and Secondary at b, along ae Emotionality distribution, with Non-Emotionality at a and strong Emotionality at e. Along ad the Activity distribution, with non-Activity at a and strong Activity at d. The eight limiting positions are at the corners. An individual who is placed in any one type is more likely to exhibit the qualities, belonging to that particular type, than those of another, and the degree

to which .....

to which he does so will be determined by the variable ratio. If he belongs to the S.A.E. type, the more strongly he is Secondary Functioning, Active, Emotional, the more he will exhibit the S.A.E. type qualities, and the closer will his position be to corner "g" of the cube. As the variable pattern tends to an average ratio, he will approach nearer and nearer to the centre of the cube, or intersecting point of the Diagonals; as soon as the value of one of the variables drops below average - or as the case may be rises above it - he crosses the centre of the cube and enters a new type. At the focal point, where we expect the largest number of cases, the behaviour qualities will be most mixed and undifferentiated. This tallies with the common finding that most people are of "mixed temperament", the stumbling block of most typologies, which are unable to account for the slight differentiations of the mass. In the case of the Heymans' typology this difficulty does not exist, for once the function of variables is known, the behaviour pattern of any ratio, even the ratio at the focus, can be determined.

By qualitative, and partly quantitative methods, Heymans shows that each variable possesses fairly definite correlates, that the interaction of variables produces certain known results, and that the quantity in which each variable is present can already be fairly accurately measured, although further work will have to be done to develop this to perfection. Hence any given individual can be approximately placed in relation to all those processes and qualities, which are known as Temperamental.

We see from .....

We see from this analysis that the Heymans' typology contains all the elements which are essential to a satisfactory solution of the Temperament problem. As a typology, its chief virtue is that it is dynamic. Heymans has concentrated on the subjective and behaviour aspects of Temperament, and has attempted to reduce temperamental behaviour to a few simple behaviour units, which again seem likely to have an experimentally verifiable organic basis. This satisfies the requirements of both General and Individual Psychology. His three variables correspond to the three regularities we have traced throughout Temperament theory. We shall see whether, by means of a similar research, the findings of Heymans can be corroborated. If we are successful in this, we shall carry the analysis of these findings as far as possible. Much of what Heymans takes for granted, or describes in a qualitative way, we shall attempt to prove by exact methods. The method of establishing the strength of a variable by means of criteria, the reality of the variables as distinct Units, the accurate determination of their function, the absence of overlap between them, and the functions of variable combinations, all these must be accurately determined before any general Temperamental validity can be granted to the Heymans theory. Heymans was mainly interested in Temperament as a problem in Individual Psychology. His typology is designed for that purpose, and its organic foundations lay beyond the scope of his work.

In conclusion the following remarks from Heymans,(1) which seem eminently to the point, may be noted: "First of all I .....

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(1) op. cit. Vol. 1. p. 188.

of all I wish to point out that this classification does not pretend to be the only true, or good one, not even a 'natural' one. It is possible to divide a group of phenomena from very different points of view, and of these different possible classifications there is not just one right, and all the others untrue; but they are all more or less useful. Only judgements can be true or untrue: in a classification, however, one does not make a judgement, one merely classifies. Classification can sometimes have no other use than some saving of time (such as for instance arranging chemical elements in a register in alphabetic order) while in other cases it can be pregnant with new insights and new problems (such as the classifying of these same elements in the system of Mendelejeff.)"

"The great majority of individuals are somewhere between the very marked representatives of the various types; they possess the three fundamental characteristics of the type to which they belong in very unequal degree, and deviate in one direction more, in another direction less, from the average man. With that of course goes a difference in correlated qualities. Further one cannot exclude the possibility that through the agency of certain (especially ethical) characteristics, of which this classification takes no account, the operation of its fundamental function is altered or compensated for. In general one has to beware of the narrowing of one's outlook, to which a definite classification, if one gets tied up in it, can lead. Reality is infinitely richer than any system, and it is important to keep one's eyes open to this richness."(1)

The 'usefulness' .....

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(1) Op. cit. Vol. 1. p. 195.

The 'usefulness' of which Heymans speaks he ascertained to his own satisfaction in three large groups, yet he keeps on urging research for further corroboration on groups in different countries and different environment. Better and more detailed questionnaires, the formulating of new problems, and finer analysis of present data, all these he recognises as necessities.(1) We feel therefore justified in launching yet another investigation along the same lines, putting a few of these suggestions into effect, and extending its scope from the purely Individual Psychological problem to General Psychology. Incidentally we are perhaps introducing the work of Heymans to the larger circle, which it so eminently deserves.

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(1) Heymans and Wiersma op. cit. Zeitschrift für Psych. 51. 1909.

CHAPTER III.

General Direction of Investigation.
The Questionnaire.
The Subjects.
Method of scoring Questionnaires:
Criteria.
The scoring in practice.
Reliability of Material.
Statistical Method.

In order to verify the findings of the Heymans School, and to subject these to further analysis, we shall have to gather a set of comparable data.. This then is our first task. Throughout we shall have to improve on, or modify the Heymans technique in order to cover the wider scope of our investigation.

This becomes immediately necessary in choice of subjects and compilation of questionnaire.

A few experiments were attempted with the Heymans Questionnaire on fairly large groups of students. It was, however, found impossible to ensure any uniformity or reliability on the rating side. Friends, relatives, acquaintances were used, often too young to have any psychological insight, or too biassed. The subjects themselves used to select someone to fill up the form, so that the indispensable condition of complete privacy on the rating side was also wanting. Questionnaire material, when collected in this way, is entirely valueless, and as no way out of these difficulties could be found, a different line of approach was sought.

In Psychological work there has been a natural tendency to get down to as simple and uncomplicated an organism as possible. In temperament work it has been profitable to study the deranged organism. Although valuable knowledge on simple relationships has been obtained, this approach, based as it is on disunion, unbalance, does not throw much

light .....

light on the normal, dynamic interrelations. It has tended to distort and make unreal the Temperament picture.

Probably the soundest approach, at any rate for the general problem, will be through the study of animal behaviour. A fruitful field awaits the enterprising investigator here. The next best thing, in human material, is the child. In the school-going child, especially among the younger ones, character and personality have not developed to the same extent as in the adult. Such character qualities as there are are more direct, more easily separated from the Temperamental basis. There is less chance of fundamental trends having been obliterated and superseded by habit formations.

Many forms of behaviour, especially on the emotional side, have not yet become socially conditioned and inhibited. Lastly one can secure fairly large and representative groups, and obtain reliable and controlled evidence on them. It is possible here to fulfil the condition of uniformity on the rating side by getting teachers, men and women of about equal experience and training, to answer questionnaires. In many cases they have been able to observe the children, both in school and out, for a number of years. They are able to study them for some time with reference to special points in the questionnaire, and they stand in most cases as unbiassed outsiders towards their material. It seems reasonable to suppose that they have some psychological insight into the child mind, as it manifests itself in the daily school routine. Altogether, in this type of research, it would be difficult to find more controlled conditions.

Hence it was decided to continue work through this medium. As the Groningen school had already conducted an enquiry among school children, data for comparison were available.

A group of nearly 4000 Secondary school pupils in Holland was examined by means of a special school questionnaire. This material, collected by Prof. Heymans, was worked out and analysed by T. J. Hugo(1) partly in corroboration of the adult enquiry, partly for educational purposes. The latter followed Heymans' method of scoring and was more interested in Individual and Educational issues than in an exact demonstration of the reality of variables, their probable physiological basis, and the general Temperamental validity of the whole classification.

We shall adapt the Heymans-Hugo school questionnaire to our use and evolve methods of scoring and analysis suitable for our purpose.

The Questionnaire.

The Questionnaire as finally used is given in Appendix I. It was compiled as follows:

All questions except Nos. 13, 25, 26, 29, 30, 31 were taken from the Heymans-Hugo School Enquiry. A considerable number of alterations were made in these, however, especially where rather extreme alternatives were involved, and fuller data could be obtained by introducing a gradation.

In question 1, (H_2)(2) "(c)-lazy" was unfortunately omitted in about half our group.

Question 5. (H_{29}) had an additional alternative: "(c)-thinks over those matters which were found interesting but yet finds it easy to dismiss everything from the mind and attend completely to something else". Heymans intended the question to measure a kind of ideational perseveration ("nachwirkung"), or Secondary function in a very pure form. It was difficult to convey this meaning in English, as teachers .....

(1) T. J. Hugo, "Karaktertiepes van Skoolkinders en Hulle Behandeling". Thesis published 1918. "Karakter Studie en Opvoeding", Pretoria 1922.

(2) H and number attached will in future stand for Heymans-Hugo Questionnaire and the particular number of the question referred to in it.

teachers probably would not understand the term "perseveration". From an examination of a first batch of completed questionnaires it appeared that teachers were interpreting our question as intending to measure "ability to remember" and "concentration on work". The later introduction of (c) was an attempt to get indirectly at the required perseveration measure. This way of putting it does not carry the "Don't care" or "Dunce" implications of "(b)- So heard, so forgotten."(1)

In Question 8, (H78) "(c)-Good-humoured" and "(d)-"Unable to be angered" were added, to increase its rather narrow scope.

In Question 14, (H1), "(c)-Lifeless and inert" supplements on the negative side.

Question 20, (H11), has "(f)-Take it calmly and with resignation" replacing "Indifferent". We thought it advisable to discover the incidence of the more balanced, controlled reaction pattern.

Question 23 (H76) is also enlarged to cover the more controlled response in "(c)-More reserved in expression of appreciation", the negative response in "(b)-Indifferent."

Again in Question 24, (H79), "(c)-eager to correct and make good" is put in to supply the balanced factor.

In Question 28, (H75), "(C)- Indifferent" covers the negative behaviour form.

Of the new questions, 25, 26, were taken from the Adult Questionnaire, except that in both, alternative (c) was added in about half the questionnaires.

Question 13, on Constancy in Friendship, seemed a useful one to include.

Question 29 .....

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(1) This is the actual wording in the questionnaire. The data were collected before we realised that this wording does not conform to standard English usage.

Question 29, "Inclined to show a temper on certain occasions (when teased, punished, thwarted etc.)" covers a number of points under different questions in the H. questionnaire.

Question 30, "(a)-Inclined to be a ringleader, or involved in trouble, scrapes and naughtiness." "(b)-Belonging to the law-abiding and well-behaved" "(c)-Merely apathetic", similarly summarises a few of the H. Questions under the heading of "Breaking of the peace" (H7,8,9,10,17,53.)

Finally Question 31 was only introduced in half the questionnaires, the second batch, as it was found rather difficult to determine the Activity or Non-Activity of some subjects. It was mainly used in a corroborative manner.

Questions 13, 29, 30 and 31 are therefore entirely new and not to be found in any of the Heymans Questionnaires.

The instructions and requests on the first page of the questionnaire are innovations. They secured us some valuable information on class position, as well as providing a number of interesting character sketches and numerous remarks, and more detailed explanations throughout the range of tests.

Most of the other tests in the H. Questionnaire referred to character, personality, school performance, interests in certain subjects, intelligence etc. We have taken over the more purely Temperamental ones, with a selection from the other sets. Most of these questions, as will be readily seen, are objective, asking what the child does, how it behaves in certain situations. There are a few on feeling states and moods, but even these are easily observable. We avoided as far as possible introducing abstract qualities,

or general .....

or general personality traits. Questions 25 and 26 (Emotional - Non-Emotional, Critical - Idealising) are the only ones of that kind. Nearly all questions refer to behaviour which can be particularly well observed in the class-room, or in situations closely connected with school life. On the side of the subject one therefore has a fairly uniform background, set of situations, or reality, against which the child is rated. To the raters an objective set of data is presented with which they are, through experience, particularly well qualified to deal.

In these respects, the school enquiry is superior to the adult investigation, and more reliance can be placed on its findings.

Subjects:

These questionnaires were applied to a group numbering 645 cases. This number falls far short of Hugo's 4000, yet is sufficiently large to yield reliable results.

The children tested range from 9 to 16 years of age, the majority being between 13 and 14. They are of both sexes. 434 cases are Scottish, 211 South African.

The South African material was secured through the co-operation of a number of teachers in Cape Town. Questionnaires were printed on the spot and distributed, according to directions, over certain environmental groups, closely corresponding with those in Scotland. Only such teachers were asked to co-operate both there and in Scotland as were sufficiently interested in the research to fill in the forms conscientiously.

We must be careful to note the selection factor in the

constitution.....

constitution of our group. The fundamental nature of the variables could not be determined unless we knew what particular environmental factors were involved, and what the general influence of Environment on the variables is. As we shall have to study this general environmental effect from our data, our groups must be especially chosen to cover a range of well-marked environmental differences. Hugo ignored this environmental factor entirely, and it is impossible to say to what extent his findings are fundamental, to what extent due to selection.

In Scotland the sample was made up as follows:

(1)	George Watson's College, Edinburgh	23 cases
	Royal High School, "	23 cases
	Shawlands Academy, Glasgow	30 cases
	Total	76 cases.

This constitutes a superior urban group. All pupils were in the Secondary division, 3u form. The average intelligence in this class, which is a selected one, is above that in the other sections of the same (3d) form.

(2)	Douglas Ewart High School, Newton-Stewart	49 cases
	Stranraer High School, Stranraer	58 cases
	Stranraer Academy, "	50 cases
	Whithorn School, Whithorn	50 cases
	Total	207 cases.

These schools are all in an agricultural area. The first two are Secondary schools. The pupils from these two were unselected, from the rank and file of those between the ages of 10 and 15. They are a rather mixed group, not of the same standard as the above three town schools, but better than those in the other two schools in this country group. The latter were both Primary, and a similar range of pupils was obtained from them.

(3) Vale of Leven Academy, Alexandria 19 cases

A group from an area in which there is grave unemployment. Mining and Industrial. Belonging to a fairly well-to-do class in this area, ...

in this area, shopkeepers, artisans etc.

(4) Dumbarton Academy, Dumbarton. 59 cases.

This group was taken from "Non-Qualifying" classes, containing children with low I.Q., who failed to secure the necessary percentage in the qualifying examination for the Secondary Division. They are from very poor homes, many running messages after school, or selling newspapers.

(5) Dr. Guthrie's Boys' School, Liberton. 73 cases.

This is an Industrial School for delinquent boys, or boys removed by order of the court from the most squalid slum conditions. The greater percentage is delinquent, however.

This Scottish sample, numbering 434 cases, gives a fairly comprehensive selection, and environmental influences, if existing, ought to be traceable.

The South African sample was constituted as follows:

(1)	Rondebosch Boys High School, Cape Town	25 cases
	South African College High School "	20 cases
	Total	45 cases.

Corresponds to group, (1) in Scotland. A superior town selection, though only the first 25 were Secondary School pupils.

(2) Muizenberg Secondary School, Cape. 62 cases.

A seaside school, very good middle class, though somewhat more mixed than group (1) and corresponding in social standing with the two country High Schools in the Scottish group.

(3)	Sydney Street Primary School, Cape Town	45 cases
	Wesley Coloured Practising School" "	21 cases
	Total	66 cases

Extremely poor environment; slum area. In Sydney Street School, many children belong to the 'poor-white'[1] class. Actually ...

(1) The term "Poor-White" is very specific in South Africa. It is applied to a set of poor Europeans, either rural, or recently rural, who have sunk, educationally and socially far below the accepted "White" standard. Though still remaining "white", they are forced to live among the coloured, in conditions infinitely worse than those of many coloured families, to whom they are in fact often inferior.

Actually, though coloured, the children at the Wesley Training College may come from better homes. Probably corresponds with the Dumbarton group in Scotland.

(4)	Marsh Memorial Homes School, Cape Town	25 cases
	St. George's Orphanage	13 cases
	Total	38 cases

An institutional group. The Marsh Memorial Homes take Orphan and destitute children, usually from fairly poor environments. The other institution is a Railway Workers Orphanage.

Both Scottish and South African groups and sub-groups are massed together in the eight-fold Temperament Division and in the analysis of the combinations and correlations produced by the three variables. In so doing we are examining the nature and operation of the three variables in a cross-section of the whole population, even though the proportions of the constituents may not be correct. For the purpose of this analysis therefore, we look upon the group of 645 cases as an undifferentiated mass. A study of environmental differences and their influence is made subsequently.

Method of Scoring the Questionnaires. Criteria.

The all-important point in the research is the placing of the individual cases in the three-dimensional Temperamental Scale, on the basis of the data supplied in the questionnaires. How did we decide whether an individual was Primary or Secondary Functioning, Emotional or Non Emotional, Active or Inactive?

A number of questions were chosen as criteria for each variable.

These were for Secondary and Primary Function.

1. a. Regularly work with application and zest (S.)

b. .....

b. With periods of slacking and easing off (P.)

2 a. Usually attentive (S)

b. Easily distracted. c. Playful, (1) d. often busy with other things than lesson (P).

3 Immediately cease attending at the end of a lesson (P)

5 a. Retain previously learned (S)

b. So heard, so forgotten (P) c. Thinks over those matters found interesting, but can dismiss everything else from the mind and attend completely to something else (P)

6 a. Impulsive (P) b. Cautious (S)

7 a. Cheerful .....

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(1) Though 'playful' is open to a number of different interpretations, as many different types of play are known to the psychologist, yet there is not much chance of ambiguity in the present context. In the first place not many varieties of play are possible in the classroom and during the lesson. Such play as occurs is nearly always of a definite type, and much the same anywhere, as we can testify through practical and extensive experience in Schools in Holland, Belgium, South-America, South Africa and Scotland.

When 'playful', rather than alternative (a) is marked in the questionnaires, it follows that the child is not usually attentive to the lessons. Taking the circumstances of class routine into consideration, it is highly unlikely that the type of play involving serious and sustained attention could occur there. The high-spirited child, full of fun, would only be marked as 'playful' if its disinclination to take things seriously involved perpetual inattention to the lesson. That is all the question intends to get at. Finally there is nothing to prevent a teacher from marking more than one alternative.

7 a. Cheerful (P) b. Depressed (S)

c. Alternatively either (P) d. Always even of mood (S)

13 a. Constant in friendship (S) b. Inconstant;develops "crazes" (P)

14 a. Restless and inclined to fidget (P)

b. Calm and quiet (S)

For Activity - Inactivity.

1c. Lazy (I)

14c. Lifeless and inert (I)

15a. Get down smartly to set class work and finish it (A)

b. Inclined to dawdle and waste time (I)

16a. When in difficulties: Inclined to give up (I) b. Try to fight through with determination (A) c. Ask for help (I)

17. After school hours occupied at sport, walking etc. (A)

31. Is the pupil in your opinion an active or an inactive type? Does the pupil display mainly intellectual activity, or mainly physical activity, or both, or neither in any marked degree, or definitely neither? This last question was used corroboratively or to settle the matter in cases of doubt.

The Emotionality - Non-Emotionality Criteria were:

20. When scolded a. inclined to cry (E) d. Sulk (E)

21. At examinations a. calm (N) b. Nervous (E)

23a. Quickly enthusiastic (E) b. Indifferent (N)

24. After making bad mistake: a. Angry (E) b. discouraged (E) e. Indifferent (N).

25a. Emotional (E) b. Non-Emotional (N) c. Feelings not on surface, but probably yet there (E).

These criteria differ somewhat from those used by Dr. Hugo. 1.

Among the.....

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1. Karakter Studie en Opvoeding p. 22-24.

Among the Function criteria he includes Question 4, "Inclined to sulk," and Question 8, "Irritable etc." We omitted these.

A reference to the figures of Hugo will show (see his thesis.[1], Questions 16 and 78) that, although occurring maximally among the Primary Emotional types, it is Emotionality, as well as Function which determines the incidence of these qualities. Primary Function is a greatly facilitating factor though perhaps not a causative one. A criterion should predominantly select <u>one variable only</u>.

We introduced 14 a and b, (H1) as a criterion because on Hugo's figures the Secondary Functioning scored markedly different from the Primary on it. Criterion Question 13 was a new one, a try-out.

Regarding the Activity Criteria, we only used (c) in Question 1, Hugo both (a) and (c). On the other hand we had 14 "(c)- <u>Lifeless and Inert</u>," which is not in his questionnaire at all. Both questions 17 and 18 (H56 and 57) we found fairly useless as criteria. Indeed, we ignored question 18 altogether in the analysis of our data. It fails to meet British conditions. In Holland, no sport is attached to school-life. The teachers have little or no contact with the pupils after school - there are no boarding schools - and whatever sport is practised the children get on their own initiative in outside football and swimming clubs. Many join gym Clubs. Consequently, only the really active trouble to seek out some opportunity for practising sport, and the question is therefore, for Holland, quite suitable as a criterion. In British schools, each child is expected to participate in some branch of sport. Nearly all are automatically members of the school Sport Clubs, so that the question loses all diagnostic value.

Much ....

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1. Hugo Karaktertiepes van Skoolkinders en hulle behandeling Published 1918. University of Groningen.

Much the same applies to Question 17. Furthermore there were obvious differences in the knowledge which teachers had or were able to obtain, on after-school activities of the child.

We did not include Question 22 among our Emotionality Criteria. The percentage incidence in each of the eight combinations of the three variables is as follows:[1]

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
22. Depressed.	43.2	3.9	24.4	.6	46.	3.6	21.	1.2
Optimistic	3.1.	6.1	17.7	31.4	1.9	7.6	18.2	34.4

Although some difference is observable for the incidence of "depressed" between Emotional and Non-Emotional, it almost entirely vanishes for "optimistic," giving place to a purely Secondary - Primary difference.

For reasons already stated (q.v.) Question 8 was omitted. Similarly, in Question 20, (H11) alternatives b,c,e, were excluded from the criterion

When Scolded	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
Argues	14.6	6.1	27.4	19.2	11.5	7.4	28.7	16.
is rude	2.2	1.5	6.1	8.1	2.8	2.	11.5	8.2
hangs about	2.9	14.4	3.7	23.8	5.9	19.5	4.7	33.7
Total	19.7	22.0	37.2	51.1	20.2	28.9	44.9	57.9

When we look at Hugo's figures it is plain that there is no homogeneity in these three qualities at all, and that the difference which emerges is one between Secondary and Primary Function. We had, however, 24e. extra, as well as the very general Question 25, certainly not safe by itself, but very helpful in conjunction with the other criteria.

The present research differs, however, from those of Hugo and Heymans in the method of using these criteria. For instance,[2] in deciding whether a child was active or inactive, Hugo gave +1, if an activity criterion, -1, if an inactivity criterion was underlined. If the algebraic sum was +, the child was Active, if -, Inactive; if zero, the child was also considered Inactive. This is not very satisfactory. It means

a child ....

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1. The figures in these columns indicate, expressed as percentages, the number of times each of these qualities occurred in each type. i.e. 43.2% of the S.A.E. group were depressed, 3.1% were optimistic. The remainder were not rated on this question at all. And similarly for the other 7 types.

2. Hugo. Karakter studie en opvoeding p.23.

a child gets, say only +2 for "getting down smartly to set class work" and "fighting through with determination in a difficulty," while getting +6, if all the forms of activity in Question 17 are underlined. This method assumes a uniform degree of validity for all the criteria. In defence of Hugo it must be said that he had no means of knowing which of his criteria were highly diagnostic, which less so. Reference to his figures, however, shows that a considerable difference did exist. Hence it was decided in this research to assign differential scores to criteria, in proportion to their usefulness, observed or surmised.

Criterion Question 1 gives the following percentage incidence in each of the eight combinations of variables.

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N
Work regularly	97.8	94.3	57.9	29.7	81.4	60.2	11.5	3.7
Fits & Starts	1.3	3.4	37.2	54.7	10.9	14.3	66.9	52.

From these figures it follows that when "Fits and starts" is marked, there is fairly certain evidence of Primary Function, whereas "Work regularly" though occurring maximally in the Secondary types, yet is shown to a very considerable extent by the two Primary Active types. The same is the case in criterion Question 2:

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
Attentive	92.8	91.8	28.7	16.3	87.	80.7	16.8	9.9
Distracted	5.3	5.5	53.9	65.1	9.	7.4	65.	60.8

Attentiveness occurs to a considerable extent in the Primary active types.

The "Secondary" Criterion is therefore not so diagnostic as the Primary, and ought to receive less weight.

As already mentioned (see page) Question 5 did not achieve its real function (ideational perseveration) and could not be weighted as heavily as intended.

In Question 3 again, ("Immediately cease attending at bell-ring) numbers of teachers annotated it: "Habit of not doing so is strictly enforced."

After study of Hugo's figures, and taking into account

systematic ....

systematic peculiarities of interpretation, the following scoring values were assigned to the Function Criteria:

1. "a-Work regularly" +1 "b-Fits and Starts" -3
2. "a-Attentive" +2 "b,c,d,(distracted, playful etc.)" -3
3. "Immediately cease attending" -2.
5. "a-Retain previously learned" +1.
   b & c -1.
6. "a-Impulsive" -2. Cautious +2.
7. "a-Cheerful -1. "b-Depressed" +1½
   "C-Alternatively either" -3 "d-Always even" +3
14. "a-Restless & fidgety" -2. "Calm & quiet" +1½
13. "a-Constant in friendship" +1 "b-Inconstant" -1.

If more than one quality is marked on the same side - e.g. b,c,d, in Question 2, all marked together - there is no increase in the score. The maximum on the primary side for that question is -3.

Regarding the Activity criteria, it seems reasonable to hold that a child, marked as "lazy" or "lifeless and inert" cannot be active. One can weight these two qualities heavily. Hugo's figures for the criteria 15 & 16 again make differentiation necessary.

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N
15. Get down to Work	86.6	89.1	85.4	75.	41.9	29.5	28.5	26.4
Dawdle	-	-	1.8	1.2	9.	6.6	34.2	19.7

The four active types between them average less than 1% "dawdling." On the other hand "getting down to work" is fairly frequent even among the most inactive types.

In Question 16, things are very much the same, except that the Inactivity criteria occur with greater frequency among the active groups. Hence the following weighted scores were used.

1. "c-lazy" -3
14. "c-Lifeless and inert" -4.
15. "a-Get down to work" +2 "b-Dawdle" -3
16. "a-Give up" -1 "b-Ask help" -1 "c-Grind on" +3

17. Occupation after school +3 -3

This was largely a matter of judgment, and depended on the thoroughness with which the question appeared to have been answered by the rater. The score was assigned along a sliding scale from manifest activity to manifest inactivity, zero when there was any doubt about the reliability of the data in the question, or no marked tendency either way. In assigning a score on this question some weight was also given to remarks appended by teachers, and to question 31, where it had been included. This criterion is, however, very unsatisfactory, and something better will have to be devised for future questionnaires.

As already pointed out, it was found necessary to drop some of Hugo's Emotionality criteria.

Question 22 and the major part of Question 20 were omitted for reasons already discussed.

). When re-	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
roved 'Cries'	22.7	1.7	13.4	12.8	.6	2.	12.5	9.9
Sulks	8.7	3.	17.7	5.2	10.3	2.6	21.4	6.

The two remaining items in the latter question, "sulks" or "cries," have been retained, but cannot be given a very high scoring value as the differences are not striking.

On the other hand differences are clear and unambiguous in Question 24:

24. After making Blunder:

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
Angry	29.5	3.9	43.9	7.	25.2	2.4	40.2	5.7
Discouraged	30.6	3.2	20.1	4.7	41.6	3.2	19.4	2.1
Indifferent	.5	5.5	.6	13.4	.3	9.6	1.9	30.4

One is entitled to assign large diagnostic value to all three items in this criterion. In Question 23, where we introduced "(b)-Indifferent," we have assumed that this item would be equally efficient as its counterpart in question 24 was, so that we have given it a large scoring value.

The figures for "enthusiastic" in the same question, are unambiguous, though small. We have not assigned a high

diagnostic ....

diagnostic value to question 21, "Calm or nervous at Examinations," as in many of our groups, of low intelligence and poor environment, there was a total indifference to examination results, among emotional as well as among non-emotional cases, so that cause for nervousness never arose and "indifferent" might have been a very useful addition.

The "Balanced Responses" which were newly introduced into some of the criteria (in Question 20 "take scolding calmly;" in 23 "Reserved in expression of appreciation," in 24 "Eager to correct and make good after blunder") were left entirely out of account, as it was impossible to foretell their function.

This leaves Question 25: "a-Emotional, b-non-Emotional, c-Emotional under the surface." We had at first intended to use it only in corroborative fashion, but often, through only "Balanced" responses being marked, we had to use it to decide one way or another. Finding, however, almost no contradiction between its verdict and the verdict of the other criteria, where the comparison could be made, we assigned it a definite value, on which all the papers were re-scored. In cases where the other criteria pointed one way, Question 25 another, the other criteria were given the advantage. This was also the case where the score was zero, there being a balance of the other criteria on one hand, and Question 25 alone on the other.

In this way we arrived at the following criterion values for Emotionality:

20	"a-Cries when scolded"	+1
	"d-Sulks " " "	+1
21	"a-Calm at examinations"	-1
	"b-Nervous " " "	+1
23	"a-Enthusiastic"	+2
	"b-Indifferent"	-3

24 "a-Angry after ...

24 "a-Angry after blunder" +3 "b-Discouraged" +2
"c-Indifferent" -3

25 "a-Emotional" +3 "b-Non-Emotional" -3
"Feelings below surface" +1

The only function of the criteria in this research is to sort individuals into groups, not to indicate their exact position in each group. By means of these criteria no exact measure of the strength of the variables can be obtained. The measurement throughout is of an "all or none" type. There are, for instance, degrees of "enthusiasm" and degrees of "reserve" which are not revealed by the mere underlining of these qualities. For the purposes of this question one is either "enthusiastic" or "reserved", according as one or other attitude is more habitual. Two individuals, the one with a strong, the other with an average Secondary Function, may each have the same score on the criteria of this variable, as each may possess all the criterion qualities and there is no way of indicating that these qualities are shown much more intensely by the one than by the other. This drawback is not a serious one for our purposes. It will be remembered that individuals vary between the positive and negative extremes of each variable, as illustrated by the cube diagram. In respect of the Function variable, we find at the focus those in whom neither Secondary nor Primary Function predominates. Close to the intersecting point we find those in whom respectively Secondary or Primary Function predominate slightly. These are the weakly Secondary and weakly Primary Functioning. As we have assumed that the largest number of cases lies at the centre, there will be, in any group, more weakly than strongly Secondary or Primary Functioning individuals. The same will of course apply to other variables.

The nature ....

The nature of this distribution will be reflected in our large group of over 300 Secondary Functioning cases.(1) Hence the observed characteristic qualities of Secondary Function will be the correlations of the variable below maximum strength. We defined a dynamic type, however, as one in which only quantitative, not qualitative variation is possible, or only such qualitative variation as follows consistently from the attributes of the variable or variables concerned. If, therefore, from a weak Secondary Function, a characteristic pattern emerges, the attributes of a strong Secondary Function can be easily deduced. We actually found this to be the case. The clear emergence of the pattern is partly due to the fact that as the strength of a variable decreases in an individual, this is not necessarily accompanied by his possessing fewer and fewer criterion qualities. All may be marked even though the intensity of the variable is low. This is the only explanation we can give of the fact that the majority of cases in the Secondary Function group for instance had criterion scores closer to the maximum than to zero. It is a natural and expected result with an "all or none" measure, expecially where the variable measured is very general in its operation, and its effects are easily discerned even in low intensity. It follows that for the purposes of the general Psychological enquiry, this questionnaire answers sufficiently well; in fact, the "all or none" measurement serves to throw basic relationships into bold and well-defined relief. If, however, accurate measurement for the purposes of Individual Psychology are required, improvements will have to be effected whereby these differences in intensity of behaviour qualities

can be observed ....

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(1) For the sake of clearing up this rather difficult point, we may be forgiven if we anticipate some of our actual findings.

can be observed. The "all or none" measure will have to be replaced by a scale. We shall refer later to the possibilities of designing clinical tests. A further discussion as to the efficacy of the criteria can be left to the next chapter. We shall there show to what extent these criteria inter-correlate, whether they are indeed functions of Unitary factors, and again whether they are consistent with the other functions of these Unitary factors as revealed by the questionnaire.

THE SCORING IN PRACTICE.

The scoring of the questionnaires was by no means a mere automatic application of the criterion-values as outlined above. In a number of cases, marginal notes by teachers qualified the answers, so that it was necessary to alter a criterion value for that particular case. "Impulsive" and "Cautious", for instance might be both marked, in which case no score was made either way. The greatest difficulty arose, however, when a zero value for a set of criteria was obtained. This occurred hardly ever for Secondary-Primary function, where there was nearly always a substantial margin one way or another. In the very few cases where there was not, a decision was made by considering which way the larger number of criterion questions went, apart from their values. Judgement was suspended until the position of the subject on the other two variable scales was known. (For the sake of uniformity, all papers were examined successively on one criterion only.)

More difficulty was experienced with the Activity Criteria, partly because some, as we have shown, proved useless, partly because there were so few, and finally, because it was often difficult to interpret the difference between intellectual and physical activity, which was often manifest. From remarks appended by teachers, one would consider the pupil to be extremely active, yet find him

inactive .....

inactive on the school work criteria. Again the decision only had to be made one way or another where there was zero score. Hugo took all the zero's into the Inactive. In such cases we first considered very carefully the possible contribution of the other two variables. Yet, in 122 cases we enquired for further particulars from the teachers, on either Emotionality or Activity. By no means all these 122 were cases in which a zero score for these two variables was obtained. A number were definitely Active or Inactive, emotional or non-emotional, and were merely put in to test the reliability of the rating. Others were close to the border, or were ambiguous, as with the criteria conflicted with the corroborative question 31.

We wrote a personal letter to the principals of the schools or the individual teachers. Fairly lengthy and comprehensive definitions of Emotionality and Activity were supplied as defined in Chapter II; then, without in any way suggesting an answer, we asked them to rate the pupils named, in the light of these definitions, on two very finely graded scales for Emotionality and Activity.

One teacher wrote "I find the pupils in this list the most difficult of the whole group to classify." We suspect therefore that it was only partly the inefficiency of the Activity criteria which caused the difficulty. The majority of these cases must in fact have been indeterminate, neither particularly active, nor particularly inactive, so that even with the best of criteria, it would have been doubtful under which heading to classify them. Those unambiguously Active and Inactive cases which we had included in this group, to serve as a check on the rating, were all correctly classified, so that we can take the re-rating to have been reliable.

The difficulties ...

The difficulties in regard to Emotionality were fewer in number, and were all solved by the additional data. In the case of Activity many cases remained doubtful to the end. As, however, we went through all papers consecutively, the factors which influenced our verdict either way can be taken to be constant.

53 Cases, or 8% of the total, were included among the actives, although definitely on the border line. It must not be forgotten, however, that the nature of this Temperamental scheme, with three dynamic variables which each range from a positive to a negative pole, would necessarily tend to produce such border line cases. Undoubtedly, the better and more plentiful the criteria, the easier it will be to make a decision; yet borderline cases there will always be. We shall be better able to deal with them only as technique is improved. The Function criteria have almost reached that stage. Every case was classified, without the aid of any additional information. Again the justification of the procedure will be in the result obtained.

Reliability of Material.

(1) Random Errors. It was impossible in this investigation to calculate reliability coefficients. Random errors must have occurred in both directions. But these could never have produced the very real relationship which will be shown to exist. In so far as it is not the aim of this research to establish exact mathematical proportions of the interrelations, these random errors are of no importance and do not effect the qualitative result obtained.

(2) Systematic Errors. It is possible that good pupils in the class were credited, unconsciously, with other "good" temperamental qualities and poor pupils with undesirable traits, so

that roughly the ....

that roughly the whole temperamental division is due to school ability or intelligence, and nothing else. One would then have to assume that this was a universal fault in the estimate of (a) a large variety of teachers of both sexes in Scotland, South Africa and Holland, (b) that it was a fault in 458 medical practitioners in Holland, who produced a materially similar distribution of types, though dealing with vastly different material, in a different environment, and by means of different criteria. It is extremely unlikely that this should be the case. Furthermore, character sketches which some teachers added to the questionnaires indicate that among the Primary Functioning, some of the brightest, most pleasant, and intelligent children are to be found. In spite of the fact that they are notoriously inattentive in class, and are lacking in application to work, they are often more likeable than their intellectual superiors of the Secondary type, who tend to be reserved and of a more retiring disposition. Enthusiasm, more positive and likeable than reserve, is as readily granted to the Primary Functioning as the less valuable behaviour forms to which they are prone. Even of the poorest Inactives, most sympathetic accounts are often given. Finally, in the worst environments, delinquent or coloured, we find a fair percentage of active types, with good attributes, while in the best classes of superior schools there are many Inactives. Yet the I.Q. of the latter is probably considerably higher than that of the former, so that other than absolute Intelligence factors must have played a part in the judgments. Discussion with principals and teachers has confirmed this opinion. In view of these facts we do not think that the "Halo-effect" entered as a systematic error in our classification ...

classification.

Statistical Method. In this research, unfamiliar statistical methods have been used. The material is of such a nature, that orthodox correlation methods could not be applied. Once the "all or none" type of question is replaced by a scale on which differences in intensity of the quality possessed can be indicated, such correlation technique will become useful for very exact work. We shall be unable to give the nice, quantitative measurement of the proportions in which the three variables produce any one quality. It will merely be our aim to show that the variables exist as realities, that they are unitary and distinct, and that they, severally and in combination, produce certain behaviour patterns. The method must be made to fit the requirements of the subject, and the state of development which it has reached. Wherever useful and practicable, however, reliability measures of our data will be given, so that the validity of the relationships we have established, no matter whether by orthodox or unorthodox methods, can be tested.

The total sample of 645 cases is first classified into eight 'types,' or type-groups, the eight possible combinations of the three bi-polar variables. Going through our questionnaire question by question, we can determine how many individuals in each type-group possess one quality a question refers to, how many the alternative quality. We then express these numbers as percentages of the total number in each type-group.

In question 6 for instance, 27% of the Passionate individuals are impulsive, 72% are cautious, 3% of the Phlegmatic are Impulsive, 97% cautious and so on for all types, and similarly for all questions. We shall refer to this as the "percentage incidence" of a quality either in a 'type,' one of the eight possible combinations of the three bi-polar variables, or, as the case may be, in a "bi-polar grouping" of one variable, where the whole sample has been dichotomised into Actives and Inactives, or Secondary and Primary, or Emotional and

Non-Emotional ..

TABLE I.

Percentage Incidence of Temperament Qualities for each of eight 'Types', being the eight possible combinations of Three Bi-Polar Variables,

Function (Secondary and Primary)
Activity (Active and Inactive)
Emotionality (Emotional and Non-Emotional).

	S.A.E. (103)	S.A.N. (144)	P.A.E. (114)	P.A.N. (41)	S.I.E. (14)	S.I.N. (49)	P.I.E. (74)	P.I.N. (106)	Av.
1a Work regularly with application and zest	95	91	35	21.5	11	51	8	1	49.5
b With alternate periods of laziness and hard work	3	7.5	64	71.5	1	39.5	73.5	73.5	41.5
c Lazy	(1)	(1.5)	(1)	(7.)	(2)	(10)	(17.5)	(27.5)	(8.5)
2a Usually attentive	98	97	37	35.5	13	88	5.5	9.5	57
b Easily distracted	2	2	38	35.5	-	10	60.	60.	27
c Playful	1	4	36	16.5	-	-	28.	10.5	13.5
d Often busy with other things than lessons	-	1.5	17	16.5	1	4	26.5	40.	14.5
3 Immediately cease attending at end of lesson	6.5	5.5	58.5	62	1	6	69.5	81	38.5
4 Inclined to sulk,(after supposed unjust treatment)	12.5	4	38	21.5	4	14.5	60.	42	26.5
5a Child retains the previously learned	83.5	84.5	66	47.5	7	26.5	16.	9.5	53
b So heard, so forgotten	6.5	10	19	38	2	65	74.5	76	35
c Thinks over what is found interesting, but can dismiss everything from mind	(9.5)	(5)	(15)	(12)	(3)	(6)	(8)	(15)	10.5
6a Impulsive	27.	3	82	50	2	-	73.5	37	37
b Cautious	72.	97	17	52.5	12	100	24	59	61.5
7a Cheerful	61.5	42	63	59.5	3	10	36	38	45.5
b depressed	7.5	4	2	2.5	2	20.5	5.5	15	7.5
c Alternately either	7.5	3.5	36	31	4	8	51.5	37	23.5
d Always even of mood	30.5	54.	3.5	9.5	5	67	8	22	28.5
8a Irritable	2.	.5	18	16.5	1	4	28	13.5	10.5
b Quickly offended	19.	5.	23.5	16.5	2	4	38.5	24	18.5
c Good humoured	78.	78.5	61.5	69.5	7	63	36	55	64
d Unable to be angered	-	16	2.5	-	4	32.5	1.5	12.5	9.5

	S.A.E. (103)	S.A.N. (144)	P.A.E. (114)	P.A.N. (41)	S.I.E. (14)	S.I.N. (49)	P.I.E. (74)	P.I.N. (106)	Av.
9a Accurate (punctual at school, work done in time etc.)	93.5	~~93.9.3~~	60	59.5	5	39.5	6.5	11.5	56
b Inaccurate (careless mistakes etc.)	6.5	7.	39	40.5	7	59	92	90	42.5
10a Attempt to grasp a problem, form an opinion	70.	76.5	62	52.5	4	10.	17.5	14.5	48
b Accepts and learns by heart what is taught	29.	23	38	47.5	10	88.	81.5	85	51
11a Remembers what is learned clearly and accurately	85.5	90.	70	50	2	16.5	8	11.5	53
b Remembers inaccurately and in muddled fashion	12.5	10.	30	47.5	12	81.5	90.5	89	45.5
12a Quick and ready in answering	70.	55.5	84.5	45	2	6	36.	11.5	48
b Slow in answering	26.	44.5	14.5	52.5	12	94	61.	89	50.5
13a Constant in friendship	81.5	83.	50.5	64.5	10	77.5	42.5	47.5	64.5
b Inclined to be very thick and then break off	2.	4.	35	16.5	1	10	37.5	33.5	19
14a Restless and inclined to fidget	11.5	5.	91	62	1	2	73.5	45.5	39
b Calm and quiet	86.5	93.5	8	35.5	9	45	8.	25	~~42~~ 28.5
c Lifeless and inert	-	1.5	-	-	4	57	17.5	30.5	12.5
15a Get down smartly to set class-work	94	97	68	74	6	43	17.5	5	60
b Inclined to dawdle and waste time	5	2	32	26	7	53	80	95	38.5
16a Inclined to give up	6.5	7	29	16.5	6	61	81.5	81	37
b Try to fight through with determination	70.	80.5	40	62	1	10	2.5	4	42
c Ask for help	21.	13.5	34	24	7	29	14.5	15	21
17 Music	14.5	15.5	11	9.5	3	8	6.5	10.5	12
Handwork	11.5	13.5	10	9.5	2	4	1.5	5.5	9
Sport — Occupation after school	77.	66.5	88	86	10	55.5	52	60	69.5
Reading	50	53.	50	35.5	7	34.5	33.5	21	41.5
Hobbies	27	15.5	20	12.	4	12.5	28	15	19.5

		S.A.E. (103)	S.A.N. (144)	P.A.E. (114)	P.A.N. (41)	S.I.E. (14)	S.I.N. (49)	P.I.E. (74)	P.I.N. (106)	Av.
20a	When scolded inclined to cry	20	3	12.5	7.	7	10	21.5	10.5	12.5
b	become rude	3	-	2.5	2.5	-	-	13.5	3	3
c	argue	4	1.5	19	19.	-	6	14.5	11.5	9.5
d	sulk	11.5	4.	35	16.5	1	16.5	49.5	33.5	22.5
e	adopt annoying attitude	3.	1.5	4.5	-	-	2.	6.5	4.	3
f	takes it calmly & with resignation	55	87.5	40	62	5	71.5	21.5	51.5	56
21a	At Examinations calm	47	87	56	78.5	2	77.5	47.5	81	66.5
b	At Examinations nervous	56.5	13.5	44	21.5	12	22.5	52.	20	34
22a	Depressed and slightly pessimistic	17.5	16	16	21.5	8	73.5	33.5	40	27.5
b	Usually bright and optimistic	80	75	81	78.5	6	22.5	58.5	58	67.5
23a	Quickly enthusiastic over things, people, events, interests	56.5	10	80	9.5	3	-	44	3	31.5
b	Indifferent	6	13.5	9	47.5	6	73.5	36	87.5	33.5
c	More reserved in expression of appreciation	37.5	76.5	10	43.	5	29	15	11.5	34.5
24a	After making a bad mistake, angry	9.5	.5	23.	-	3	-	26.5	3	10
b	" " " " discouraged	26	6.5	17.	9.5	6	24.5	26.5	14	17.5
c	" " " " eager to correct & make good	71	80.	57.5	45.	5	12.5	20	7.5	47
d	" " " " indifferent	1	12.	11	45.	1	67.	24	77.	28
25a	Emotional. Exhibits feelings frequently & readily	67.5	.5	98	4.5	9	2	89.5	6.5	41
b	Non-emotional. Cool, controlled	6.5	82.5	-	76.5	-	90	4	71.5	43.5
c	Feelings not on surface, but probably there	(22)	(17.)	(2)	(19)	(4)	(6)	(5.5)	(22)	(14)
26a	Critical	24	23.	48	35.5	1	12.5	58.5	37	33.5
b	Idealising	41.5	44.	27	21.5	4	30.5	8	13.5	28
c	Neither	(29)	(21.5)	(20)	(31)	(9)	(36.5)	(25.5)	(38)	28
27	Headstrong (inclined to passive resistance)	11.5	5.	30.5	21.5	1	8	45.5	27.5	20

	S.A.E. (103)	S.A.N. (144)	P.A.E. (114)	P.A.N. (41)	S.I.E. (14)	S.I.N. (49)	P.I.E. (74)	P.I.N. (106)	Av.
28a Polite and affable	93.5	92.	78.5	66.5	13	63	53.5	55	75
b Insolent and rude	1	.5	17.	5.	-	-	24.	11.5	8
c Indifferent in manner	5	7.5	8.	24.	1	37	21.5	36	17
29 Inclined to show temper on occasions	43.5	12.5	62.	35.5	1	14.5	76	48.5	41
30a Ringleader and involved in trouble and scrapes	12.5	3.	54.	19	1	2	45.5	23.	22
b Belonging to well-behaved and law-abiding	83.5	94.5	42.5	55	11	39	34.5	35.	595
c Merely apathetic	5	4	8	26	2	65.5	19	47.5	20

Non-Emotional. Next one can work out the percentage incidence of a quality in the whole group, and observe in what way it differs from the percentage incidence in each type.

This method is well suited to the material and brings out all that is required.

Table I. presents the complete results obtained from the whole questionnaire. The figures in the first eight columns represent the percentage incidence of each quality in each of the eight type-groups. (e.g. The entries in column 1 mean that 103 subjects were classified as S.A.E. Of these 95% work regularly with application and zest, 3% with alternate periods of laziness and hard work, and 1% is usually lazy; 98% of the same group are usually attentive, 2% easily distracted, 1% playful; and so on for the remaining qualities.)

Some of these percentage figures are bracketed. This was done wherever a sub-question was introduced later and therefore applied to a smaller number of subjects. These bracketed percentages were calculated on the whole group, but serve well enough for comparison between the eight types. In column 5, S.I.E., the incidence of qualities has not been reduced to percentage form. There are only 14 cases in this group; in subsequent tables, however, where bi-polar groupings of the variables are made, it is necessary to use the percentage form, as an average percentage for the two poles of each variable, in the entire group, is worked out from it. Yet although the number of cases is so small, the incidence of qualities and its deviation from the Average even here emerges clearly, consistent with the combination of variables, constituting this type, so that it is unlikely that a large source of error has been introduced.

In a number of cases the percentages do not add to 100, the reason being that questions sometimes remained unanswered, or were qualified in such a way that it was impossible to score them under a definite heading, or two or more alternatives

were.....

were underlined. Each alternative in the whole questionnaire can be looked upon as a separate complete question, which was, or was not underlined, the percentage in each group indicating the number of people who possessed the quality in question. The percentage indicates, especially comparatively, to what extent each quality is found on the average in each type.

In column 9, the percentage incidence of each quality in the whole sample is given (e.g. 49.5% of all the subjects work regularly and with application). Although differences between types, and especially small differences, trends in a certain direction, emerge most clearly in direct comparison, it is useful to compare the percentages in each type with the average for the whole group, to establish what is most outstanding, most typical in each type. At the expense of a great deal of labour, it would have been possible to establish exactly the reliability of differences in incidence of qualities between types, and between a type and the average incidence. The differences are, however, sufficiently clear, the trends sufficiently consistent, to stand by themselves. In subsequent tables, such measures of reliability and significance have been applied, and from these it will readily be seen that the differences shown in Table I. are significant.

CHAPTER IV.

A. Conditions for General Temperamental Validity of the data.

B. Intercorrelation of Criteria.

C. The Reality of the Variables.

D. The Question of Overlap between variables.

E. Analysis of the function of Variables, singly and in combination.

(1) Determination of Mood.

a) Subdued and Even Mood Qualities.
b) Assertive and changeable Mood Qualities.

(2) General Conduct.

a) Socially valuable conduct qualities.
b) Socially less valuable conduct qualities.

(3) Way of Working.

a) Qualities of Attention and Application.
b) Qualities of lack of Application and distraction.

(4) Qualities affecting School performance.

(5) Qualities of General Indifference.

F. General Summary.

G. Summary of function of Variables.

We have now at our disposal a set of data collected and compiled in the manner we have described in the preceding Chapter.

On the basis of three variables, we have constructed eight type-groups; Table I gives quantitative details of the behaviour patterns corresponding to each of these types. One can read off from it the probability that certain quality or qualities shall be found in one group with a certain frequency, rather than in another. At first sight the patterns appear to vary consistently with the variable ratio on which they are based.

Heymans.....

Heymans, having gathered a similar set of data, proceeded immediately to describe these behaviour patterns accurately, to compare them with each other, and to trace and explain the cohesion which each revealed. He did not go out of his way to prove what he had assumed in the building up of his typology; one had to infer such systematic proofs from the very convincing results he obtained.

Our primary interest is a different one, namely to establish the general Temperamental validity of the data. We must be able to state the Heymans typology in terms of variables of exactly known function.

We must reduce the whole range of Temperament behaviour qualities - which the Heymans adult questionnaire covers adequately - to these simple variables. We must demonstrate that the correlations contained in Table I are the characteristic and necessary behaviour patterns, resulting from all the possible combinations of three variables, each a unitary factor, each functionally distinct, each influencing the function of the other in a specific way.

In order to establish the general validity of the variables and of these results, we shall therefore have to show that the following conditions are satisfied:

(1) The criteria whereby we measured each variable must form a homogeneous whole, for each pole of each variable (i.e. they must intercorrelate.)

(2) In relevant qualities, other than criterion-qualities, a group selected for one pole of a variable must differ consistently and characteristically from a group selected for the other.

We then know that we are dealing with a real, functional variable, with a behaviour unit of definite connotation.

(3) Most important of all is the question of overlap between the three variables themselves. It will be found

that for instance .....

that for instance Activity and Secondary Function both correlate positively with some indentical qualities. Which of the two is causative? If they are real, separate functions, there should, fundamentally be no such overlap. We shall have sufficient evidence to show that the variables are separate and distinct beyond any doubt. We shall attempt to show, where there appears to be an overlap, that one variable is causative, the other merely a subsidiary agent, strengthening, or facilitating, or modifying in some way. One must not forget that Activity for instance must manifest itself through some medium, that the same Active impulse will not emerge similarly through different media and hence that these media will correlate differently with "Active" qualities.

When we have satisfied this condition we know that the variables are distinct behaviour Units, that the form of behaviour measured by one is not a compound one, which could be stated in terms of the other two, or in terms of some additional, undiscovered factor. We shall also know, however, that there are certain behaviour qualities which are compound, and which can only be stated in terms of combinations of the variables.

(4) The next step will therefore be to measure the function of each variable as extensively and accurately as our data allow, and to trace the part played by the interaction of variables in the production of complex behaviour forms.

(5) The qualities which each type possesses, and which together form a characteristic whole, must be consistent with the particular combination of variables of which the type is compounded. In order to demonstrate that these conditions are satisfied, Table I. will be split up into a number of smaller Tables, giving a clear analysis of the results obtained.

Intercorrelation of Criteria.

The intercorrelation of the Function Criteria is shown in Table II. .....

TABLE II.

Efficacy and Cohesion of Function Criteria. Difference between percentage incidence of "Secondary" or "Primary" qualities in the two groupings around the Secondary and Primary poles.

No. of Question	Secondary & Primary Function Criteria	% Secondary	% Primary	Difference	Criterion	Mark	ϵ	$\frac{r_1 - r_2}{\epsilon}$
1a	Work regularly and with zest	79	-16.4	+62.6	S	+1	.031	20
b	With alternate spells of laziness and hard work	14.2	-70.8	-56.6	P	-3	.032	18
2a	Usually attentive	94	-22.4	+71.6	S	+2	.024	29
b	Easily distracted	3.5	-48.4	-44.9	P	-3	.027	17
c	Playful	1.2	-23.	-21.8	P	-3	.022	10
d	Often busy with other things than lesson	3.1	-25	-21.9	P	-3	.025	9
3	Immediately cease attending at end of lesson	6.2	-68	-61.8	P	-2	.029	21
6a	Impulsive	11	-60.6	-49.6	P	-2	.032	15.5
b	Cautious	89	-38.1	+50.9	S	+2	.032	16
5a	Retains previously learned	61.5	-35	+26.5	S	+1	.036	7
b	So heard so forgotten	24-	-51.9	-27.9	P	-1	.037	7.5
c	Thinks over what is found interesting etc.	10.4	-12.5	- 2.1	P	-2	-	-
7a	Cheerful	33.6	-49.1	-15.5	P	-1	.038	4
b	Depressed	11.5	- 6.2	+ 5.3	S	+1½	.026	2
c	Alternately either	11.7	-39	-27.3	P	-3	.032	8.5
d	Always even of mood	46.6	-10.8	+35.8	S	+3	.033	11
13a	Constant in friendship	78.3	-51.2	+27.1	S	+1	.036	7.5
b	Inclined to be very thick and then break off	5.8	-30.6	-24.8	P	-1	.028	9.
14a	Restless and inclined to fidget	6.4	-68	-61.6	P	-2	.029	21.
b	Calm and quiet	72.2	-19.1	+53.1	S	+1½	.034	15.5
	Average % Difference Secondary Criteria	66.5	-24.9	+41.6			.035	12.
	Average % Difference Primary Criteria	10.9	-45.6	-34.7			.032	11.
	Number of Cases in each group	310	-335					

in Table II. The whole group of 645 cases is here divided into Secondary and Primary, both groupings around these two poles thus containing both Actives and Inactives, Emotionals and Non-emotionals indiscriminately. Hence differences between the two groups are differences in Function only, the other two variables being constant. This corresponds, as nearly as may be, to the partial correlation technique.

Column 1 gives the percentage incidence of each criterion in the groupings around the two poles (the "percentage" system throughout is as described for Table I., and the subsequent use of the term "percentage" must be interpreted accordingly). In column 2 the percentage differences are given, + indicating the excess of the percentage incidence of the criterion in the Secondary Group over its incidence in the Primary Group, - excess of the percentage incidence of the criterion in the Primary Group over its incidence in the Secondary Group. (In future the terms "positive" and "negative" will be used in this manner to contrast the opposite poles of each variable). Averages for the whole set for both columns are worked out. Column 3 merely indicates which is a Secondary, which a Primary criterion, while 4 gives the scoring value, "weighting" of each criterion as used in selection. In order to establish the significance of the percentage differences, Yule's formula[1.]

$$\epsilon^2_{12} = \frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}$$

was applied. This formula can be used to prove or disprove the reality of a difference between two groups. p_1 represents the percentage of cases in the one group, displaying a certain quality, p_2 the percentage of cases in the other group, displaying the same quality.

n_1 is the number of cases, from which p_1 was derived, (in our case the number round one pole), n_2 the number of cases from which p_2 was derived (the number of cases around the other pole.) $q_1 = 1-p_1$, $q_2 = 1-p_2$

In Table II ....

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1. An Introduction to the Theory of Statistics. p. 269.

In Table II., 1a, for instance $p_1 = 79$, $p_2 = 16.4$ $n_1 = 310$, $n_2 = 335$. 79% of the 310 Secondary functioning cases work regularly, and only 16.4% of the 335 Primary functioning cases are stated to do so.

From this formula one finds ϵ, given in Column 5, Table II. which is the P.E. for each percentage difference, $p_1 - p_2$, given in column 2. $\frac{p_1 - p_2}{\epsilon}$, given in column 6, indicates the ratio of this percentage difference to its P.E.

This formula will be used throughout to establish the significance of percentage differences; it should be noted, however, that, if the differences are less than three times P.E., but are in the same direction, a general, qualitative significance can be safely assumed. Actually, especially in the more important correlations, our differences are many times their P.E., their significance being beyond any doubt.

Turning now to Table II., we see that in the group around the Secondary pole all the Secondary criteria, in the group around the Primary pole, all the Primary criteria have by far the greater incidence. All these differences, with the exception of 7b, are qualitatively significant, many being many times larger than their P.E. Even 7b can be taken to be significant, being in the right direction. 5c was omitted, being based on less than the full number of cases. This quality was, however, assigned to so few people, and that in such a random fashion, that we cannot find any diagnostic value in it.

The ratio of a difference to its P.E. gives an approximate index of the characteristic nature of the quality concerned, for either the Secondary, or the Primary group. We cannot now discuss the usefulness of the individual scoring values of criteria, but, bearing in mind what was said before on this subject, and the principle that was followed in deciding on a weighting, they appear on the whole to be correctly estimated.

We are not at present interested in the behaviour patterns, the qualitative implications, of the two sets of Primary and

Secondary ....

TABLE III.

Efficacy and Cohesion of Activity Criteria.

Differences between percentage incidence of "Activity" or "Inactivity" qualities in the two groupings around the Active or Inactive poles.

No. of Question	Activity and Inactivity Criteria.	% Active	% Inactive	Difference.	Criterion	Mark	ϵ	$\frac{r - r^2}{\epsilon}$
15a	Get down smartly to set class work	83.2	27.1	+56.1	A	+2	.034	16.5
b	Inclined to dawdle and waste time	16.2	69.5	-53.3	I	-3	.035	15.
16a	Inclined to give up	14.8	66.6	-51.8	I	-1	.035	15
b	Try to fight through with determination	63.1	5.9	+57.2	A	+3	.028	20.
c	Ask for help	23.1	27.1	- 4.	I	-1	.035	1.
14c	Lifeless and inert	.4	33.5	-33.1	I	-4	.031	11.
1c	Lazy at work	2.6	17.2	-14.6	I	-3	-	-
17	Occupied with Music	12.6	11.5	+ 1.1				
	Handwork	11.1	6.3	+ 4.8				
	Sport	79.2	59.6	+19.6	A	+3-3		
	Reading	47.1	34.7	+12.4				
	Hobbies	18.6	21.1	- 2.5				
	Total	168.6	133.2	+35.4			.026	8
	Average % difference Activity Criteria (Nos.15 & 16)	73.2	16.5	+56.7			.031	18
	Average % difference Inactivity Criteria (Nos.14,15,16)	13.6	49.2	-35.6			.036	10
	Number of cases in each group	402	243					

TABLE IV.a.

Efficacy and Cohesion of Emotionality Criteria. Differences between percentage incidence of 'Emotionality' or 'Non-Emotionality' qualities in the two groupings around the emotional and non-emotional poles.

TABLE IV.b.

Tentative Emotional Criteria.

As in IV.a.

No. of Question	Emotionality and Non-Emotionality Criteria.	% Emotional	% Non Emotional	Difference	Criterion	Mark	ϵ	$\frac{\epsilon \cdot \epsilon^2}{\epsilon}$
20a	When scolded inclined to cry	26	- 7.6	+18.4	E	+1	.03	6.
d	" " sulks	25.8	-17.6	+ 8.2	E	+1	.032	2.5
21a	At examinations calm	41.1	-81.	-39.9	N	-1	.035	11.
	" " nervous	59.6	-19.4	+40.2	E	+1	.036	11.
23a	Quickly enthusiastic over things	50.4	- 5.6	+44.8	E	+2	.031	14.
	Indifferent	23.5	-55.5	-32.	N	-2	.036	9.
24a	After making bad mistake angry	20.1	- .9	+19.2	E	+3	.024	8.
	" " " " discouraged	28.1	-13.6	+14.5	E	+2	.032	4.5
	" " " " indifferent	10.8	-50.2	-39.4	N	-3	.032	12.
25a	Emotional, enhibits feelings frequently	79.8	- 3.4	+76.4	E	+3	.025	30.5
b	Non Emotional, cool, contracted	2.6	-80.1	-77.5	N	-3	.024	32.
c	Feelings not on surface,but probably yet present	14.4	-16.	- 1.6	-	-	.028	-
	Av. % Difference Emotional Criteria	41.4	- 9.7	+31.7			.033	9.5
	" " " Non " "	18.5	-56.7	-38.2			.035	11.
24c	After mistake eager to correct and make good	46.1	-36.2	+ 9.9	-	-	.039	2.5
23c	More reserved in expression of appreciation	24.6	-40.	-15.4	-	-	.036	4.
20b	When scolded becomes rude	4.8	- 1.4	+ 3.4	-	-	.014	2.4
	" " argues	9.4	- 9.5	- .1	-	-	.023	-
	" " adopts annoying att.	3.5	- 1.9	+ 1.6	-	-	.018	-
	" " takes it calmly and with resignation	38.1	-68.1	-30.	-	-	.036	8.
	Number of cases in each group	305	-340					

Secondary Criteria; these will be discussed later, under more suitable headings.

We have demonstrated at present that the incidence of Secondary Criterion-qualities in the Secondary group exceeds the same incidence in the Primary group by 41.6%, which is 12 times larger than its P.E., the incidence of Primary Criterion qualities in the Primary Group exceeding the same incidence in the Secondary by 34.7%, which is 11 times larger than its P.E.

In Table III the Activity Criteria are treated similarly. Only one, 16c, "Ask for help," is quantitatively not significant, though of the right sign. No. 17, which was used more or less as a sliding scale, most indicative when all or nearly all of its possibilities were marked, proves to be useful as such. For 1c the significance is not calculated, as the criterion was not applied to all cases.

The incidence of Activity Criterion Qualities in the Active group exceeds the same incidence in the Inactive group by 56.7%, (18 x P.E.), the incidence of Inactivity Criterion-Qualities in the Inactive group exceeds the same incidence in the Active group by 35.6% (11 x P.E.)

Table IVa shows that the Emotionality and Non-Emotionality criteria behave in a similar fashion. The percentage differences are in the right direction, all but 20d being significant. 25c was not given to the whole group.

The incidence of Emotionality criteria in the Emotional group exceeds the same incidence in the non-Emotional group by 31.7% (9.5 x P.E.), the incidence of Non-Emotionality criteria in Non-Emotional group exceeds the same incidence in the Emotional group by 38.2% (11 x P.E.)

In Table IVb are tabulated the "Balanced" qualities, newly introduced, 23c 24c 20f, as well as the three discarded criteria of Hugo. The results show that the latter were rightly suspect. 23c and 20f are both significant of Non-

Emotionality,.....

TABLE V.

Effect of variable in other than criterion qualities. Consistent differences between % incidence of certain characteristic qualities in groups selected by Emotionality criteria as "Emotional" and "non-Emotional".

No. of Question.	Qualities.	% Emotional.	% Non Emotional	Difference	ϵ	$\frac{r-r^2}{\epsilon}$
4	Inclined to sulk	34.9	20.5	+14.4	.035	4
6a	Impulsive	49.1	22.5	+26.6	.036	7
b	Cautious	49.7	77.1	-27.4	.035	8
12a	Quick and ready in answering	51.1	29.5	+21.6	.036	7
b	Slow in answering.	47.	70.	-23.	.038	6
14a	Restless and inclined to fidget	46	29	+17	.037	4.6
	Calm and quiet.	42	50	- 8	.039	2.
	Lifeless and inert	12	22	-10	.029	3.5
27	Headstrong	23.6	15.5	+ 8.1	.031	2.6
28a	Polite and affable	79.6	69.1	+10.5	.036	2.9
b	Insolent and rude	10.5	4.2	+ 6.3	.017	3.
c	Indifferent in manner	10.4	26.1	-15.7	.025	6.4
29	Inclined to show temper on occasion	47.1	27.8	+19.3	.037	5
30a	Ringleader and involved in trouble & scrapes.	29.8	11.8	+18.	.033	5.5.
b	Belonging to well-behaved and law abiding.	59.9	55.9	+ 4	.039	1.
c	Merely apathetic	11.5	35.8	-24.3	.032	7.6
	Average positive % difference	43.2	28.6	+14.6	.037	4.
	Average negative % difference	28.7	46.8	-18.1	.035	5.
	Number of Cases in each group.	305	340			

Emotionality, which is what one would have expected. 24c points towards Emotionality; "eagerness" would probably be strengthened by a balanced, moderate, emotional reinforcement.

<u>These three tables prove conclusively that for each pole of each variable, the criteria cohere and measure the same behaviour factor, the opposite of the factor measured by the criteria for the other pole. This amounts to saying, in the language of a different statistical method, that for each variable, the separate criteria for the one pole, as well as those for the other pole, intercorrelate, but that there is a high negative correlation between the pools of the two sets.</u>

<u>The Reality of the Variables.</u>

In Table V, the incidence of a number of qualities, some of which are facilitated by Emotionality, some by Non-Emotionality, in two large groups, consisting of all Emotional and all Non-Emotional cases respectively is examined. Again in this way, we keep Activity and Function constant. None of these qualities are criteria for Emotionality. Now if our Emotionality variable, as measured by the criteria, is real we ought to find in the subjects classified as Emotional a greater incidence of Emotionality qualities than in those classified as Non-Emotional. Reference to Table V will reveal that this is indeed strikingly the case. Hence qualitatively, the criteria have isolated two groups, which continue to differ characteristically over a further range of qualities. The Emotionality variable continues to function positively in the subjects classified as Emotional, negatively in the Non-Emotional. The "Emotional" subjects are in fact more emotional than the "Non-Emotional;" the criteria have isolated a real functional entity. Again only in three cases is the difference not quantitatively significant; in most others it is amply so.

The two average differences, positive and negative, are both significant: +14.6 (4 x P.E.) and - 18.1 (5 x P.E.).

Similarly it could be shown that the Function and Activity variables are real, that the subjects classified by means of the criteria ...

Qualities.	Secondary Function.	Activity.
Depressed	+ 5.3	- 9.8
Always Even of Mood	+35.8	-8.9
Unable to be Angered	+15.3	-14.3
Pessimistic	+13.3	-33.2
Cheerful	-15.5	+30.3
Optimistic	-13.9	+33
Cautious	+50.9	-7.6
Calm at Exams	- 9.4	+12.1
Quickly Enthusiastic	-12.2	+34.8
Impulsive	-49.6	+ 9.4
Discouraged after error	+ 8.2	-12.2
Inclined to show temper	-36.1	+ 1.9
Ringleader	-29.3	+ 2.7
Restless and Inclined to fidget	-61.6	+10.4
Lifeless and Inert	+ 6.5	- 4
Quick and ready in Answer	- 7.9	+47

TABLE V^b

Distinctness of Positive Poles of Activity and Function Variables.

the criteria as Active, are in fact more active in all respects than, or differ otherwise characteristically from, those classified as Inactive, that subjects classified as Secondary Functioning do indeed show throughout the reaction pattern which goes with Secondary Function, and that they differ thus characteristically from the Primary group.

The Question of Overlap between Variables.

This is a much more fundamental and difficult matter, and cannot be so readily demonstrated. We have seen a strongly positive relationship between the criteria for one pole of a variable, a strongly negative relationship between the two poles of a variable. What is the correlation between the criteria for the positive poles of two distinct variables, or between the positive pole of one, and negative pole of another variable? If the variables are to be distinct unitary factors, there should be zero correlation. Table Vb for instance shows the Activity and Function variables, yielding differences of opposite sign over a wide range of qualities. But that in no way solves the matter. The great difficulty is that many forms of Temperamental behaviour are complex, and are the result of a certain configuration of variables. Such qualities will correlate with all those phases of variables, which are responsible for their appearance. As we proceed with a further detailed analysis, we shall fully discuss each case of apparent overlap and attempt to analyse and define its nature. We shall then be in a position to summarise the findings on this score, and decide whether the scheme satisfies the condition or not. Judgment must be deferred till then.

Analysis of the function of Variables, singly and in combination.

We shall therefore trace the detailed function of each variable, singly and in combination with each and all of the others. The questionnaire deals with a wide range of Temperamental behaviour qualities sufficiently wide to cover most qualitatively different forms of such behaviour. This will

enable ...

enable us to analyse complex qualities and behaviour forms into their components, and will give us an accurate conception of the function of each variable.

We can then summarise the evidence for its being a unique, qualitatively distinct, behaviour variable. For convenience, and to show the general operation of the variables, we have roughly divided all qualities in the questionnaire under the following headings:

(1) Determination of Mood.
  (a) Subdued and Even Mood - qualities.
  (b) Assertive and Changeable Mood-qualities.

(2) General Conduct.
  (a) Socially valuable conduct qualities.
  (b) Socially less valuable conduct qualities.

(3) Way of Working.
  (a) Qualities of attention and application.
  (b) Qualities of lack of application and distraction.

(4) Qualities afftecting school performance.

(5) Qualities of general indifference.

For each group, Tables have been drawn up.

a) A table extracted from Table I., showing the percentage incidence of the qualities under each heading for each of the eight types with the average percentage incidence for the whole group.

b) Tables of bi-polar groupings of all three variables.

As already explained, this enables us to study the part played by one variable at its two poles, the other two variables being roughly constant in the two bi-polar groupings. It enables us to study the effect of combination of variables on the incidence of qualities, and to determine which variable is truly causative of certain qualities, which merely subsidiary, or quasi-causative.

No. of Question.	Qualities.	S. A. E. 103	S. A. N. 144	P. A. E. 114	P. A. N. 41	S. I. E. 14	S. I. N. 49	P. I. E. 74	P. I. N. 106	Av.
7a	Cheerful	61.5	42	63	59.5	21.	10.2	36	38	45.5
b	Depressed	7.5	4.	2.	2.5	14.	20.5	5.5	15	7.5
c	Alternately either	7.5	3.5	36.	31.	29	8.	51.5	37	23.5
d	Always even of mood	30.5	54.	3.5	9.5	36	67	8.	22	28.5
8a	Irritable	2.	.5	18.	16.5	7	4	28	13.5	10.5
b	Quickly offended	19.	5.	23.5	16.5	14	4	38.5	24.	18.5
c	Good humoured	78.	78.5	61.5	69.5	50	63	36.	55.	64.
d	Unable to be angered	-	16.	2.5	-	29	32.5	1.5	12.5	9.5
22a	Depressed and pessimistic	17.5	16	16	21.5	57	73.5	33.5	40	27.5
	Bright and optimistic	80.	75	81	78.5	43	22.5	58.5	58	67.5

TABLE VI.a.

DETERMINATION OF MOOD.

Percentage incidence of qualities for each of the eight 'types' (combinations of three bi-polar variables).

TABLE VI.b.

Differences between percentage incidence of "Subdued and Even Mood Qualities" in bi-polar groupings of each variable.

TABLE VI.c.

Differences between percentage incidence of "Assertive and Changeable Mood Qualities" in bi-polar groupings of each variable.

No. of Question	Qualities	% Secondary	% Primary	Difference	% Active	% Inactive	Difference	% Emotional	% Non Emotional	Difference
7b	Depressed	11.5-	6.2	+ 5.3 (2)	4	-13.8	- 9.8 (2.6)	7.2-	10.5	- 3.3 (1.4)
d	Always even of mood	46.6-	10.8	+35.8	24.4-	33.3	- 8.9 (2.4)	19.5-	38.9	-19.4
8c	Good humoured	67.4-	55.6	+11.8 (3)	71.9-	51	+20.9 (5.2)	56.4-	66.7	-10.3 (2.7)
d	Unable to be angered	19.4-	4.1	+15.3	4.6-	18.9	-14.3 (5.3)	8.2-	15.2	- 7. (3)
22a	Depressed and pessimistic	41.	-27.8	+13.3	17.8-	51.	-33.2 (9)	31	-37.8	- 6.8 (1.8)
	Average % difference	37.2-	20.3	+16.9	24.5-	33.6	- 9.1	24.5-	33.8	- 9.3 (2.6)
	Significance Av.% Difference			=.035 5			=.037 2.5			=.036 2.6
7a	Cheerful	33.6-	49.1	-15.5	56.5-	26.2	+30.3	45.4-	37.4	+ 8. (2)
c	Alternately cheerful and depressed	11.7-	39	-27.3	19.5-	31.4	-11.9	31.	-22.4	+ 8.6 (2.5)
8a	Irritable	3.4-	19	-15.6	9.3-	13.1	- 3.8 (1.5)	13.8-	8.6	+ 5.2 (2)
b	Quickly offended	10.5-	25.6	-15.1	16.	-20.1	- 4.1 (1.3)	23.8-	12.4	+11.4 (3.8)
22b	Bright & Optimistic	55.1-	69.	-13.9 (3.7)	78.6-	45.6	+33.	65.6-	58.5	+ 7.1 (2)
	Average % Difference	22.9-	40.3	-17.4	36	-27.3	+ 8.7 (2.4)	35.9-	27.9	+ 8. (2)
	Significance Av.% Difference			ϵ =.037 4.7			ϵ=.037 2.4			ϵ =.037 2.2
	No. of Cases in each group	310	335		402-	243		305-	340	

In this latter set of tables, percentage differences between positive and negative poles of each variable have been calculated as in Criteria Tables. The P.E. of these differences has not been determined for those which obviously are or obviously are not significant. It has only been worked for differences on the border, and the figures in brackets give the ratio of such differences to their P.E. Again it must not be forgotten that consistent trends in one direction establish a qualitative significance.

Determination of Mood. Tables VI. a,b,c,.

The most outstanding feature in Table VI^{b} is that Secondary Function and Emotionality operate in opposite directions in respect of Subdued and Even Mood Qualities. The Secondary average for these exceeds the Primary average by 16,9% (5 x P.E.), the Non Emotional the Emotional by 9·3% (2.6 x P.E.) undoubtedly significant, the signs being all in the same direction. "Evenness of Mood" is chiefly characteristic of Secondary Function and Non-Emotionality. The conscious stream runs on smoothly and placidly, in well defined channels, without Emotional rapids and waterfalls, less dangerous indeed, more effective, but also less inspiring. The Secondary, especially when they are also Non-Emotional, are therefore more likely to be depressed, pessimistic, and less likely to be angered.

The Activity variable, here and in Table VI^{c}, goes positively with Good humour (+20.9% 5.2 x P.E.), Cheerfulness (+30.3%), and Optimism and Brightness (+33%). Where it goes negatively with all the other mood qualities, it seems that Activity is truly causative of these three; Vigorous metabolism, overflowing energy,

zest.....

zest for life, these make for true "joie de vivre". Now in respect of the Secondary mechanisms, Activity manifests itself as Good Humour, (+11.8%, 3 x P.E.); in respect of the Primary mechanism as cheerfulness and Brightness and Optimism i.e., in the one case it is slightly "braked", in the other case not. By observing the consistent character of Activity as well as of Function, it is easy, where they coincide in any quality, to determine exactly what part is played by each in producing a correlation. Activity is against depression, as well as against alternation in mood, against inability to be angered, as well as against irritability and quickness to take offence. The more one is Active, the less likely are these qualities to occur, but if they do the depressed, subdued and even mood qualities are found among the Secondary Actives the alternating and aggressive among the Primary Actives.

In Table VI^{c}, the relationship between Secondary Function and Emotionality is confirmed. The more Assertive and changeable mood qualities occur in the presence of Emotionality and absence of Secondary Function. The Primary average exceeds the Secondary average by 17.4% (4.7 x P.E.), the Emotional the Non-Emotional by 8% (2.2 x P.E.,signs all in same direction). The influence of Primary Function is especially notable in alternation between cheerfulness and depression, irritability, and quickness to take offence. In the last quality the influence of Emotionality is greatest.

The problem must now be raised, as to the exact relation, in which these variables stand to each other in the production of these correlations. The average percentage difference is greater for Primary Function. The qualities also fit in well with the general Primary pattern.

Alternation.....

Alternation, irritability, unevenness are a result of the tendency to obey the motive of the moment, to react there and then.(1) If something goes against the Secondary Functioning person, he may reflect that he has had a fairly long run of luck, that he has another chance next week, or that it is possible to try out a new approach, that any way irritability may bring him no further and that a rash act may later have adverse consequences. The moment is judged in a time perspective, in relation to experiences of the past and possibilities of the future. He remains good humoured. The evenness is not broken. With the Primary Functioning type, when a motive is frustrated, that is all that matters at the time. Compensating considerations, the results of past experience or alternative motives, are unable to assert themselves. He becomes depressed or angry. Similarly if someone makes an unpleasant remark, the Secondary Functioning type, even when moderately Emotional, will not react by taking offence, or become angry so readily, for self respect, ethical principles, a number of possible and variegated considerations, all integrated, will inhibit the more direct, instinctive impulse. With the Primary there is no such brake; the overwhelming motive of the moment is to satisfy the instinctive drive. Yet at other times, the Primary type may be as ethical as the Secondary. The conscious field, however, is shallow and extensive, motives too disintegrated to bring about consistent and directed action. It is the moment, instantaneous action and relief of the impulse of the moment which become an irresistible motive.

Yet.....

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1. It will be necessary to presume certain qualities, belonging to Types, which are not so far demonstrated or proved to exist, in explaining correlations. This cannot be avoided. We beg for the time being acceptance of these presumptions.

Yet all this does not solve our problem. We have two groups, one Emotional, one Non-Emotional. Each consists of Primary as well as Secondary cases. How is it that yet there is a preponderance of aggressive qualities in the Emotional group, if it is Function alone which is causative? There are more or less equal numbers of Primary and Secondary cases in the Emotional and Non-Emotional groups. Stated in this way, the proposition is clearly untenable. Let us make a more careful examination, however. In the Emotional group, there will be motives of purely Emotional origin; also there will be a general Emotional colouring of other responses. One can safely assume that in respect of the Primary pattern, Emotionality intensifies and increases the frequency of characteristic reactions. The figures bear this out sufficiently well. Weak Primary Functioning cases - those close to the average where Primary and Secondary Function are of equal strength - will tend towards even mood qualities in the Non-Emotional group, while in the Emotional group they will definitely begin to display the more typical but latent reactions of the pattern. In the Emotional group, therefore, the Primary pattern will be more evident, and the more aggressive Primary qualities will be more often called forth, and will be more strongly manifested.

What happens in case of the Secondary Emotional group? The narrower, deeper conscious field is an asset of the Secondary type. It can lose this advantage, however, when there is an excessive narrowing of the field, with consequent tremendous intensity. This occurs when strong Emotionality is combined with strong Secondary Function.

Napoleon showed this pattern characteristically.

Deep,.....

Deep, passionate drives are formed, directed mainly to one, or a few highly emotionally charged goals. Gone is now the braking, or modifying of a reaction by a whole integrated system of motives. Only one dominating motive is left, by which actions are inexorably determined. The integration of motives has become a knot, the lives of such Secondary Functioning cases are like the moments of the Primary Functioning in extenso. A burst of irritability or a quick change in mood occurs, not because of a mere yielding to the drive of the moment, but because there are no counteracting motives. In the case of the Primary Functioning, such counteracting motives do not assert themselves at the moment. In the case we are considering the motivation is one integrated whole, the temper revealed is due to the frustration of all that matters. In such a Secondary case, reactions are produced which phenomenally are identical to those accompanying the Primary pattern, but which are genetically absolutely different. In fact, the sum total behaviour patterns will likewise be different; in the one case stereotyped, only called forth by situations connected with the main personality drive, in the other case varied, arising again and again with all sorts of situations. No confusion would be possible to any but the casual observer. But there will be isolated identical responses, taking them qua responses, entirely divorced from their context and genesis, and it is the occurrence of these, together with the clearer emergence of the pattern when emotionally reinforced in the weak Primary Functioning cases, which account for the correlation, we have been attempting to explain. Emotionality has played a most important part, but it has operated through a Function mechanism, and produced a form of reaction, genetically consistent and connected with this mechanism. One might

say.....

say Emotionality has here played a causative part, but it has only caused to appear, something that was bound to follow from the combination of a typical mechanism with a typical force.

Readiness to take offence, irritability, quick changes in mood are always frequent with the Primary Functioning, whether Emotional or not; they become more and more markedly frequent and intense as Emotionality increases in strength, while they can also occur in the strongly Secondary Functioning Emotional cases, in connection only with a characteristic development of that type, in which all motivation has become directed to one end.

We can conclude that certain functional effector patterns are fundamental; that each pattern can develop typically and characteristically, according to the nature of the forces seeking an outlet; that this development can be studied by taking into very careful account both the function mechanism and the driving force, with its own, known correlates; and that the correlations found with a variable are often the extent to which it has facilitated, or altered, or contributed to the development of the operation of another, in a typical and consistent manner. Emotionality always favours expression of affective responses; it 'causes' the affective, instinctive element, but the manner of this expression depends largely on the nature of the other two variables, and the way they are all combined. We are studying here the main differences in mood; not so much differences in intensity between the various mood reactions, as differences between the patterns of these reactions. With a given strength of the Emotionality variable the Primary Functioning will reveal one mood pattern the Secondary Functioning another,

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with consistent subsequent differences depending on the strength of either Function.

The results indicate that Mood is primarily determined by Function, the outstanding characteristic of Secondary Function is Evenness, shading off into depression, or Good Humour; of Primary Function, Alternation, with on the one side a preponderance of cheerfulness, on the other a tendency towards Irritability and Taking offence. Emotionality can operate either as a deepening or as a compensating factor of these tendencies. A Primary functioning, Non-Emotional type will be less likely to be Irritable, than a P.F.-Emotional one; similarly, a S.F. Emotional type will not be so readily "unable to be angered" as a S.F. Non-Emotional one. Again the more Active the type, the less evident will be the more unpleasant mood qualities. Good Humour in the case of the Secondary Functioning, Cheerfulness, optimism in the case of the Primary Functioning, will prevent, or at any rate counteract, their appearance. Throughout the subsequent analysis, the socially valuable nature of the Activity variable must be kept in view.

The Primary Functioning, Inactive, Emotional type (nervous) will show the worst aggressive mood traits, the Secondary Functioning, Inactive, Non-Emotional, Apathetic the worst subdued mood traits.

Reference to Table VI[a] will show this to be the case. 28% of P.I.E. are irritable, (Av. 10.5%) which is a maximum, 38.5% are quickly offended, (Av. 18.5%) again a maximum. Of the S.I.N., 20.5% are depressed (Av. 7.5%) no less than 73.5% depressed and pessimistic (Av. 27.5%) easily maximum for these two qualities.

From these two examples it is clear how, by examining how each variable operates, in relation to certain qualities, one is able to predict what quality or qualities and in what

strength.....

strength, will be obtained by any combination of the three variables.

That this is consistently the case a further examination of Table VI[a] will reveal. Activity assists cheerfulness and optimism. Emotionality and Primary Function likewise. Hence we find a maximum for Cheerfulness among the P.A.E. (Choleric) 63% - 45.5%.[1.] Similarly for Optimism (78.5% - 67.5%). The corrective action of Activity and Emotionality on the trend of Secondary Function is clearly demonstrated.

Of the S.A.E. type, 61.5% are Cheerful, of the S.A.N. type 42% (Av. 45.5%). In Evenness of mood, however, Emotionality is again a hindrance, for here we have for these two types respectively 30.5% and 54% (Av. 28.5%). Remove Activity, however, and we get S.I.E. 21%, S.I.N. 10.2% (Av. 45.5%), for Cheerfulness. For Evenness of Mood 36% and 67% (Av. 28.5%). Here too the influence of Emotionality is clear. For the apathetic type "Evenness" reaches a peak (67% - 28.5%). Its Primary counterpart, the Amorphous has for the same quality 22%!

The latter's maximum is found, again as expected, in alternation of mood, (37% - 23.5%) in which respect it is only exceeded by the Nervous type (51.5% - 23.5%), where Emotionality aggravates the tendency. One can observe the same compensating or facilitating effect, through variables working in opposite direction, when comparing the P.A.E. and P.A.N.; P.I.E. and P.I.N., on the score of Irritability and taking offence quickly. Consistently, Activity decreases the percentage, Emotionality increases it, Activity being the more powerful of the two. It will also be noticed that the two Active Secondary Types remain well above the average for Cheerfulness, Good Humour and Optimism.

Although Secondary Function does tend to produce the

more .....

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1. Where two figures are given in this way, the first gives the percentage incidence for the type, the second the average % incidence for the whole group.

more depressed qualities, yet it does so to any considerable extent only in certain combinations. The usefulness of this whole Temperamental Scheme lies exactly in this: that it avoids the "all or none" failing of many typologies, and is able to account for the great majority of Temperamental patterns on the basis of interrelation of variables. In the S.A.E. and S.A.N. types, Activity plays a large part; their "Secondary" nature nevertheless emerges in the prevalence of "Evenness" where we get "Alternation" in the P.A.E. and P.A.N., all equally active. Both are cheerful and optimistic, yet both are vastly different, in their general behaviour patterns, and this agrees very well with every day experience, where the majority conform to some measure of cheerfulness and balance, yet display some unmistakable individuality in temper and temperament.

A further examination of this table will reveal a number of more logical differences, but it would demand too much time and space to describe all these. A summary description of each type will be given later.

Wherever material for comparison is available, the results of Hugo will be given in corroboration. A classification and study has also been made of the numerous qualifying remarks, observations, and other supplementary material, appended to the questionnaires by teachers, and where to the point, this qualitative material will be briefly given in support. Hugo established the same difference[1.] between the prevalence of alternation and of evenness of mood, also the same results for Irritability and Quickness to take offence. He finds however, less cheerfulness and less optimism in the Secondary types than we do, but differences between the results are only quantitative. Qualitatively, he arrives at the same conclusions. Our more exact method of classification, the rather more complete questionnaire and the benefit of being able to study previous work to prevent pitfalls have probably yielded

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1. Hugo "Karaktertiepe van Kinders en hulle behandeling" thesis. Groningen.

TABLE VII.a.

GENERAL CONDUCT.

Percentage incidence of qualities for each of the eight "types" (combinations of the three bi-polar variables.)

No. of Question.	Qualities.	S. A. E. 103	S. A. N. 144	P. A. E. 114	P. A. N. 41	S. I. E. 14	S. I. N. 49	P. I. E. 74	P. I. N. 106	Av.
29	Inclined to show a temper on occasion	43.5	12.5	62	35.5	7	14.5	76	48.5	41
6a	Impulsive	27	3	82	50	14	-	73.5	37	37.
b	Cautious	72	97	17	52.5	86	100	24	59	61.5
13a	Constant in friendship	81.5	83	50.5	64.5	72	77.5	42.5	47.5	64.5
13b	Inconstant in friendship	2	4	35	16.5	7	10	37.5	33.5	19.
20a	When scolded inclined to cry	20	3	12.5	7.	50.	10	21.5	10.5	12.5
b	become rude	3	-	2.5	2.5	-	-	13.5	3	3
c	argue	4.	1.5	19.	19.	-	6	14.5	11.5	9.5
d	sulk	11.5	4.	35.	16.5	7	16.5	49.5	33.5	22.5
e	adopting annoying attitude	3	1.5	4.5	-	-	2.	6.5	4	3
f	take it calmly and resignedly	55	87.5	40.	62	36	71.5	21.5	51.5	56.
21a	At examinations calm	47	87	56	78.5	14	77.5	47.5	81	66.5
b	Nervous	56.5	13.5	44	21.5	86	22.5	52.	20	34
23a	Quickly enthusiastic over things, person etc.	56.5	10	80	9.5	21	-	44	3	31.5
23b	Indifferent	6	13.5	9	47.5	43	73.5	36	87,5	33.5
23c	More reserved in expression of appreciation	37.5	76.5	10	43.	36	29	15	11.5	34.5
24a	After making a bad error: angry	9.5	.5	23.4	-	21	-	26.5	3.	10
b	discouraged	26.	6.5	17.	9.5	43	24.5	26.5	14.	17.5
c	eager to correct and make good	71.	80.	57.5	45.	36	12.5	20.	7.5	47
d.	Indifferent	1.	12.	11	45	7	67	24	77.	28
27	Headstrong & inclined to passive resistance	11.5	5.	30.5	21.5	7	8	45.5	27.5	20
28a	Polite and affable	93.5	92.	78.5	66.5	93	63	53.5	55	75
b	Insolent and rude	1	.5	17.	5.	-	-	24	11.5	8
c	Indifferent	5	7.5	8	24.	7	37	21.5	36.	17
30a	Ringleader & often in trouble & scrapes	12.5	3.	54	19.	7	2	45.5	23	22
b	Belonging to law abiding & well behaved	83.5	94.5	42.5	55.	79	39	34.5	35	59.5
c	Merely apathetic	5.	4	8	26.	14	65.5	19	47.5	20

Way of Working. (Tables VIII a, b, c.)

We shall here examine how Application and Attention, or their opposites, Lack of application and Distraction, are determined by the three variables severally and jointly.

Table VIII[b] deals with the first.

At a glance, it is seen that Emotionality plays no part here. The difference is equal to its P.E.

Of paramount importance is Secondary Function, with a positive difference in its favour of 46.1% (13 x P.E.) Owing to the narrowing of the conscious field, the child, once at a task, will continue at it without distraction. Secondary attention comes easily. Stimuli not belonging to the pattern on which the child is set, fail to arouse a reaction. A background of integrated motives, such as the importance of doing well at school with a view to a future career, the moral obligation of working consistently, the duty to observe the rules and regulations of the class, which are ever present, in Secondary form, all these continually influence behaviour. In addition to this, interest is easily sustained, not merely through its own inertia but because to the Secondary child, a subject is not merely some abstract knowledge one is compelled to learn. It is seen in relation to much wider issues; its meaning links up with other bits of knowledge and information, and its implications and consequences are much more readily understood and grasped.

The function of Activity, which also shows a clear positive difference (+35.4% 9 x P.E.) is to provide the essential driving force for all these Application reactions. Secondary Function alone cannot be causative in these qualities; especially when it is strong, stimulability will be reduced to a minimum, and responses will consequently be few. We have provisionally identified Secondary Function with Spearman's inertia and Pavlov's Inhibition mechanism. Spearman thinks of it as slowness, with which nervous energy transfers

itself ....

No. of Question	Qualities.	% Secondary.	% Primary	Difference.	% Active	% Inactive.	Difference.	% Emotional.	% Non Emotional.	Difference
1b	Work with alternate periods of laziness etc.	14.2	70.8	-56.6	36.5	46.9	-10.4 (2.6)	36.9	48	-11.1 (3)
c	Lazy	6.6	13.2	- 6.6	2.6	17.2	-14.6	8.4	11.5	- 3.1
2b	Easily distracted	3.5	48.4	-44.9	19.4	32.5	-13.1 (3.6)	25	26.9	- 1.9
c	Playful	1.2	23	-21.8	14.4	9.6	+ 4.8 (1.9)	16.2	7.8	+ 8.4 (3)
d	Often busy with other things than lessons	3.1	25	-21.9	8.8	19.4	-10.6	11.1	15.5	- 4.4
3	Immediately stop attending at end of lesson	6.2	68	-61.8	33.1	40.9	- 7.8 (2)	35.4	38.6	- 3.2
14a	Restless and inclined to fidget	6.4	68	-61.6	42.4	32	+10.4 (2.5)	46	29	+17
c	Lifeless and inert	21.9	12	+9.9 (3.3)	.4	33.5	-33.1	12	22	-10 (3.5)
15b	Inclined to dawdle and waste time	27.5	58.2	-30.7	16.2	69.5	-53.3	41.7	44	- 2.3
16a	Inclined to give up	29.4	52	-22.6	14.8	66.6	-51.8	40	41.4	- 1.4
c	Ask for help	28.4	21.9	+ 6.5 (2)	23.1	27.1	- 4 (1)	29.9	20.4	+ 9.5 (2.8)
	Average % Difference	13.5	40.9	-28.4	19.3	36	-16.7	27.5	27.7	- .2
	Significance Av. % Difference			ϵ =.033 8.6			ϵ =.037 4.5			ϵ =.035 -
	Number of cases in each group	310	335		402	243		305	340	

TABLE VIII.c.

Difference between percentage incidence of "Qualities of lack of application and distraction" in bi-polar groupings of each variable.

No. of Question.	Qualities.	% Secondary.	% Primary	Difference.	% Active	% Inactive	Difference.	% Emotional	% Non Emotional	Difference
6b	Cautious.	89-	38.1	+50.9	59.6-	67.2	- 7.6 (2)	49.7-	77.1	-27.4
13a	Constant in friendship.	78.3-	51.2	+27.1	69.9-	59.6	+10.3 (2.6)	61.4-	68.1	-6.7 (1.8)
20f	When scolded take it with resignation	62.5-	43.8	+18.7	61.1-	45.1	+16. (4)	38.1-	68,1	-30
21a	At exams. calm.	56.4-	65.8	- 9.4 (2.5)	67.1-	55	+12.1 (3)	41.1-	81	-39.9
23a	Quickly enthusiastic etc.	21.9-	34.1	-12.2 (3.5)	39	-17	+22.	50.4-	5.6	+34.8
c	More reserved in expression of appreciation.	44.8-	19.9	+24.9	41.8-	22.9	+18.9	24.6-	40.	-15.4
24c	After bad mistake eager to correct and make good.	49.9-	32.5	+17.4 (5)	63.4-	19	+44.4	46.1	36.2	+9.9 (2.5)
28a	Polite and affable.	85.4-	63.4	+22	82.6-	66.1	+16.5 (4.6)	79.6-	69.1	+10.5 (3)
30b	Belonging to law abiding & well behaved.	73.8-	41.8	+32	68.9-	46.9	+22	59.9-	55.9	+ 4
	Number of Cases in each group	310-	335		402-	243		305-	340	

TABLE VII.b.

Difference between percentage incidence of "Socially valuable conduct qualities" in bi-polar groupings of each variable.

TABLE VII.c.

Differences between percentage incidence of "Socially less valuable conduct qualities" in bi-polar groupings of each variable.

No. of Question.	Qualities	% Secondary	% Primary	Difference		% Active	% Inactive	Difference		% Emotional	% Non Emotional	Difference	
6a	Impulsive	11	-60.6	-49.6		40.5	-31.1	+ 9.4	(2.4)	49.1	-22.5	+26.6	
13b	Inconstant in friendship	5.8	-30.6	-24.8		14.4	-22	- 7.6	(2.4)	20.4	-16	+ 4.4	
20a	When scolded inclined to cry	20.8	-12.9	+ 7.9	(2.6)	10.6	-23	-12.4	(4)	26	- 7.6	+ 18.4	
	to become rude	.8	- 5.4	- 4.6	(3.5)	2.	- 4.1	- 2.1		4.8	- 1.4	+ 3.4	(2.5)
	to sulk	9.8	-33.6	-23.8		16.8	-26.6	- 9.8	(2.9)	25.8	-17.6	+ 8.2	(2.5)
	to adopt annoying attitude	1.6	- 3.8	- 2.2	(1.7)	2.2	- 3.1	- .9		3.5	- 1.9	+ 1.6	
21b	At exams. nervous	44.6	-34.4	+10.2	(2.7)	33.9	-45.1	-11.2	(2.8)	59.6	-19.4	+40.2	
24a	After making a bad mistake, angry	7.8	-13.2	- 5.4	(2)	8.4	-12.6	- 4.2	(1.7)	20.2	- .9	+19.2	
	discouraged	25.	-16.8	+ 8.2	(2.5)	14.8	-27.	-12.2	(3.6)	28.1	-13.6	+14.5	(4.5)
27	Headstrong, inclined to passive resistance	7.9	-31.2	-23.3		17.1	-22	- 4.9		23.6	-15.5	+ 8.1	(2.5)
28b	Insolent and rude	.4	-14.4	-14	(7)	5.9	- 8.9	- 3.		10.5	- 4.2	+ 6.3	(3)
29	Inclined to show temper on occasion	19.4	-55.5	-36.1		38.4	-36.5	+ 1.9		47.1	-27.8	+19.3	
30a	Ringleader, Often in trouble & scrapes	6.1	-35.4	-29.3		22.1	-19.4	+ 2.7		29.8	-11.8	+18	
	Average % difference	12.4	-26.8	-14.4		17.5	-21.7	- 4.2		26.8	-12.3	+14.5	
	Significance Av. % difference			ϵ =.031 4.6				ϵ =.033 1.3				ϵ =.031 4.7	
	Number of cases in each group	310-335				402-243				305-340			

more accurate data in the present research.

General Conduct Qualities. Tables VIIa, b, c.

For convenience sake we have divided these into two groups: "Socially valuable" and "Socially less valuable" Conduct Qualities. No ethical principles are involved in our application of the terms "valuable" or "less valuable." We are merely indicating the social usefulness of the adaptation made to environment. Among the less valuable, one or two will only be so when in excess, or very pronounced (e.g. 'Impulsive') while some of the valuable qualities (e.g. 'cautious') would cease to be valuable socially in a similar way.

Immediately striking in Table VII[b] is the continuous and considerable excess of Activity over Inactivity in determining valuable conduct qualities. There is only one exception, "cautious" (-7.6% 2 x P.E.), indicating a very slight correlation with Inactivity; as has been pointed out, extreme caution is not valuable; in the Inactive types, an appearance of caution may cover up total lack of initiative. Otherwise large differences all indicate that the more "balanced" reactions, such as a more reserved expression of appreciation, calmness at examinations, eagerness to make good after a mistake, good behaviour and upholding of law and order, resignation after a deserved scolding, politeness, and constancy in friendship, go with Activity to a greater extent than with Inactivity. "Eagerness" and "Enthusiasm," both positive qualities, show maximum differences (+44.4% and +22%). Very large positive differences are also shown by Secondary Function, except that Spontaneity, as evinced by quick and ready enthusiasm, is found to a greater extent among the primary (-9.4%). The latter react quickly and readily to the stimulus, the former always have a number of past associations influencing their reaction, have a greater resistance to overcome, do not react to so many situations, so that this result is natural and to be expected. Observe also in this connection the large positive differences for "cautious" and "more reserved" (+50.9% and 24.9%). The whole set gives a more restrained, even, less exuberant impression, for the positive Secondary ...

Secondary Function differences. We shall explain the greater nervousness in examinations later.

Emotionality again operates both ways, though one or two of the differences are hardly reliable. As one might expect, ready enthusiasm is highly correlated with Emotionality (it was a criterion). In this case one can say Emotionality is causative of Enthusiasm, Function merely favouring, or toning down the expression of an affective drive. Take away Emotionality from mood and the significant differences still remain; take away Emotionality from Enthusiasm, and the entire quality disappears. There is a significant difference in favour of Emotionality in respect of politeness and affability. It stands to reason that, where feeling, a "warmness," the quality which produces enthusiasm, is present, one is more likely to get affability, than where it is not. "Eagerness" seems also to imply some Emotional correlate (+9.9%). That absence of Emotionality should produce reserve, calmness at examinations, and tendency towards resignation, is natural and expected.

Again from this table it appears that there are two forces, the force of Activity, a general energy, the nature of which is not yet evident, and the force of Emotionality, an instinctive drive, belonging to the Autonomic nervous system which are expressed differently through different effector systems, the Primary and the Secondary. The bigger the correlation of these forces with a quality, the more they are the determinants of the particular form of behaviour.

In Table VII^{c}, Inactivity is shown to go with the less desirable, less valuable conduct qualities; although the average difference is statistically not reliable (-4.2 1.3 x P.E) yet the trend is there. Extreme impulsiveness, though detrimental would probably only be possible when Primary Function is accompanied by Activity.

Discouragement after error, crying and sulking after scolding, nervousness at examinations are fairly significantly correlated with Inactivity. Much more striking, however, is

the ....

the part played by Primary Function.

The average difference (-14.4%, 4.6 x P.E.) is significant, in spite of a few positive differences, where the less valuable quality goes with Secondary Function. There is a slight tendency for discouragement to be more common with the Secondary types. It will be shown later that "Indifference after a mistake" is more common with the Primary. On account of the greater integration of motives of the Secondary type, their fuller attention, their taking things more seriously, - not merely an individual stimulus but a whole pattern, including principles, moral and ethical, determining their reactions,— they are, when of low activity, more inclined to become "discouraged" then "indifferent." Prevalence of crying after scolding, and nervousness at examinations can be similarly explained. It is not so easy for the Secondary type to adopt a "Don't care"attitude.

Chief correlates of Primary Function are Impulsiveness, Inconstancy in friendship, Inclination to show a temper, and Ringleading, getting into troubles and scrapes. (-49.6%, -24.8%, -36.1%, -29.3%). We may quote here Dr. Hugo: "As regards morality, there is no reason to suppose that the Primary Functioning child is less morally inclined, or that it is less appreciative of moral principles than the Secondary child. But we must add to this that equal strength of (moral) impulse is not always accompanied by equal power of control over motives. In the Primary child, the whole of consciousness is occupied by motive representations of the moment; he only disposes of the data which at that moment and under those circumstances are present. In the Secondary child, however, earlier experiences are still operative (perseverate, German "nachwirken"). The given motive representations are therefore strengthened, braked, according to the favourable or unfavourable light thrown on them by earlier experience and former decisions."[1.]

In.....

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1. Karakterstudie en Opvoeding p. 106.

In the Primary child the reaction follows everywhere too easily on the stimulus; there is far less control. Hence insolence and rudeness, temper, anger, are more frequently exhibited by it, while the Secondary child might think twice, and suppress, given the same instinctive impulse.

Egoistic, a- social inclinations are the starting point of all human nature; satisfaction of the ego remains always an important consideration. But this satisfaction becomes socially conditioned. We acquire a mass of habits, conditioned reactions, social and ethical gestalten. Owing to his neural organisation, the Primary child often acts primitively in spite of this; his reactions are far less braked, or altered by this social neural super structure, simply because in the moment of action, this whole set of acquired social reaction is not available, pushed out of the shallow conscious stream.

Thus also we can account for the prevalence of "Ringleading, always in trouble and scrapes" among the Primary. A certain motive, some pleasing or satisfying of the self, presents itself; and, thinking only of immediate results, the subject chooses methods, the implications of which are not fully appreciated; had moral principles had a chance to assert themselves, the child might not have acted thus. The Primary Functioning are usually pleasant and popular. Consequently, urged by their impulsiveness, and motivated by playing up to this popularity, or in order to strengthen it, they tend to get more often involved in scrapes, and show in this connection more undesirable qualities, than the Secondary children. Their "inconstancy in friendship" (-24.8%) is not so much due to perfidy, quarrels, ill feeling against the former friend, as a tendency to react to something new, throw the whole personality into it for a while; and then, as fundamental bonds, deep connections, are not established, they flit as easily away again to a new enthusiasm.

As.....

As might be expected, Emotionality shows a clear positive connection with these socially less valuable conduct qualities. (Av. + 14.5%, 4.7 x P.E.). They can all become Emotionally coloured, and are then accordingly strengthened.

Many are the expression of a primitive, instinctive drive, unconditioned and unsocialised, modified merely, if at all, by the Function Mechanism. We can look in this set for the clearest manifestation of the Emotionality variable pure and simple, Secondary Function acting merely as a brake, or decreasing frequency and creating depth and duration; Primary Function generally facilitating, increasing frequency, both of the valuable, and the adverse emotional reactions, but counteracting deep and lasting effects.

We should expect therefore to find Socially valuable behaviour, which is nevertheless not marked by an excess of reserve, caution and seriousness, in the Active Emotional types, and mainly among the Secondary Active Emotional (Passionate). We should also expect such behaviour in the Primary Active Emotional, though here it will be more mixed, certainly more exuberant and accompanied by less valuable qualities. The Activity variable would again ensure socialisation to a considerable extent. As we saw in the introduction, a number of writers looked upon volition as the determination of activity by the integration and organisation of instinctive drives. The function of our Activity variable agrees with this definition. The worst form of behaviour would be found among the nervous P.I.E., to a lesser degree among the P.I.N. (Amorphous), of quite a different order among the S.I.E. and S.I.N. types (less aggressive, less unsocial). The S.A.N. type, though exemplary in conduct, would yet lose

the benefits, ...

the benefits, as well as the drawbacks, of Emotionality, the tendency of Secondary Function towards reserve and caution not being counteracted.

Table VII[a] fully bears out these expectations. The Nervous exceed all other types in:

Inclination to show temper (76% - 41%),
Inconstancy in friendship (37.5% - 19%),
Sulking (49.5% - 22.5%) Angry after error (26.5% - 10%),
Being Headstrong (45.5% - 20%) Insolence and Rudeness (24% - 8%).

Nervousness at examinations is not so common among the Primary types, but the Nervous type yet possesses it well above the general average (52% - 34%), and more than any other Primary type. The Primary Functioning on the whole, and expecially the Inactives, care too little about success in examinations to make the situation sufficiently significant to create nervousness.

These qualities are still shown considerably above average by the P.I.N. (Amorphous) but absence of Emotionality tends towards general indifference (to be dealt with under separate heading).

The S.I.E. (Sentimental) show a peak for "crying when scolded" (50% - 12.5%) "Nervous at examinations" (86% - 34%), "Discouragement after bad error" (43% - 17.5%), the presence of Secondary instead of Primary Function making all the difference in the nature of the less valuable conduct qualities displayed. This type for instance is near the maximum for politeness (93% - 75%) while 79% belong to the law abiding and well behaved.

The S.A.E. (passionate) are well above average in ready enthusiasm (56.5% - 34%) only surpassed by the P.A.E. (80% - 31.5%) though scoring highly for politeness (93.5% - 75%),

constancy in ...

constancy in friendship (81.5% - 64.5%) and Good Behaviour (83.5% - 59.5%). They are, owing to their Emotionality averagely inclined to show a temper (43.5% - 41%) averagely inclined to become angry after error (9.5% - 10%), and may be impulsive (27% - 37%). The Phlegmatic (S.A.N.) have maximal scores for calmness at examinations (87% - 66.5%), Reserve, (76.5% - 34.5%), politeness (92% - 75%). Good behaviour (94.5% - 59.5%), Constancy in friendship (83% - 64.5%), while only the S.I.N. (Apathetic), owing to their lack of Activity, can outdo them in Caution (100% - 61.5%). The peaks in Impulsiveness, (82% - 37%) Enthusiasm, (80% - 31.5%), Ringleading and getting into trouble and scrapes (54% - 22%) are found in the Choleric (P.A.E.). There are very considerable scores, only second to the P.I.E in some of the other socially less desirable qualities, activity having toned them down to some extent, while favouring again their eminence in Ringleading. To be responsible for petty personal crimes, peccadilloes and general unpleasantness is one thing. To be sufficiently popular and daring to lead the gang demands more sterling qualities, qualities derived from activity, so we find in this P.A.E. type at the same time good scores for Politeness (78.5% - 75%) and eagerness to correct and to make good (57.5% - 47%). The P.A.N. (Sanguine) type loses in attractiveness through lack of Emotionality, as compared with the P.A.E., but gains again in lesser intensity of socially undesirable tendencies. Compared with its Secondary counterpart, there is, however, owing to the difference in Function, a great slip downwards towards "indifference," where we have "reserve," "caution" in the S.A.N.

These mere selections from the Table illustrate the interrelations and mutual influences upon each other of the three variables as well as a fuller treatment would.

A good deal of qualitative material, bearing in the widest sense on conduct qualities, is available, from notes appended by teachers, all in close agreement with the conclusions already reached as to the function of the three variables and their

combinations in determination of conduct.

If we examine references to the more positive, striking qualities of Temperament and Personality, we find the honours on the side of the Primary Functioning child, as being "popular, smart pupil, original, vivacious, alert, bright and optimistic, endowed with a sense of humour, good natured, pleasant and frank, honest, likeable, happy, independent, quick witted and observant, energetic, self confident, practical and capable, sensible and self willed." Out of the 71 times on which one or other of these epithets was recorded, it was applied 34 times to the Choleric (P.A.E.) 11 times to the Passionate (S.A.E.), 19 times to the Phlegmatic (S.A.N.). Only 5 times was it applied to an Inactive type.

The Primary Active child enjoys an all round popularity. Yet on the other side of the picture we find that "petulant, affected, unpopular, bully, effeminate, weak, quarrelsome, nasty nature, uncouth, insolent, careless, untidy," are recorded for 32 cases, of which 26 are Primary, 12 of these Inactive.

Only 3 cases of delinquency are specially mentioned among the Secondary Types (excluding of course the Industrial School Group). Two of these were sex offences, the third a case of theft with skillful lying accompanying it.

Among the Primary types, truancy is the most common complaint, very naturally so, owing to restlessness, desire for stimulation and the difficulty experienced by this type of child in giving Secondary Attention; Six Primary cases were stated to be habitual truants. This type of child will naturally chafe at the cramping school routine, hanker for the freedom of the street or country, and will be induced to escape and seek this freedom, to evade the continual punishment which its Temperament earns for it.

Only one case was noted among the Secondary, displaying a reprehensible trait, (apart from actual delinquency) namely "playing shady games."

Among the Primary, such traits are rife. "Cribbing," cowardliness, dirty sport, slyness, cringing, telling lies,

stealing ...

stealing, mischievousness, running away from home, sneaking, telling tales, quarrelsomeness, bullying, two-facedness, surreptitious behaviour," all these occur among the Primary, none are mentioned with the Secondary. Yet with it all, some of these delinquent cases are stated to be "likeable."

In our group of 73 Industrial School boys, all but a few delinquent, no fewer than 55, or 75%, are Primary Functioning. Transferring the doubtfully Active Cases to the Inactive side, we find 42 of these 55, or 76% Inactive, while 28 of the 55, or 51%, are Emotional. These figures are striking, and agree with Hugo's findings that delinquency, or breaking of the peace, purposely upsetting the order of the class room, reprehensible character traits, go with Primary Function and Inactivity combined, in a maximal degree if strong Emotionality is added.

A number of elucidating remarks was also added to the question on "Ringleaders etc." In 22 cases it was specifically noted that there was no leading, merely naughtiness and trouble. These were all Primary Cases, of which 8 Inactive Emotional, 5 Inactive Non Emotional; of 13 cases it was stated that they were leaders, without being lawbreakers. Six of these were secondary, of which 4 were Passionate.

Regarding Politeness, in 50 cases "affable" was struck out; 31 of these were Secondary, and of these again 28 Phlegmatic. Where the absence of "affable" amounts to "reserved politeness" in the Secondary, it tends to "off-handness and brusqueness" in the Primary. The observation was also made that Primary children are sometimes polite towards teachers, rude, quarrelsome, indifferent to inferiors or equals. On the whole, in spite of some of these failings, the Primary, especially the Active, are extremely popular, likeable and cheerful.

Finally, some Emotionality seems to be essential for the formation of friendships. In 15 cases, "no friends" or "no capacity for friendships" was remarked. All but one were non-emotional, 11 Inactive, Function making no difference.

Way .....

No. of Question.	Qualities.	S. A. E. 103	S. A. N. 144	P. A. E. 114	P. A. N. 41	S. I. E. 14	S. I. N. 49	P. I. E. 74	P. I. N. 106	Av.
1a	Work regularly with application and zest	95	91	35	21.5	79	51	8	1	49.5
b	With alternate periods of laziness and hard work	3	7.5	64	71.5	7	39.5	73.5	73.5	41.5
c	Lazy	1	1.5	1	7	14	10	17.5	27.5	8.5
2a	Usually attentive	98	97	37	35.5	93	88	5.5	9.5	57.
b	Easily distracted	2	2	38	35.5	-	10	60	60	27.
c	Playful	1	4	36	16.5	-	-	28	10.5	13.5
d	Often busy with other things than lesson	-	1.5	17	16.5	7	4	26.5	40	14.5
3	Immediately stop attending at end of lesson	6.5	5.5	58.5	62	7	6	69.5	81	38.5
14a	Restless and inclined to fidget	11.5	5.	91.	62	7	2.	73.5	45.5	39
b	Calm and quiet	86.5	93.5	8	35.5	64	45	8.	25.	48.5
c	Lifeless and inert	-	1.5	-	-	29	57	17.5	30.5	12.5
15a	Get down smartly to set class work	94	97	68	74	43	43	17.5	5	60
b	Inclined to dawdle and waste time	5.	2.	32	26	50	53	80	95	38.5
16a	Inclined to give up	6.5	7.	29	16.5	43	61	81.5	81	37
b	Try to fight through with determination	70.	80.5	40	62	7	10	2.5	4	42
c	Ask for help	21.	13.5	34	24	50	29	14.5	15	21

TABLE VIII.a.

WAY OF WORKING.

Percentage incidence of qualities for each of the eight types

(combinations of three bi-polar variables).

No. of Question.	Qualities.	% Secondary.	% Primary.	Difference.	% Active	% Inactive.	Difference.	% Emotional.	% Non Emotional	Difference.
1a	Work regularly with application and zest	79	-16.4	+62.6	60.6	-34.8	+25.8	54.2	-41.1	+13.1 (3)
2a	Usually attentive	94	-22.4	+71.6	66.9	-49	+17.9	58.4	-57.5	+ .9
14b	Calm and quiet.	72.2	-19.1	+53.1	55.9	-35.5	+20.4	42	-50	- 8.
15a	Get down smartly to set classwork.	69.2	-41.1	+28.1	83.2	-27.1	+56.1	55.6	-54.8	+ .8
16b	Try to fight through with determination	41.9	-27.1	+14.8	63.1	- 5.9	+57.2	29.9	-39.1	- 9.2 (2)
	Average percentage difference	71.3	-25.2	+46.1	65.9	-30.5	+35.4	48.	-48.5	- .5
	Significance Average % difference			ϵ = .035 13.			ϵ = .038 9.			ϵ = .04 -
	Number of cases in each group	310-335			402-243			305-340		

TABLE VIII.b.

Differences between percentage incidence of "Qualities of attention and application" in bi-polar groupings of each variable.

itself from one set of neurons to another. This again may be related to differences in the after-enervation measured in Wiersma's experiments. If, however, we confine ourselves to subjective phenomena, we have ideational perseveration, which interferes with new stimulation, and which tends to prolong indefinitely any form of activity with which the subject may be, or may have been occupied. Such is the case when certain tunes or thoughts keep on recurring to consciousness and cannot be shaken off. Thus it is possible for the Secondary Functioning, to give the impression of attending and yet be merely apathetic, to drift on in a certain task, through inertia, till the first obstacle pulls them up, or to sit very quietly, and do no work at all. The Activity variable ensures that work is started, rapidly, and that great efforts will be made to overcome obstacles. Hence for these two qualities we get maximum positive differences of 56.1% and 57.2%. Secondary Function therefore favours attention, application, calmness primarily, smart work and fighting through with determination secondarily; the Activity Variable is the chief determinant in the latter, where it is merely given greater effect by Secondary Function; in the qualities of attention and application, it plays no part in the pattern, the particular effector form, but it provides the necessary energy. The part of Emotionality is neutral.

Table VIII^{c} shows the function of Emotionality to be no different in respect of the qualities militating against satisfactory work in class. The difference is much smaller than its P.E. yet examining the individual qualities, we see that in some cases Emotionality, in others non-emotionality, proves to be a significant facilitating factor. The Emotional are more inclined to be playful and to be restless and inclined to fidget, the non-Emotional tend to be lifeless and inert, and to work by fits and starts. Throughout so far we have found that Emotionality accompanies positive reactions, expressions of feelings, and that these reactions can be indiscriminately socially valuable or valueless, while Non-Emotionality everywhere accompanies socially valuable and

useless ....

useless responses of a negative or more controlled nature. Much depends on the nature of the accompanying variables. With Emotionality we can hitch our wagon to the stars, as well as plumb abysmal quagmires.

Our contention, that Emotionality has a neutral function in respect of qualities of application or distraction, is supported by the figures of this table.

The qualities leading to unsatisfactory way of working are largely favoured by Primary function (-28.4% 8.6 x P.E.) There are maximal differences for working by fits and starts (-56.6%), easily distracted (-44.9%) stopping immediately at end of lesson (-61.8%) and being restless and inclined to fidget (-61.6%).

Primary attention, which outweighs everything else with the Primary Functioning child, is largely responsible. Reference has frequently been made to the shallow, but very extensive conscious field of the Primary Functioning type. This means that attention is splintered, and now this stimulus attracts it, now that. There is little or no inhibition, and any casual happening is sufficient to overcome the little Secondary attention the child is able to muster. It is very difficult to catch the interest of these children for any length of time, unless somehow or other, the significant implications of the subject, lesson, or task, can be brought home to them. Abstractions are fairly useless in these cases. If the child can be made to live the lesson, take if possible an active part in it, or see the subject and its implications in relation to some of his usual activities he will be as keen, as possibly keener than the Secondary pupil. We must compensate for the lack of integration from within by creating outer significance, integration with the more immediate meaning and action complex of the child. If such interest is not aroused, the child will exercise its natural and rather excessive mobility (through emphasis on the effector side of the organism) on anything and everything the moment presents, scribble, play carve the desk, or be generally restless and ...

and fidgety. When the lesson is over, attention is with the greatest ease brought into something else; all that went on a few minutes previously fades from consciousness. Just as we found them to alternate in mood, the Primary show alternation in zeal of work. Maybe, for certain reasons, or by pure chance, or the nature of the lesson, attention is caught. The child will work with might. Something else gets into the way a few hours later, or the lesson has too many abstractions, and distraction takes the place of work. There is no "braking," regulating background, as with the Secondary functioning child, which keeps up a fairly even performance. Yet laziness pure and simple, or lifelessness and inertia, are not determined by Function.

This brings us to a consideration of the part played by Activity in these qualities. This variable strongly counteracts distraction and lack of zeal (-16.7%, 4.5 x P.E.). Though inactivity goes to some extent with alternating and distractive tendencies, these reaction patterns are, however, first and foremost determined by Function; there are two different effector mechanisms to the same energising force, and it is these mechanisms that are fundamental. The energising force itself is again dominant where mere strength and speed of reaction are measured, as in Questions 15 and 16. Qualities of distraction are less likely to occur in the Primary when there is a fairly powerful organic drive which will counteract the splintering of attention. Once a start has been made on the task the child, impelled through activity, may get sufficiently far to reinforce its initial interest, and create some Primary significance so that a distraction is less likely to be effective. The action itself becomes the motive of the moment. The less active ones will be distracted before they have got sufficiently far in the work to achieve this reinforcement. In this manner, the Activity variable plays an important role in counteracting the weaknesses of the Function mechanism. For

the rest, the correlate qualities of Activity or Inactivity speak for themselves.

In combination, one would therefore expect greatest zeal and attention among the Secondary Active Types, to a lesser extent among the Primary Active, where restlessness should reach a maximum; and still to a very fair extent among the Secondary Inactive. Owing to the inertia of the Secondary Function, determination and readiness to act will be largely absent. The Primary Inactive will have little to commend them. Everywhere there will only be minute differences between the Emotional and Non-Emotional in each group. Table VIII[a] bears out these expectations. Maximal scores are obtained by the two Secondary Active types for working with application (95% and 91% - 49.5%) attention, (98% and 97% - 57%), calmness (86.5% and 93.5% - 48.5%) settling to work smartly (94% and 97% - 60%) fighting through difficulties with determination (70% and 80.5% - 42%). Restlessness reaches its peak in the choleric (P.A.E.) (91%-39%). The difference between the two Secondary and the two Primary Inactive types in respect of application is notable (79% and 51%, 8% and 1%, Av. 49.5%). On the other hand, lifelessness and inertia are most frequent among the Secondary (29% and 57%, 17.5% and 30.5% Av. 12.5%). In the two Primary Active types, all the "Distraction" Qualities occur above average, the genuine Activity qualities, however, likewise; while among the Primary Inactives, maximal amounts of instability and distraction go with maxima in Inactivity, once again branding these types as thoroughly inferior, much more so than the Secondary Inactive types.

Hugo's figures correspond exactly with ours. Maxima occur for the same questions in the same types. The findings are thus identical, and added weight can be given to them.

Similarly there is qualitative support from teachers' remarks. In 9 cases, all but one Secondary, quietness and calm are especially remarked on. As quiet, rather negative natures, 18 cases are mentioned, of which 14 are

No. of Question	Qualities	S. A. E. 103	S. A. N. 144	P. A. E. 114	P. A. N. 41	S. I. E. 14	S. I. N. 49	P. I. E. 74	P. I. N. 106	Av.
9a	Accurate (punctual at school etc.)	93.5	93.	60	59.5	36	39.5	6.5	11.5	56
	Inaccurate (careless mistakes)	6.5	7.	39	40.5	50	59	92	90.	42.5
10a	Attempt to grasp a problem & form opinion	70	76.5	62	52.5	29	10.	17.5	14.5	48
b	Accept and learn by heart what is taught	29.	23	38	47.5	71	88.	81.5	85	51
11a	Remembers what is learned clearly	85.5	90	70	50	14	16.5	8	11.5	53
	" inaccurately and in muddled fashion	12.5	10.	30.	47.5	86	81.5	90.5	89	45.5
12a	Quick and ready in answering	70	55.5	84.5	45	14	6	36	11.5	48
	Slow in answering	26	44.5	14.5	52.5	86	94	61	89	50.5

TABLE IX.a.

QUALITIES AFFECTING SCHOOL PERFORMANCE.

Percentage incidence of qualities for each of the eight types

(combinations of three bi-polar variables.)

TABLE IX.b.

Differences between percentage incidence of "Qualities affecting school performance" in bi-polar groupings of each variable.

No. of Question	Qualities.	% Secondary.	% Primary.	Difference.	% Active	% Inactive.	Difference	% Emotional.	% Non Emotional	Difference
9a	Accurate (punctual at school etc.)	65.5	34.4	+31.1	76.5	23.4	+53.1	49	50.9	-1.9
	Inaccurate	30.6	65.4	-34.8	23.2	73	-49.8	46.8	49.1	-2.3
10a	Attempt to grasp a problem & form opinion	46.4	36.6	+ 9.8 (2½)	65.2	17.8	+47.4	44.6	38.4	+6.2 (1.6)
b	Accepts & learns by heart what is taught	52.8	63	-10.2 (2.5)	34.4	81.4	-47.	54.9	60.9	-6. (1.5)
11a	Remembers what is learned clearly	51.5	34.9	+16.6 (4.4)	73.9	12.5	+61.4	44.4	42	+ 2.4
b	" inaccurately and in muddled fashion	47.5	64.3	-16.8 (4.3)	25	86.8	-61.8	54.8	57	-2.2
12a	Quick and ready in answering	36.4	44.3	-7.9 (2)	63.9	16.9	+47	51.1	29.5	+21.6
	Slow in answering	62.6	54	+8.6 (2)	34.4	82.5	-48.1	47	70	-23
	Av. % Difference Questions 9,10,11, Favourable qualities.	54.5	35.3	+19.2	71.9	17.9	+54.	46	43.8	+ 2.2
	Av. % Difference Questions 9,10,11, Unfavourable qualities.	43.6	64.2	-20.6	27.5	80.4	-52.9	52.2	55.7	- 3.5
Significance of Average % Difference				$\epsilon = .038$ | 5 $\epsilon = .039$ | 5			$\epsilon = .033$ | 16 $\epsilon = .033$ | 16			$\epsilon = .039$ | - $\epsilon = .039$ | -
	Number of cases in each group	310-335			402-243			305-340		

Secondary. As serious are described 10 Secondary types, all but 2 active, all but 1 non-emotional. Numerous remarks are appended about the variability of Primary children, of very good attention one day, hopeless attention another, great interest in some subjects, total lack of it in others.

Qualities afftecting School Performance. Tables IX a, b.

We have seen that the Primary are temperamentally unable to act in school as the Secondary, the Active as the Inactive. How does this affect other qualities, leading to success in school, or conducive to failure?

In Table IX^{b}, the incidence of the qualities of accuracy, attempting to grasp a problem and form own opinion, and ability to remember what is learned clearly, are examined.

Again there is no difference between the Emotional and Non-Emotional groups. One is immediately struck, however, by the great importance of Activity in this connection. There is a difference of no less than 54% (16 x P.E.) between the Active and the Inactive group.

In the previous section, Function was found to determine the character of behaviour, with Activity an important second. The present qualities are, however, much more specific. Attention alone, or distraction alone, quietness or fidgeting, will not make a child independently minded, and able to think for himself, accurate, and, if he chooses or happens to recall, able to do so clearly and concisely. Undoubtedly Function may be an important asset or drawback, but these figures indicate that these qualities are determined by the general Activity factor, mental alertness, readiness to act upon some motive representation, not just impulsively, but rather in the problem-solving way, overcoming obstacles, until the task is completed, the motive satisfied. Throughout we find Activity on the side of socially valuable qualities. Both other variables have their drawbacks at both poles. Activity has not; it is always found with those correlates that have the greatest social value. That Activity must be sharply

distinguished ....

distinguished from restlessness, mobility, always being on the move, is also emphasised by these correlations. These are characteristic of the Primary Type.

In order to grasp a problem and form an opinion, one must be able to take a wide view of all its implications, weigh all pros and cons. This we found is not the strong point of the Primary Functioning. Similarly, Accuracy demands an attention to detail, which again the Primary, with their splintered attention, shallow and extensive conscious field are less able to give. In respect of Memory, where the Activity difference is greatest (+61.4%) the contradiction with the Primary pattern is greatest. The difference in respect of Function for this quality is 16.6% (4.4 x P.E.) in favour of Secondary Function. It is important therefore to distinguish very clearly between the apparent Activity of the mercurial Primary type, and the genuine Activity which can manifest itself purely in mental alertness. Secondary Function, so often causative of socially valuable qualities, shows here too a positive difference (+19.2% 5 x P.E.) yet it is safe to assume that its function is only facilitating. A little Activity would go a long way with a Secondary System. The contributory effect of Secondary Function is least in "attempting to grasp a problem and form an own opinion" (+9.8% 2.5 x P.E.), where the connection with the Secondary mechanism and its peculiar advantages is least obvious, and least direct. This connection is most direct in Accuracy, so we have here the greatest difference in favour of Secondary Function (+31.1%). On the other hand, the Primary mechanism aids Activity in the determination of these valuable qualities by the wider range on which observation works, by greater alertness and enthusiasm. But in all these cases, volitional effort and energy is necessary, and without it, the Secondary child is not much more likely to be accurate or remember clearly than the Primary.

We have .....

We have added to this table the quality "Quick and ready in answering." A different pattern obtains here. Once more, Activity is chiefly causative (+47%) indicating that there is a fairly important speed element in the Activity variable, although the word "speed" must be used with circumspection; but this time both Emotionality (+21.6%) and Primary Function (-7.9% 2 x P.E) co-operate. On the one hand there is the facilitating hastiness of the Primary, on the other the braking deliberateness of the Secondary; Emotionality and enthusiasm, Non-Emotionality and reserve go together; hence the correlation of Emotionality with "quick and ready answering." In so far as it is not foolish and thoughtless, this quality needs ease and strength of volitional process, mental alertness, readiness to decide after rapid consideration of a number of circumstances and implications, and involves therefore accuracy, clear memory, and ability to form own opinion. In this quality, the nature of the Activity variable, as distinct from Function, comes very clearly to light.

We would expect maximal incidence of these qualities affecting school performance in the Secondary Active types, minimal in the Primary Inactive, with on the other hand a peak for quickness and readiness in answering in the P.A.E. type.

Reference to Table IX[a] gives 93.5% and 93% for Accuracy in the Passionate and Phlegmatic types, 6.5% and 11.5% for the Nervous and Amorphous, the Average being 56%.

Similar consistent differences are observed for the other qualities. As expected, however, the Choleric are at the top for quick reply, 84.5% Av. 48%. The Apathetic, S.I.N. score only 6%, absence of Activity and Emotionality, and presence of Secondary Function, all tending towards slowness.

Interesting qualifying remarks about "slowness" and "speed" were appended by teachers. Very often, extremely quick answers are given, on the spur of the moment, with little evidence of thought behind them; in 18 out of the 19

cases ...

cases where this qualification was made, the child was Primary Functioning. In another 19 cases, where slowness was especially remarked on, and qualified by terms such as "deliberate," "well thought out" "does not venture a reply or commit himself without consideration," 16 were Secondary, the remaining three Primary Non Emotional.

Among the Secondary Inactives, this slowness becomes a slowness of thought, inertia, with the Primary Inactives an almost complete vacancy and dullness. The remark "slow in speech and thought, very unintelligent," or words to that effect were applied to 16 non-active cases, all but one Primary all but one Non-Emotional. On the other hand "slow but accurate" was applied to 9 cases, all Secondary, all but one Active, all but two Non-Emotional.

We noted that "excellence in remembering" is mainly determined by Activity, yet also correlates positively with Secondary Function. This correlation is partly due to the fact that there is such great variability in the Memory process of the Primary child. Out of 20 recorded cases of good retention in some subjects, in which the child was particularly interested, 16 were Primary. Six Primary cases, all Emotional, were stated to be determined workers, if they happened to be interested in the particular task. This variability factor governs all actions of the Primary Type.

Our results differ, in this set of qualities, from those of Dr. Hugo. All our Active types display them well above average strength. With him, only the two Secondary Active types do so. His two Secondary Inactives actually exceed the Primary Actives. Our results seem far more consistent with the nature of the variables, especially the Activity variable (we shall come back to this point in due course) and are probably due to the weighting of criteria, resulting in a better method of classification. His data agree with ours in assigning a maximum for quickness to the P.A.E., a minimum to the S.I.N.

	SAE	SAN	PAE	PAN	SIE	SIN	PIE	PIN	Av.
23b Indifferent. No Enthusiasm.	6	13.5	9	47.5	43	73.5	36	87.5	33.5
28b Indifferent in Manner.	5	7.5	8	24	7	37	21.5	36	17
24a Indifferent after making bad error.	1	12	11	45	7	67	24	77	28
30c Apathetic regarding law and order.	5	4	8	26	14	65.5	19	47.5	20
14c Lifeless and Inert	-	1.5	-	-	28	57	17.5	30.5	12.5

TABLE X. A.

Percentage Incidence of Qualities of General Indifference for each of the eight Types

(Combinations of three bi-polar Variables.)

TABLE Xb.

Difference between percentage incidence of "qualities of general Indifference" in bi-polar groupings of each variable.

TABLE Xc.

Difference between percentage incidence of "Inertia" in bi-polar groupings of each variable.

No. of Question.	Qualities.	% Secondary.	% Primary.	Difference.	% Active	% Inactive.	Difference.	% Emotional.	% Non-Emotional.	Difference.
23b	Indifferent. No enthusiasm.	34	-45	-11 (3)	19	-60	-41	23.5	-55.5	-32
28b	Indifferent in manner.	14.1	-22.4	- 8.3(2.8)	11.1	-25.4	-14.3	10.4	-26.1	-15.7
24a	Indifferent after making bad error	21.8	-39.2	-17.4(5)	17.2	-43.8	-26.6	10.8	-50.2	-39.4
30c	Apathetic as regards law and order.	22.1	-25.1	- 3.	10.8	-36.5	-25.7	11.5	-35.8	-24.3
	Average % difference first 4 qualities.	23	-32.9	- 9.9	14.5	-41.4	-26.9	14	-41.9	-27.9
	Significance Average % Difference			$\epsilon = .035$ 2.8			$\epsilon = .036$ 7.5			$\epsilon = .033$ 8.5
	Number of cases in each group.	310-335			402-243			305-340		

TABLE X.c.

14c	Lifeless and inert	21.9	-12	+ 9.9(3.4)	.4	-33.5	-33.1	12	-22	-10.

Qualities of General Indifference. Tables X a, b, c.

These qualities have been abstracted from the other Tables, as they are quite an interesting category by themselves.

General indifference in Manner, lack of Interest in things, Indifference after making bad error are equally determined by Non-Emotionality and Inactivity (-27.9%, 8.5 x PE. and -26.9%, 7.5 x P.E.) Yet the part played by these two variables is quite distinct. Indifference can imply two things: a) that nothing is done about a thing; b) that there is nothing to do anything about. The first occurs with lack of Activity, the second with lack of Emotionality. Both give a final general impression of Indifference.

Where there is a very weak active impulse, i.e. lack of volitional effort, motives will have to be tremendously strong to produce any reaction at all. We find the biggest difference for the Activity Variable in respect of lack of Enthusiasm, where the Inactives surpass the Actives by 41%. Enthusiasm, although it contains such a purely Emotional element, also implies doing something about a thing. The Inactives have not the energy or will to do it and are thus credited with a lack of enthusiasm. And so one often finds in life people losing chances of advancement, of following up an alluring possibility which presents itself, not because they have failed to see or appreciate these, but because they lacked sufficient "go", initiative, to take the trouble. In the case of Non Emotionality, there are no motives upon which to act. If one feels nothing about an event, situation etc., though one could react to it, one has not the desire. With the strongly Non Emotional, one can expect indifference towards specific things, accompanied by ceaseless and determined labour on perhaps a few set or routine tasks, on which they have concentrated such feelings as they have; with the Inactive, indifference generally. That is why "no enthusiasm"

is more.....

is more frequent among the Inactives than among the Non-Emotional. It is extremely important, for the validity of this Temperament scheme, to keep these differences clearly in mind.

This is the last set of qualities to be discussed and we shall once more concentrate on the matter of overlap by studying the effect of one variable at a time, the other two being constant. We have seen that an overlap occurs, in respect of a number of qualities; but that it is only an apparent overlap. Having observed the quality of Indifference in a subject, how can we tell whether it is due to Inactivity or to Non-Emotionality? Obviously the only safe scheme is to apply the criteria, and so discover whether there is a general Indifference due to lack of Activity, or a Non-Emotional Indifference, due to lack of affective reactions and a consequent narrowing down of the range of motives. Emotionality not only increases the possible motivations of responses, it also tends to increase their frequency and intensity. Many situations leave the Non-Emotional type cold. He is "Indifferent to them".

Indifference is less frequent in the Secondary Group (-9.9% 2.8 x P.E.). Given a very low Activity level, whatever flow of energy there is will be dissipated, diffused through the scattered channels of the Primary Type, producing at the most a restlessness, but through this dispersion, "dilution", unable to effect a willed act of any importance. In the Secondary Type, this low Activity, conserved in a narrow channel, saved from wastage through distraction and splintered attention, is able to effect something, be it only the carrying out of one lowly motive or routine task. Consequently on the average the weakly Active Secondary Functioning child is less often classified as Indifferent than the weakly Active Primary. In the one case Activity is conserved, in the other not.

In reality .....

In reality only one variable is causative, but it is impossible to isolate it for measurement. As one can not measure Activity operating in vacuo, it must be measured through some function, which, according to its nature, modifies it. Hence where a weak Activity can still be detected when operating through a Secondary Function, it cannot when operating through a Primary Function. It is this which accounts for the greater correlation of Primary Function with Inactivity. Only Activity is causative. The apparent overlap is due to attendant circumstance, which it is impossible to avoid but which need not mislead us, if we measure the three variables over a wide range of activities, as we have done. An analysis can then be made of the way they combine. Their true unitary nature and function emerges quite unambiguously, and from their balance of strength, the resultant qualities can be worked out.

The nature of Secondary Function reveals itself characteristically for instance, in X^c, "Lifeless and Inert". This quality, again largely determined by Inactivity (-33.1%) and Non-Emotionality (-10%) has a greater incidence in the Secondary, than in the Primary Group (+9.9%, 3.4 x P.E.). The Primary child, even when Inactive, and though perhaps performing fewer volitional acts than its Secondary Inactive counterpart, will tend to be more restless, fidgety, nervous sometimes. Hence the term "lifeless and inert" will be less frequently applied to it than to the Secondary Inactive type, which in extreme forms will merely vegetate.

This analysis should lead us to expect the most profound indifference, in the fullest meaning of the term, in the P.I.N. type, Amorphous, followed next in order by the S.I.N, Apathetic. This latter type ought to score a maximum also

for inertia ....

for inertia and lifelessness. Least indifferent should be the Passionate (S.A.E.) least lifeless the Choleric (P.A.E.).

In respect of the latter quality the choleric score indeed zero (Av. 12.5%), the Apathetic 57%, which is the highest. The Amorphous score 87.5% (Av. 33.5%) for lack of enthusiasm, 77% (Av. 28%) for indifference after error, both maxima. They are, very aptly, robbed of this doubtful honour by the Apathetic in respect of Apathy towards law and order in class (65.5% - 20%). The Passionate score 6%, Av. 33.5%, 1% Av.8%, 1%, Av. 28%, for the three Indifference qualities, minima indeed! Only the Phlegmatic score less in Indifference in Manner, .5%, Av. 8%.

Turning again to the collection of qualitative remarks, we find that in 36 cases to the question "Occupied after School etc.","No interest" was added or phrases such as "sleeps", "star gazing", "loafs about", "hangs about", "messes about" etc.

Of these only 9 are active, (only one Sec. Ac.) 27 are Inactive (1 S.I.N., 11 P.I.E., 15 P.I.N.) Of the 36, 14 are Emotional. This corresponds fairly well with the above findings.

A general observation of some importance must be made with respect to question 25, a) Emotional or b) Non Emotional, or c) Feelings not on surface but probably yet there. When c) had not yet been added, the following note was appended in 9 cases, all Secondary Active: "Emotional, but does not display feelings readily". The passions of the "Passionate" run deep, are not squandered on many stimuli, but are probably concentrated on one object, driven into one mighty channel. There is more intensity than overtness, and here we have a direct influence of function on Emotionality. In four cases of Choleric (P.A.E.) types special mention was made of the strength and frequency of

Emotional Behaviour.....

Emotional Behaviour. In the case of one Sanguine type, "Non-Emotional" was marked, but added to it was : "But displays what feelings he has.

General Summary.

The foregoing analysis has demonstrated the reality of the three variables in terms of their function. By means of the criteria, we are able to separate people into Primary or Secondary, Emotional or Non-Emotional, Active or Inactive Groups.

We have found that each variable tends to be correlated with definite qualities, that variables affect each other in specific manner, and that the intensity and nature of qualities in any one type can be predicted from a knowledge of the proportion in which the variables are present in this type.

Have we proved to satisfaction that the variables are completely functionally distinct? Have we accounted for the overlap factor? It has been our aim to show that such overlap as undoubtedly exists is due to the fact that certain qualities are complex, and can only be understood in terms of a combination of variables; Secondly that there is a purely apparent overlap. Overlap becomes only then a serious drawback when two variables could singly account for exactly the same behaviour quality. We have shown that this is never the case.

We saw for instance that certain mood patterns were complex and originated entirely from the combination of a typical instinctive force with a fundamental mechanism. We found that Primary Function correlated with Indifference qualities, although our figures pointed to Inactivity as causative; the reason being that weak Activity is still effective in the Secondary, but is obliterated in the Primary Functioning.

When.....

When comparing the Secondary group with the Primary group for these qualities, we take it that Activity is constant, while on account of the very nature of Activity as a force which cannot operate in vacuo, but which needs an effector mechanism for its expression, this is a condition which cannot be fulfilled. A number of weakly Active Primary cases will be classified as Inactives, and will be credited with the Inactive Indifference qualities, because of the dissipation of their weak Activity drive.

The extent to which Primary Function obliterates weak Activity is the extent of its correlation with Indifference qualities. This would be a spurious correlation if we concluded that Primary Function caused Indifference.

Having regard to the correlations with the Activity variable, and to the already known functions of Primary and Secondary Function, the true relationship can be accurately deduced, and, comparing the respective percentage differences can even be approximately established mathematically.

We do not think that even by the orthodox partial correlation methods, the problem of overlap could have been more adequately solved. All correlation has to deal with given and observed material, and these Primary Functioning cases are given as Inactive. Our method of Analysis, deductive, as well as statistical, seems suited to the peculiar nature of the subject. We have been able to determine to what extent each variable contributed to the incidence of a quality. We have considered each singly and have analytically established its theoretic function, assuming it to be operative alone.

The observed correlations are objectively given facts, and objection could only be lodged against the validity of the Temperament scheme if we were unable to show that in producing certain behaviour patterns, some variables were causative, others merely facilitating, braking, or qualitatively modifying, if we were forced to admit that an identical

behaviour.....

behaviour quality could be produced by two variables independently. For all practical purposes, our analysis is sufficient and cannot lead us into errors, either qualitative or quantitative.

Once we have examined an individual and know how the variables combine in him - and this we can do by means of our proven criteria, or by means of clinical tests - we are able to foretell what qualities, in what proportion, will by displayed by him. We can give an adequate account of his subjective temperamental make-up. The finer we can make our system of classification and criteria, the better we shall succeed here; but finally, and in the last instance, when all this has been done, we shall still find the subjective overlap, although probably exactly and mathematically determined in each case.

This is an ultimate necessity, as the variables are operative in every individual, no matter in what ratio, and to be operative means to influence each other in a characteristic fashion. The nature of this mutual influence as we have traced it in this chapter is known, and it is that which constitutes our overlap.

Our scheme has already given an approximate mathematical measure of the degree of this overlap, besides putting its qualitative nature and foundation clearly, without confusion, and sharply defined.

We submit therefore that the general validity, as well as the general usefulness of the method is proved.

Summary of function of Variables.

We shall postpone a final discussion as to the nature of the variables to a later chapter, in order to prevent repetition. Throughout the preceding analysis their general characteristics have sufficiently clearly emerged for present purposes.....

purposes. For the sake of completeness and cohesion, it will be sufficient to give a very brief factual summary of the findings.

Secondary function determines Even and Subdued mood qualities, Good Humour, the more balanced, though somewhat less positive socially valuable behaviour qualities, and to a maximal extent Secondary attention and Zeal and Application in work. It favours those qualities leading to General Effectiveness, and is less inclined to accompany general indifference than its Primary pole, though neither determines it.

Its further chief characteristics are a deep, though narrow conscious field, a braking effect on immediate effector, activity, great evenness, and reaction to the situation, rather than to the stimulus. The reaction is made against a back-ground of motives, past and future actions, social habits, and principles.

Primary Function goes with Cheerfulness and Optimism, while it causes Alternation in Mood. It determines many socially less valuable and aggressive behaviour qualities, is chiefly responsible for Distraction, lack of Secondary attention, and Variability in Application to work;is consequently also at a disadvantage in those qualities producing General Effectiveness, and is more often associated with General Indifference. A very wide, but very shallow conscious field, splintered attention, very free and unbridled effector mechanism, reaction to the Primary stimulus, and the motive of the moment, not integrated with any other motives, or the general Socially conditioned background, and consequently often contradictory actions, and a good deal of variability; these are the chief qualities of the Primary Function.

Activity goes with all that is favourable. It produces Cheerfulness of Mood, Good Humour and Optimism. It facilitates or

causes.....

causes all the best, socially most valuable behaviour qualities, while it counteracts the less valuable; it is the impelling, volitional, energising force which finds expression through vastly different mechanisms, with differing degrees of effectiveness, in the qualities of attention, zeal and application. It determines the qualities which make for general effectiveness, and in its absence, general indifference or socially less valuable qualities, due to weakness of volitional effort and Primary Function and Emotionality combined, hold sway. There is an element of speed, readiness, in the Activity variable.

Emotionality is quite distinct from the other two variables. In respect of Mood, it counteracts all the even, subdued qualities; it strengthens, adds to, the more positive, aggressive and variable qualities. In its effect it can be socially valuable, as well as harmful. It operates either way, producing Enthusiasm, Interest, Eagerness, as well as Headstrongness, Temper, Anger. It lends affective colour to actions good or bad. Excess on the positive side is just as bad as excess on the negative side, so that on balance, Emotionality does not materially affect qualities of Application, Zeal, Distractibility, and General Effectiveness. The balanced, medium position produces the most effective adaptation.

Non-Emotionality, if at all general and pronounced, and especially when combined with Inactivity, can reduce effectiveness to zero, producing Indifference in many spheres. Wherever it operates, Emotionality influences the strength, speed, and tone of a reaction, and in purely affective

responses, ...

responses, determines the reaction itself. It gives intensity to our reaction rather than direction.

In a later chapter we shall show that in respect of Activity and Emotionality, we are dealing with two different Organic Forces, in respect of Function with differences in the receptor and effector mechanisms.

CHAPTER V.

DESCRIPTION OF THE EIGHT TYPES.

I. The Secondary Active Types.
The Passionate Type and the Phlegmatic Type.

II. The Primary Active Types.
The Choleric Type and the Sanguine Type.

III. The Secondary Inactive Types.
The Sentimental Type and the Apathetic Type.

IV. The Primary Inactive Types.
The Nervous Type and the Amorphous Type.

We shall now deal concisely with each of the types produced by the eight limiting combinations of variables. It was not expedient to do this before we had established the validity and detailed function of the variables. It was especially important to investigate first the way in which the variables influence each other. An earlier treatment would therefore have involved far too many assumptions and a-priori statements. The type - description does not of course apply to each individual in the type. It only gives what is most generally characteristic, a pattern to which a group of people more or less approximates. The actual strength or presence of qualities in each individual will depend upon his variable - ratio, as well as on a number of other incidental factors, such as environment, age, and sex. Extremes and border line cases will occur frequently, but in each case, the corresponding behaviour pattern can be accurately traced, if the effect and function of each contributory factor is known.

We shall therefore have to make certain assumptions regarding the modification to which the variable patterns are subject under the influence of age, sex and environment.[1]

A discussion .....

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1. We are not applying any ethical standards to the various types. It is only our intention to compare the adjustments each makes to environment, with special reference to the social value of such adjustments.

A discussion of these must be postponed to a later chapter.

1. The Secondary Active Types.

The Passionate Type, S.A.E., and the Phlegmatic Type, S.A.N.

In the Phlegmatic, the socially valuable aspect of Secondary Function reaches its peak, Activity enhancing it and suppressing peculiar tendencies towards a less useful adjustment; the Passionate display more strikingly the "Secondary Function - Emotionality constellation qualities". The latter type shows greater intensity and variability of behaviour than the Phlegmatic, less reserve, more cheerfulness, but also greater frequency of socially less valuable behaviour qualities. On the other hand, the Passionate type is much more unified than the Choleric type; its emotional reactions will be characterised by strength, depth, and duration, rather than by frequency, explosiveness and shallowness. The conscious field is much narrower than in the choleric especially in extreme forms. That is to say, attention is concentrated and focal, and devoted for lengthy periods to the same situation. The extended conscious field of the Primary allows of a rapid flitting of attention from one stimulus to another. Attention is occupied with now this, now that, never for any length of time, easily distracted and not often very intense.

The Passionate are about average in Evenness of mood (30.5%-28.5%)[1] Very good humoured (78%-64%) and fairly cheerful (61.5%-45.5%). Evenness is much more frequent in the Phlegmatic (54%), Good Humour the same (78.5%), but there is a big drop for cheerfulness (42%). The S.A.E. everywhere exceed the S.A.N. in emotionally coloured actions, both socially valuable and reprehensible, though they remain below the Choleric in these respects. They are enthusiastic (56.5%-10%-31.5%), considerably more Impulsive than the

Phlegmatic.....

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1. Where 2 or more figures are given, the last is always the general average, the first the type under discussion, the second the type with which a comparison is made.

Phlegmatic (27%-3%-37%) but also more inclined to sulk (12.5%-4%-26.5%) to be headstrong (11.5%-5%-20%), show a temper (43.5%-12.5%-41%),to be quickly offended (19%-5%-18.5%) or to argue when scolded (4%-1.5%-9.5%). The Phlegmatic are to a maximal degree inclined to cry after scolding (20%-3%-12.5%) and to be nervous at examinations (56.5%-13.5%-34%). Both types take things seriously. It is this quality coupled with their Activity which, in later life, leads to persistent, purposive drives, the pursuit of a life's work. When reinforced emotionally, the conscious field becomes ever narrower and deeper and all absorbing passions are created, sought for their own end, Napoleon's vision of a World Empire, Luther's struggle against the Roman Church. The Phlegmatic surpass all other types in respect of the balanced, reserved qualities, after a scolding (87.5%-55%-56%), reserve rather than enthusiasm (76.5%-37.5%-34.5%) and in eagerness to make good after an error (80%-71%-47%).

At the same time, there is a greater tendency towards indifference than in the Passionate type. The Phlegmatic have second highest percentage for Inability to be angered (16%-0%-9.5%). In all qualities of application and attention both types by far surpass all others. For "usually attentive" they score 98% and 97%, average 57%! They are also outstandingly accurate (93.5%-93%-56%). Though both types easily outstrip the others in respect of those qualities of general effectiveness, the Phlegmatic slightly top the Passionate in these. For levelheaded, cool, strictly rational consideration of all factors which could enter into a situation, the Phlegmatic are eminently suited. Failure to them is merely another objective situation, to be analysed, to be used for future advantage. The heart may overrule the head in the more pronouncedly passionate; both in respect of grasping a problem (76.5%-70%-48%)

and.....

and Remembering clearly and accurately, (90%-85.5%-53%) the Phlegmatic are superior. They are also maximally Calm and quiet (93.5%-86.5%-48.5%) and much less Quick and ready in Answer than the Passionate (55.5%-70%-48%). They are the most superior type in getting down to work, and sticking at it with determination (97%-94%-60%) and (80.5%-70%-42%), though closely followed by the Passionate. Both types remain far below average for Ringleading (12.5%-3%(Ph)-22%) and both are maximally polite (93.5%-92%-75%) with a slight tendency towards Indifference on the part of the Phlegmatic.

Finally both types are more than any others constant in Friendship (81.3%-83% (ph)-64.5%) and are less inclined to be critical of people than idealising, in which respect they exceed the average (41.5%-44% (Ph)-28%).

Throughout, the Phlegmatic type presents an even, unbroken picture. Efficiency, persistence and reserve are the keynotes. The life of the Passionate is more intense, more coloured and relieved, with hills and vales, rapids and waterfalls, and at times and in certain cases, terrific currents; they are more efficient, in the carrying out of <u>the</u> particular motive concerned, than a Non Emotional force could be, but their drive is often not transferable, should the motive disappear, or its execution become impossible. Their Emotionality is essentially expressed in volitional action, rather than in explosive feeling states. On the whole, the Passionate are somewhat more attractive than the Phlegmatic. They reveal more relief. The former are a painting in oils; the latter a half-tone.

We have selected a number of sketches, which teachers added to the questionnaires of pupils whom they apparently thought particularly interesting or typical. These perhaps better than any detailed cataloguing of traits, will reveal the

character....

character of the type. A few are given in illustration of each type.

Passionate.

"A very intelligent pupil, very quiet and very shy, but intelligent and forms his own ideas. Has a keen sense of humour and will often be seen laughing to himself over a joke which the class as a whole has not noticed. About the most unobtrusive child in the class. Very good tempered, but shows a different spirit at home. His mother came to me one day and asked if I would tell him that she would take him to the show that afternoon. She had meant to take him, but had been prevented at first. He had been very annoyed, said he would return his ticket (scholars chit) to me, and left home in a real temper. He returned the ticket early that morning. When I told him he was going he said "No! I'm not going", very determinedly. When I explained his mother had been to see me about it, he seemed satisfied, took his ticket and smiled his usual quiet smile. I was amazed that he should show such independence and determination, and also "temper".

"Steady, reliable boy, with mind of his own. Works hard, but results not outstanding. Does not stand much nonsense from others. Obliging."

"Sensitive, athletic, mind of his own. Deep religious sense. Quiet and reserved. Strong character."

"Extremely sensitive and very reserved. Very intelligent and thoroughly active. Does not show his feelings often, but they are deep. I should think is an idealist."

"A very quaint, intelligent little boy who enjoys a joke very much and is rather mischievous. Works well and is popular. Rather quiet, but full of ideas and originality, particularly in drawing."

Phlegmatic.

"Very lacking.....

"Very lacking in qualities that take the eye but steadily first in her year. Almost grown up in her reserve and steadiness of character.

"Is a very polite, responsible serious boy; very difficult to tell what he is really like, or what he is thinking. Is not clever, but very interested in things."

"Slow, retiring, but intelligent type of strong character. Not robust looking, yet with plenty of grit."

"Quiet, sensible, reliable, honest. Not bright, but puts his best into it."

"A very neat worker without a great deal of intelligence. Very pleasant and a hard trier. Retiring disposition, with no flow of language.

"A very intelligent boy with a very fair amount of common sense. More mature in ways of thought than majority of those in the class."

"Is a quiet, but very likeable boy. Works hard and is quite intelligent. Unobstrusive, but not without feeling. Has a sense of humour and is fairly active."

"Is very neglected. He has adenoids, teeth trouble and is often ill and pale, but never thinks of going home. Just sticks it out. He is as good as gold in class as a rule, but sometimes is inclined to be a bit vindictive if someone annoys him. Is quite intelligent and a good worker."

11. The Primary Active Types.

The Choleric (P.A.E.) and the Sanguine (P.A.N.)

We shall see that these types are capable of making adjustments to reality, especially socially and in personal relationships, which are more successful and useful than the Secondary Active could achieve, but at the same time they are particularly prone to other behaviour forms which from a more general social point of view are less valuable, so that their

general.....

general efficiency is considerably impaired.

Impulsiveness, Variability, Unevenness, Restlessness, the greater where Emotionality is co-operating, will be the chief characteristics. We found reserve and predominance of balanced, measured reactions in the Phlegmatic. In the Sanguine there will be a tendency for these qualities to shade off into Indifference. Contradictions in behaviour will be rife, due to lack of unity in the type, motives and stimuli of the moment determining action without much interference from past experience or other and different motivations.

Alternation in Mood occurs in both types well above average (36% Ch-31%-23.5%) The Choleric reach a peak for Cheerfulness (63%-59.5%-45.5%) while in both types Good Humour though less than in the Secondary Types, is of more than average frequency (61.5% Ch. -69.5%-64%); the less Emotionality, the more Good Humour, but the less Cheerfulness. These types are just as optimistic as the preceding ones (81%-78,5%-67.5%). The Choleric exceed the average in irritability and readiness to take offence; the absence of Emotionality slightly decreasing the frequency of these Primary Function qualities in the Sanguine (18%-16.5%-10.5%) and (23.5%-16.5%-18.5%). All socially less valuable behaviour qualities are strongly exhibited by these two types, but again the Sanguine remain in many cases below even the Passionate in this respect. The intensity and emotional tone or drive of the Passionate are lacking. Instead there is just a more general irritability, manifested as such throughout the range of correlated qualities.

The Choleric have the second highest incidence of Headstrongness (30.5%), while the Sanguine just top the average (21.5%-20%). They are only exceeded by the nervous for Temper (62%) the Sanguine remaining below average (35.5%-41%).

Both.....

Both types score a maximum for arguing after a scolding (19%-19%-9.5%) while sulking (38%-21.5%-26.5%), becoming angry after making an error (23%-0%-10%), the Choleric are outstanding, the Sanguine again considerably below average. The latter results clearly show that this type's irritability is purely Functional, and must not be confused with true Emotionality. Crying after a scolding and Discouragement after an error are forms of Emotional behaviour which belong to the Secondary pattern. Yet the choleric type equals the general average in each (12.5%-7%-12.5%) and (17%-9.5%-17.5%). The Sanguine are much calmer than the Choleric at examinations (78.5%-56%-66.5%), but one may suspect a measure of indifference in this, for although they still show a considerable number of the balanced, reserved actions above average (taking a scolding with resignation, 62%-56%, reserved in expression of appreciation, (43%-34.5%) yet they more than any other active type are inclined to be indifferent, a result of their combination of Primary Function with Non-Emotionality (Indifference rather than enthusiasm 9.5%-31.5%, Indifference after error 45%-28%, Indifference rather than politeness 24%-17%). On the other hand, no other type is more enthusiastic than the choleric (80%-31.5%) nor is there another which was so often and unambiguously stated to be Emotional (98%), only 2% being rated as having no feelings on surface.

Both types drop far below average for attention (37%-35.5%-57%) and application (35%-21.5%-49.5%) both scoring equally highly for alternation and distractibility. Their attention lapses immediately at the end of a lesson (58.5%-62%-38.5%). Nevertheless, being active types, both still score above average in qualities of general effectiveness, the

Choleric.....

Choleric more so than the Sanguine. Though Accuracy is not their forte, they do not fall far short of the Secondary types in Ability to form an own opinion and Ability to remember clearly and accurately (62%-52.5%-48%) and (70%-50%-53%). Their Activity again places them above average for getting down smartly to set class work (68%-74%-60%) in which respect the Sanguine are superior. Similarly the Sanguine score over the Choleric in fighting through a difficulty with determination (40%-62%-42%). The Choleric, however, are outstanding for quickness and readiness in answering (84.5%-45%-48%). Though the Secondary Active types are superior in the determination qualities, the Choleric and Sanguine excel in the wide range of their attention and interests. Also, once their interest is properly caught, they will bring all their powers to bear on a problem, as energetically and efficiently as any of their Secondary fellows. The part played by Emotionality is interesting. In the Passionate its advantage is a lesser reserve, greater enthusiasm and liveliness, its disadvantage an occasional excessive narrowing of the conscious field and the genesis of all pervading passions. In the Primary active types it is responsible for much of the excessive aggressiveness, impulsiveness of the Choleric, but at the same time its absence tends to increase general indifference in the Sanguine, when it left reserve, balance in the Phlegmatic. On the other hand, the Sanguine, less restless (91%-62%-39%) and less Impulsive (82%-50%-37%) than the Choleric, are, as we have seen, more determined and less inclined to dawdle.

Both types are more inclined to be fickle than the Secondary active, but not unduly so (55%-16.5%-19%). Ringleading, and getting into trouble and scrapes again show a maximum

in.....

in the Choleric, with the Sanguine falling here far behind (54%-19%-22%). On the whole the choleric will be found to be pleasant, popular, lively, endowed with leadership qualities, full of go and vim, cheerful, but difficult to manage, liked in spite of obvious weaknesses, paradoxical, inconsequential, variable, Life's electric advertisement signs. The Sanguine will be much more negative, much less likely to make an impression owing to insufficient warmth and enthusiasm, and lacking the sterling latent qualities of the Phlegmatic to make up for this. Through lack of Emotionality, they have no overpowering motives, which often keeps them out of harm, but likewise out of positive good. Withal, they can be excellent workers, achieving a good deal of effectiveness.

The above descriptions find ready support in the following sketches from real life:

Choleric.

"One of the leaders of the class. Gives the impression of being quite a little man of the world. He has a sunny disposition and is always ready for a laugh. Is very eager to answer and to give information. I depend on him quite a lot and he takes responsibility well. He has not a strict sense of honour about his work. He copies if he can, and looks at his tables etc. He does not seem to be very ashamed of it either. At times he is very quiet, but I think that he is thinking hard all the time. Tries to get out of a bit of work if he can. He is full of ideas and plans, and never minds a joke against himself. When I asked him whether he would rather be a Japanese or an Egyptian boy he said: "Neither, because if the Nile did not come down he would starve, and he might be killed by an earthquake in Japan."

"Inclined .....

"Inclined to be playful and mischievous, always ready for a joke. Sometimes is inclined to put blame on to other people. Always interfering with others. Likes to draw a certain amount of attention to herself - even if it is a laugh against herself. Is rather helpless and unreliable.

"Very keen, if interested. Very lazy. Up to all sorts of mischief. Cheeky and defiant. Can easily go to the dogs. Devil-may-care attitude. Likes to show off and be in lime-light, but very little real self-respect."

"Intelligent, but does not always show it in school work, and is hence often disappointing. The young bantam-cock type. Alert, but often has sulks."

"Has a lovely, open, frank character. Is not clever, but fairly intelligent. Thoroughly interested in, and good at all kinds of sport. Is dependable and responsible and firm as granite. Is probably one of the most popular boys at school. I should say he is extroverted."

"If anyone is unfortunate at school it is Julius. Always being found out, always covered with ink, or doing things he should not be doing, always willing to own up and take his punishment, always smiling and never bears any ill-will. He is intelligent, is often the cause of a joke to the class, but never minds being laughed at or picked out. Julius is very brisk coming to school, but considers it a bit of a necessary evil, and to make up for it, does his work and then is out for some fun. I think he has good mental capabilities and is a general favourite."

"Full of cheek and mischief. Keen sportsman. Bright. Honest. Plenty of grit, but often intellectually lazy."

"Very.....

"Very boyish and boisterous. Strong sense of being sporting, but otherwise almost obstreperous."

"Is disliked by everyone owing to her very sullen disposition. Dominates the others as they are quite afraid of her and so do everything that she tells them."

"An extremely original, sensitive child. Is critical of all and sundry, but yet is popular because of his original way of putting things. Is silent and morose at times. I should say is Emotional. Will argue about everything.

Sanguine.

Owing to the somewhat more negative nature of the Sanguine type, not many sketches were found in this group.

"A fat boy, but full of energy and good humour. Pleasant manners and a frank attitude to the world."

"Is intelligent but rather credulous. Would not form his own opinion, but take yours. Is rather quiet and easily cowed. He is very untidy in his work and hence is often taken to task: seems chastened but improves little. Is inclined to be naughty behind the teacher's back. Is rather helpless and does not take responsibility well."

lll. The Secondary Inactive Types.

The Sentimental (1) (S.I.E.) and Apathetic (S.I.N.).

In these two types, the drawbacks, as well as

advantages.....

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(1) 'Sentimental' is not related to 'Sentiment' as defined by McDougall. Although our sentimental group will be marked by a large number of 'Sentiments', integrated emotional habits directed to certain object or objects, yet it is that, accompanied by a weak volitional impulse which is the main characteristic of the type, and which produces a wealth of feeling states, but little motivation derived from these. There is nothing in McDougall's "Sentiment" connected with the volitional impulse at all, while sentiments will be normal behaviour patterns in all our other types. The term 'Sentimental' must therefore be interpreted in the light of the attributes we shall find the type possesses.

advantages of Secondary Function will emerge most clearly. Though saved from the many pitfalls into which the Primary Inactives are led, trouble, delinquency, and utter inability to concentrate on anything, or have some homogeneity of motive and reaction, some purpose in life, the Secondary Inactive may fall into a complete apathy, exhibit a general lifelessness, owing to no Primary attention at all, and far too few situations or motives to spur them into action or interest. Evenness of mood, as well as depression reach peaks in the Apathetic (67%-28.5%) and (20.5%-7.5%). The Sentimental are a little more inclined to be cheerful, or to alternate in mood. Both types exceed all others in inability to be angered (29%(S)-32.5%-9.5%). Even in the Emotional Sentimental the drive is not large enough, and too much braked by the inertia of the type, to cause anger. They are least quickly offended of all Emotional types (14%-18.5%). Both are less good humoured than the Active types, everything pointing to a greater prevalence of negative traits, to less mental vigour all round. Both score maxima for depression and pessimism (57% (S)-73.5%-27.5%). It is in the Inactives, therefore that this tendency of Secondary Function emerges. Enthusiasm makes way entirely for Indifference in the Apathetic (73.5%-31.5%), the Sentimental keeping a little of it (21%-31.5%). Again the Apathetic are never angry after an error, merely indifferent (67%-28%).

In calmness at exams (77.5%-66.5%) lack of headstrongness (8%-20%), lack of temper (14.5%-41%), resignation after a scolding (71.5%-56%), the Apathetic show, just as the Phlegmatic, minimal scores. Of all the Secondary types, they are most inclined to sulk after an error (16.5%-22%), and least often polite (63%-57%), most often

indifferent.....

indifferent (37%-17%). It is only fitting that they should score a maximum for apathy towards class conduct and behaviour (65.5%-20%). Hence we see that owing to lack of Activity, all the more reserved, balanced, yet positive qualities of the Phlegmatic have deteriorated into apathy and indifference.

The Sentimental are most frequently discouraged (42%-17.5%) and can also rise to anger (21%-10%). They are not over-enthusiastic, and rather approximate to the Passionate in reserve (36%-37.5% (P) - 34.5%). They are less indifferent than the Apathetic (43%-73.5%-35.5%). When scolded they cry more frequently than any other type (50%-12.5%), while they are also remarkably nervous at examinations (86%-34%). Headstrongness and Temper are exhibited only to an insignificant extent. They approach the two Secondary Active types in good behaviour (79%-59.5%) and are neither ringleaders nor apathetic to any extent. The passions of their Active prototype have lost all their drive, intensity, and power of discharge. They have become mere feelings, often exaggerated as in the crying, nervousness, discouragement. Hence the term sentimental, implying in this case that behaviour generally is marked by feeling-states, often exaggerated and directed towards objects, persons and situations intrinsically unworthy of it. There is no aggressive expression of surgent emotion, and very little is <u>done</u> about the objects of these feeling states. The subject may feel deeply about Slums, Unemployment, War, Ill-treatment of animals; but having experienced this feeling, more or less passively, his task is done. Yet as demonstrated, the type compares very favourably with the

Apathetic.....

Apathetic for more positive, although reserved qualities. Both types are extremely cautious (86%-100%-61.5%), slow in answering (86%-94%-50.5%), and minimally restless (7%-2%-39%).

Here we have the weakness of the Secondary Mechanism without the compensatory influence of activity, clearly shown. No less than 57% (Av. 12.5%) of the Apathetic are lifeless and inert, of the Sentimental 29%. Even if there is no Action, or only impulsive spurts, in the Primary Inactives, yet they display an excitability, restlessness and primary attention which give the impression of liveliness. With the Apathetic there is none of that. The Sentimental are redeemed by their Emotionality. On the other hand, both types far surpass even the Choleric and Sanguine in application to work (79%-51%-49.5%) and attention (93%-88%-57%). Especially the Sentimental remain well above the general average in this respect. This ensures that both these types will make the most of what limited Activity they have, and can therefore be quite useful in certain routine tasks. When set to a task which demands no particular initiative or constructive thinking, they will carry it out conscientiously and steadily. It is true that they remain below the general average for accuracy (36%-39.5% (A) - 56%) but not to anything like the same extent to which they lack the more exacting qualities of effectiveness, attempting to form own opinion (28%-10% (A) - 48%) and remembering clearly and accurately (14%-16.5%-53%); their lack of drive, of volitional action, is responsible for this. Though they are fair in getting down to their work, the result of Secondary Funtion and attention counteracting distractibility and restlessness (43%-43%-60%) they have no determination (7%-10%(A)-42%), they are more than any other type inclined to ask for help (50%(S)-29%-21%) rather.....

rather than merely give up (43%(S)-61%-37%). They are both more than averagely constant in friendship (72%(S)-77.5%-64.5%). The Sentimental are much more polite and affable than the Apathetic (93%-63%-75%). In their case, Emotionality is a boon and a blessing. It has none, or nearly none of the disadvantages it displays elsewhere, but makes positive what would become indifferent without it, and lends colour and greater force and attractiveness throughout the type. The Sentimental will have more, and more powerful motives, and will therefore be more often and more readily brought to action. The depression and pessimism of these two types is noteworthy. It is a distinct pattern quality.

No character sketch was found in the small Sentimental group, and but few in the Apathetic class.

Apathetic.

"She is a very quiet, unobtrusive little girl, rather credulous. Seems quite often to lack interest in her work and is inclined to be lazy. Sometimes seems to day-dream. Slow in answering questions and making up her mind."

"A mouse. Frequently off school. Seldom does anything, or speaks. A kind of drowned existence."

"Rather dull and slow at her work and at everything else. Does not seem to be one with other children, but somewhat apart. Yet she is fairly self assertive and has a fair amount of self confidence. Inclined towards jelly-fish type, but is just saved from it by small things, such as a certain argumentative strain which she shows occasionally."

"He is very intelligent and yet slow. He jumped from Std. I. to III. and then was put down because he was too lazy to keep up. He finds great difficulty in explaining

anything.....

anything, because he is so halting and slow. The class is inclined to laugh at him a bit, but he is good natured and quite popular. He is serious about most things and has little sense of humour. I think there is a sort of lag in his brain. I found it difficult to answer the questions (1) because he seems to fall between the alternatives generally (2) because he is the sort of child which gives a wrong impression."

"Very slow and rather stupid. He is quiet and at times vacant. Slow to see a joke, and the children make fun of him a bit. He is anxious to please and tries. He is interested in Nature Study and Geography, but always gets things muddled."

IV. The Primary Inactive Types.

The Nervous (P.I.E.) and the Amorphous (P.I.N.).

These are two highly interesting types, displaying many peculiar behaviour patterns, and, as we shall see later, playing a most important part in the determination of at least one other Temperament system (Kretschmer's). Whatever is positive in these types is often of a socially non-valuable nature; the disadvantages of Primary Function and of Emotionality, especially where these are combined, will be found without the correcting influence of Activity. The Emotional drive especially is vented without any "braking" at all. Inactivity, weakness of volitional process, will readily become fatal to these types, marked by an extensive conscious field, ready and impulsive reaction, and very imperfectly controlled and modified primitive drives.

These considerations are immediately borne out by the frequency with which Alternation of Mood is displayed, especially by the more Emotional of the two Types (51.5%-37%-23.5%). Once an Emotional explosion has taken place, Primary Function insures that there is no rankling after

effect.....

effect; the Nervous are not the people for feuds and vendettas. For those one must look among the Passionate. Hence normality and disequilibrium alternate frequently. For the rest, both types are more often cheerful than depressed or even of mood, but yet remain below the average (36%(N)-38%-45.5%). Similarly, they are least Good Humoured of all types (36%-55%-64%). In this respect, therefore, as in many to follow, the Nervous are the most unattractive type. They are irritable (28%-10.5%) and easily offended (38.5%-18.5%) to a maximal extent, much more so than the Amorphous (13.5%) and (24%). Emotionality manifests itself in this type in a kind of hyperaesthesia. The name "Nervous" characterises it very well. They are exceptionally susceptible to affective expressions on motivations, stimulations, of the moment. The integration of the Sentimental is wanting and anything and everything could arouse an emotional discharge. They are less depressed and pessimistic than the two Secondary Inactive types, but still exceed the average for this quality substantially (33.5%(N)-40%-27.5%).

The Nervous, least of all types controlled in their affective reactions, most prone to satisfy organic, instinctive drives - partly because a sudden motive can occupy the whole of their conscious field, without other and better ones having a chance to assert themselves - extremely egocentric, are everywhere at the peak of the Socially undesirable behaviour qualities. They are prone to temper (76%-41%) are very headstrong (45.5%-20%), maximally rude (13.5%-3%) and inclined to sulk after a scolding (49.5%-22.5%). In respect of anger, they just surpass the Choleric (26.5%-23%-10%), while they are less

inclined.....

inclined to argue than the two active Primary types (14.5%-19%-9.5%) They equal the Secondary Active type in a tendency to cry (21.5%(N)-20%-12.5%) and to be discouraged (26.5%-26%-17.5%). Emotional failings of all types are theirs to a greater or lesser extent. They are extremely nervous at examinations (52%-34%) in spite of their lack of interest in scholastic work. They are second only to the Choleric for getting into trouble and scrapes (45.5%-54%-22%), though they are probably less often ringleaders in this respect than the Active type.

They outclass the Amorphous for enthusiasm, in which they remain above the average (44%-3%-31.5%). We shall find much less of the aggressive behaviour pattern in the Amorphous, but at the same time a much greater negativism, and very little of the balanced, controlled, positive qualities so prevalent among the Phlegmatic. In respect of Temper and Headstrongness they are only just over the average (48.5%-41%) and (27.5%-20%). Crying, rudeness and arguing are again only averagely shown (10.5%-12.5%), (3%-3%), (11.5%-9.5%) They sulk much less than the Nervous, but remain considerably above average (42%-60%-26.5%). They do not exceed the average for getting into trouble (23%-22%), but rather than be well behaved (35%-59.5%), they become apathetic (47.5%-20%). This slide towards the indifferent is pronounced. They are hardly ever enthusiastic, in which quality they are strongly contrasted with the Nervous (3%-44%-31.5%), but are indifferent in the highest degree (87.5%-33.5%). Their negative nature emerges clearly when we compare them with the Phlegmatic for reserve in expression of appreciation: (11.5%-57.5%-34.5%).

This difference between positive and negative qualities

which.....

which superficially have something in common cannot be sufficiently stressed, for we shall later show that failure to appreciate it fully has led the Kretschmer typology into false channels. In respect of the venting of anger, they remain far below average (3%-10%), are less than averagely discouraged after an error (14%-17.5%), but again maximally indifferent (77%-28%). They share with the Apathetic the distinction of being most indifferent in manner (36%-37%-17%). They are less often rude and insolent than the Nervous (11.5%-24%-8%).

The overwhelming weakness of both types alike lies in their fitfulness of work, and lack of application (73.5%-73.5%-41.5%), their laziness (17.5%(N)-27.5%-8.5%) their distractibility (60%-60%-27%) and general inattention to lessons (26.5%(N)-40%-14.5%). They are to a minimal extent regularly attentive (5.5%-9.5%-57%).

For immediate loss of attention at end of lesson, the Amorphous are most outstanding (81%-38.5%), the Nervous second (69.5%). In all these qualities they differ very largely indeed from the Secondary Inactive types. They are also inclined strongly towards restlessness and mobility, the Nervous more so than the Amorphous (73.5%-45.5%-39%). It is clear that this mobility has no affinity with Activity at all; is in fact nothing but a hyperaesthesia. The Nervous are also second only to the Choleric in Impulsiveness (73.5%-82%-37%), while the Amorphous are too negative, too much lacking in all organic drive to rise above the average (37%-37%). Again, not even in the mobile Nervous, is there a time speed factor (volitionally determined) for both types are far below average in quickness of reply (36%-11.5%-48%). The complete lack of volitional drive, of Activity as we have understood it, is striking in both types. They are maximally inclined to

dawdle.....

dawdle (80%-95%-38.5%) have no determination (2.5%-4%-42%) and do not even trouble to ask help in a difficulty (14.5%-15%-21%). It is no wonder that their accuracy (6.5%-11.5%-56%) ability to form own opinion (17.5%-14.5%-48%) and clearness and conciseness of memory (8%-11.5%-53%) are negligible. Both types are less than averagely constant in friendship (42.5%-47.5%-64.5%) and are inclined to be critical, rather than idealising, especially so the Nervous (58.5%-37%-33.5%).

With this Temperamental equipment, it is no wonder that these types achieve very little effectiveness, that behaviour problems and delinquency are rife among them; especially among the nervous, who are liable to clash seriously with their environment on account of their uncontrolled emotional reactions, and lack of volitional activity. The amorphous are less frequently brought into action; the absence of all strong drives makes such action less often of an anti-social nature.

A large number of elucidating sketches has been collected, of which the following are a selection:

Nervous.

"A peculiar boy. It is difficult to interest him in his work. He is very inattentive, day dreams, and avoids work. He cries easily when reproved. Sometimes he seems stupid, but when made to work he can do it."

"This child certainly needs special training. She is far below the most backward child and I have to teach her individually. If she did not have individual attention she would never do anything. I have the greatest difficulty in making her form her letters when she writes."

"Shy, weak, and sensitive, yet good character. Intellectually not very bright, but has a good deal deal of determination."

"Rather a .....

"Rather a nervous, temperamental child. Is not very interested in her work, but draws very well, and is light and sprightly and a good dancer. I think very imaginative and rather credulous". (Heymans found Imagination an outstanding characteristic of the type. Artists, Actors, Writers are commonly found among them.)

Amorphous.

"Is stupid at his work, draws very well, writes well, does handwork well. Helps at home with farm animals and can be trusted to do things. He is slow and moody. Sometimes seems much brighter than other times. Has a bad reputation with the staff except me. Used to play truant almost every day last year, but this year has been good. He does not care about punishment, and has little fear of principal, but a kind word or a joke does a lot. Has a sort of lag - will go back and ask questions you have already dismissed. Very willing to help. Looks strong and healthy, but I think at times half starved. Sometimes has very vacant expression on face. Very moody."

"Although very troublesome not unlikeable and not without certain good traits. Plays truant very often and to get out of scrapes will lie most blatantly."

"Very mediocre in his work. Lacks initiative, imagination and grit. Cries if scolded much. Gives very stupid answers to questions and does a good deal of work by copying if he gets the chance. Does things behind my back, but is too unnoticeable and unobtrusive to worry me much."

"Is not very intelligent, but good at sport. She is rather dreamy, slow, but sweet-tempered. She never makes her presence felt and does not shoulder responsibility well. She lacks enthusiasm over her work, probably because.....

cause she is not clever, but is enthusiastic over sport."

"A very quiet, lifeless sort of individual. It is difficult to interest him in things. Does not care for sport. Hangs about the station generally and is always dreaming. Can talk if he is really interested. Is not responsible, not nervous, and I should say not emotional."

"A very deep youth, not demonstrative. It is difficult to guess what he really thinks of one. Has a good deal of obstinacy in his make up. With a slack teacher would neglect his work to his heart's content."

"Painfully slow of thought. Very 'heavy in hand' to teach. His ground work very poor. Can recite multiplication tables parrot fashion, but when asked for 7 x 6 has to stop and think."

In the sketches, submitted for all the eight types, marked individuality, considerable variation within each type could be observed. None the less, they formed in each case a characteristic group; the various patterns could easily be traced back to the particular combination of variables concerned. In the light of fundamental knowledge on the composition of each temperamental pattern, superficial external resemblance can be understood, and no mistake will be made in the assessment of the personality, in the correct valuation of motives and of behaviour, and, what is more important, in the correct prediction of future activity under wholly different circumstances.

We must once more reiterate that much depends on <u>the extent to which</u> an individual is Active or Inactive, Emotional or Non Emotional, Secondary or Primary Functioning. The final combination, to some extent acted upon by environment, must be understood in this light.

CHAPTER VI.

I. Age Differences.
II. Sex Differences.
III. Environment.

The preceding chapter traced the theoretic behaviour patterns displayed by the types on the basis of variable ratios. In actual practice, a number of further factors have to be considered. Does the type change with the years, i.e. does an individual's variable ratio alter? Does the incidence of types differ as between the sexes? If so, are these differences fundamental or due to environment? To what extent can be the behaviour patterns, corresponding to a variable ratio, be modified under environmental influences? If alteration is observable, is it merely the pattern which is altered, or are changes possible in the actual ratio, i.e. in the strength of the variables themselves? These questions are very far-reaching, and involve the fundamental nature of Temperament: to what extent is it fixed and unalterable, to what extent the product of environment? Our material is inadequate to deal fully with these problems, but we shall discuss such evidence as we have.

I. Age Differences.

Age was by no means always given to the nearest month. The averages are therefore only approximate.

	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.
Age in years & 10ths of a year	12.3	12.8	12.8	13.4	13.	12.8	13.2	13.1

The differences are small and seem to be quite random. Within a certain range, age does not favour any particular type. To what extent, however, changes might take place outside the age span which we have taken is uncertain. The range in our group is from 8 to 16. Hugo's group is from 12-18, and as we shall show later his distribution is substantially the same as ours. Hence we might say that from 8 to 18, age

plays.....

plays no determining part in Temperament. As Heymans' distribution of types is somewhat different (See Chapter VII.) other factors may become operative later on, not necessarily truly Temperamental, but possibly environmental. It is very likely, however, that the Temperamental substratum remains the same in each individual, but becomes more blurred, overlaid with Personality qualities, less easily assessed against an objective background and hence less often correctly classified.

Emotional complexes, arising in the course of years, may also have a very disturbing effect. The psycho-analytic point of view is that such complexes are capable of completely altering the Temperamental make-up of an individual. We shall see, however, that certain types are more liable to these disturbances than others. The study of the origin and effect of such complexes, belongs perhaps more to the realm of Personality, or to the influence of Environment.

Heymans devotes a section to the relationship between age and strength of variables.[1] He finds Secondary Function weak in childhood, ever increasing to old age. Children approximate to the choleric type, but in adolescence they develop a bias towards the nervous. His are, however, only very general observations, and no clear distinction is drawn between changes purely due to age, and changes due to the changing environment from childhood to old age. Further data on age differences between adults may be found in an article in the Zeitschrift für Psychologie, Band 45.

For our purpose, however, it has been sufficient to show that age played no part in the determination of Temperament Types in our sample.

II. Sex Differences.

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1. Heymans, Inleiding (op.cit.) pp. 145-170.

II. Sex Differences.

Tables XI. and XII. illustrate Sex differences between the types, and between the variables separately.

Table XI.

Sex Differences between Variables.

Variable	% Males	% Females	% Diff.	P.E.
Secondary	43.6	56.5	-12.9	.042
Active	60.3	66.2	- 5.9	.037
Emotional	46.4	49.	- 2.6	-
Cases	418	227		

Table XII.

Sex Differences between Types.

Type	% Males	% Females	% Diff.	P.E.
Passionate	14.8	18.1	- 3.3	-
Phlegmatic	19.9	26.9	- 7.	.035
Choleric	17.9	17.2	+ .7	-
Sanguine	7.7	4.	+ 3.7	.019
Sentimental	2.2	2.2	---	-
Apathetic	6.7	9.3	- 2.6	.023
Nervous	11.5	11.5	-	-
Amorphous	19.4	11.	+ 8.4	.028
Cases	418	227		

These figures show the girls to be more often Secondary Functioning than the boys. The difference is more than three times its P.E. They also tend to be more Active, while the Emotionality difference is not significant.

In his adult group, Heymans found no quantitative differences in respect of Function between the sexes. There is a qualitative difference. In women, Secondary Function is more evident in some cognitive processes than in others, and these processes are not those in which it is most

evident ....

evident in the male. This is due to the influence of Emotionality which Heymans finds characteristic of women. In his large group, he found that 60% of the women and 46% of the men were Emotional, 26% and 39% respectively being Non-Emotional. A control experiment, where the rating was done by women, yielded the following results; Emotional, Men 49%, women 71%, Non Emotional Men 40%, Women 20%. According to Heymans, Secondary Function in women is most clearly and strongly revealed in affective behaviour. Moods, emotionally toned ideas, will perseverate and influence new stimulation from the unconscious. Emotional motives and the subsequent reactions will be most clearly subject to the Function patterns. It pervades their whole being to a smaller extent and is more unequal in its influence than in males. The same, however, applies to Primary Function, and taken all round, women are not more or less often Secondary Functioning than men. Finally he finds women more active than men,[1.]

It is strange that our results so completely fail to corroborate these findings except, slightly, in respect of Activity. How can we account for this? In our data, we did not examine the incidence of certain of the emotional qualities in sex groups. Heymans makes much of the following, obtained from the Dutch school enquiry.

	Boys	Girls
Irritable	10%	11%
Quickly offended	12	14
Angry when teased	14	16
Cry after scolding	9	16
Sulk " "	8	10
Indifferent "	17	11
Discouraged after error	12	14
Nervous during exam.	22	29
Cordial in relations with schoolfellows	23	37
Cool " " "	14	12
Definite in speech	26	32
Demonstrative	15	20
Even of mood	48	39
Enthusiastic	7	10

It is ....

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1. Heymans Inleiding, Part II. pp. 65-144.
" "Die Psychologie der Frauen," Heidelberg 1910, 1924.
" (with Wiersma) Zeitschrift fur Psychologie Bd. 45. and 46.

It is very difficult to say how far some of these results are merely due to environment, in its fullest sense, how far they are fundamental. Certain forms of behaviour will, from the earliest, be taught and considered as correct in girls, shameful and unmanly in boys. Girls are taught, and expected to effuse over things, to be demonstrative, womanly, a little helpless. The girl knows very soon that certain forms of behaviour are expected from her, and that she has to conform, unless she does not mind running the risk of being found less attractive. Comparing the business girl of today with the women of a century ago, the difference is already striking. It is not easy to say what is fundamental, what merely acquired in the female behaviour pattern.

The selection for Emotionality in our Questionnaire was made less on the superficial and environmentally determined, more on the fundamental forms of Emotional reaction, such as Enthusiasm, Anger, Discouragement, Reserve, Indifference, which as criteria were all considerably weighted. Nervousness, crying and sulking, of which the first two, are through a host of circumstances, less likely to be evident in school among boys, received but 1 point each.

If such and similar questions, omitted by us, are used as criteria and given the same diagnostic value as the more fundamental criterion qualities, girls will be more often classified as emotional than boys, although there might be no difference in the strength of the underlying drive, only in the manner in which it has become conditioned. The greater soundness of our criteria would explain the absence of emotionality differences between our boys and girls in Table XI. It is extremely difficult however to come to a definite conclusion on this point. Havelock Ellis states that women are subject to a greater physiological affectability but that there is "reason to believe that affectability may by training be decreased." "That there is however a limit to this sexual equalisation remains extremely probable."

"Affectability .....

"Affectability in women may be reduced to finer and more delicate shades; it can scarcely be brought to the male standard."[1]

Even if women should prove to be fundamentally more emotional than men, yet due care will have to be exercised, in assessing women and girls on a temperamental scale, to measure the intensity of the emotional drive, and not to be misled by purely conventional forms of expression which may, or may not be emotionally determined.

Regarding the very definite difference we found between the two groups in respect of Secondary Function, we find Heymans is very non-committal on the subject. The criteria which he used in his adult enquiry for Secondary and Primary Function nearly all involved a considerable Emotional element; in some Emotionality would favour the Secondary pole, in some the Primary. (They are questions about duration of anger after quarrel, sadness after a loss, attachment to old memories, inconstancy of affection, stubbornness or open mindedness etc.) Consequently if his contention that women are more Emotional holds, than a woman only moderately Secondary Functioning, might easily come to be classified as Primary Functioning, through a tendency of crediting her with the emotional element contained in the Primary criteria. Our criteria were more general, more purely diagnostic and objective, and an unevenly manifested Function - due to the distorting effect of another variable, - would be much less likely to be misinterpreted on them. Hugo offers no information on the point.

Further work on this problem is highly necessary before one could make an authoritative decision, but, in view of the much greater diagnostic value of the criteria in the school enquiry in general, and in this research in particular, it may be taken as established that, among children at any rate, the Girls are more often Secondary Functioning than the boys.

We see ....

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1. Havelock Ellis. "Man and Woman." pp. 297-315.

We see from Table XII. that boys are significantly more often Amorphous (P.I.N.) than girls (3 x P.E.), and display a tendency to be more often Sanguine (P.A.N.) (2 x P.E.). On the other hand there is a tendency for the girls to be more Phlegmatic (S.A.N.) (2 x P.E.). Especially the latter result is rather surprising, but follows from the foregoing discussion.

Around the median age of our group, girls are usually much more developed and mature, physically and in respect of personality, than boys. The earlier onset of puberty, the increased and altered metabolism may have 'tuned up' a a number of borderline cases sufficiently for a more favourable classification. Probably the Emotionality variable has an increased function at the time. It may be remembered that Heymans found a temporary bias towards the nervous type at the time. The lesser incidence of the very negative Amorphous type among the girls may be due to this. It is possible that on reaching adult stage, some girls, now otherwise classified, will revert to, or become, Amorphous or Apathetic, more likely the latter. Yet owing to the greater Activity of women of all ages, the gap, if narrowed at all, will never be quite bridged. It is also extremely interesting to note that there are no sex differences between the Choleric, Nervous and Sentimental types. The result in respect of the last two types is again contrary to popularly accepted opinion. There are far too few cases in the Sentimental group to base any reliance on the result, but a sufficient number in the Nervous category. Fruitful work could still be done on this problem.

On the basis of our data, we can detect no difference in respect of Emotionality between boys and girls. Until further evidence is forthcoming, we cannot say whether the difference observed by other investigators is apparent, and acquired

or whether .....

or whether is is fundamental. So far, the bulk of the evidence is in favour of the latter view.

III. Environment.

Throughout we have had to make certain assumptions regarding the influence of Environment on Temperamental types. We have to ask ourselves to what extent fundamental behaviour patterns can be modified by environmental influences, and whether such alteration is merely in the pattern through different conditioning of responses or whether the strength of the variables themselves is altered.

The investigation of this problem is particularly difficult.

Environment is a term which covers a multitude of distinct processes. Even when one has divided the community into groups according to social standing, or according to locality (town, country, industrial, agricultural) any number of important variations are possible within each. In a poor group one gets homes with a cheerful, healthy atmosphere, hard working, honest parents, who give their children the best attention and education within their means. In other homes the children are neglected, underfed, parents quarrel; there is drunkenness or other vice. Children are ill clad. Many are sent into the streets to sell newspapers, or they have to work hard in the house. Sometimes there are huge families, unemployment, total lack of cultural atmosphere; or laziness and indolence as examples.

Similarly children at superior schools often come from very mixed environments. In some cases they come from simple homes, where, by dint of hard work and self denial, parents manage to send them to a good school. Cultural background, home atmosphere, intellectual, moral guidance may differ very widely. There is the all important question of method of Education. Are the children repressed or uninhibited? What is the religious and ethical outlook of parents? In what relation do they stand to their children? It is clear that,

in order ....

in order to get an accurate measure of the interrelation of Temperament and Environment, detailed study of large numbers of individual cases is necessary. There are, of course, certain all round, average differences between obviously distinct groups; one can assume that certain environmental factors will more often occur in one group than in another.

It may be possible thus to arrive at some very general conclusions concerning the Temperament - Environment interrelation. Nothing more could be attempted in the present research.

Our group of subjects was deliberately selected from widely divergent and socially distinct classes of the community, in order to make this general investigation possible, without applying any special measurement, or making a detailed study of environmental factors.

Nevertheless some attempt at establishing qualitative differences was made. The Pressey X-O Tests and a re-arrangement of the Woodworth Personal Data Sheet was given to all children above the age of ten years. It was our intention to work out criteria for each school or larger group, and sex and age groups within these. How did these groups differ in what they liked, feared, or thought wrong most? In the Woodworth test, what type of Affective response, unadjusted reaction, Emotional Complex etc. was favoured by what environment?

If differences could be shown to exist, it might be possible to determine the qualitative nature of some of the forces at work in the various environments. This attempt was, for various reasons, not successful. Groups became extremely small, when split up for age and sex. Even adding several fairly similar environmental groups together did not mend matters much. No suitable method of measuring the reliability and significance of the differences could be found.

We considered it not worth spending much time and labour on such ....

on such unsatisfactory material. It remained always uncertain whether such differences as might be established would throw much light on the environmental problem, and there was no previous work to guide us on this point. Instead, therefore, we contented ourselves with attempting to discover a general quantitative difference between a few obviously divergent groups. This could not yield much elucidating information. All it could do was to show that there was some justification for our broad Environmental differentiation. Regardless of age and sex, mean Affectivity Scores on the Woodworth test were calculated. (the Affectivity Score is the number of affective responses a subject gives; e.g., the answer "yes" to the question "Are you afraid in the dark?" or "Did you ever run away from home?" is an affective response. The affectivity score gives an indication of the individuals adaptation to his surroundings, his Emotional Balance and adjustment). The P.E. of each mean was found. They were then compared, and the P.E. of the differences calculated.

Age and Sex were disregarded in order to make the groups sufficiently large. As to age, we had found it of minor importance; the average Affectivity score was sometimes higher for a young group, sometimes for an old group. More important is the Sex factor. In two of our groups, where boys and girls were about evenly divided, we calculated the P.E. of the difference between the respective mean Affectivity scores.

	Mean Boys	Mean Girls	Diff.	P.E. Diff.
Dumbarton Ac.	14	19.2	5.2	1.7
Marsh Memorial Homes Sch.	16.9	15.9	1.	.96

In the first case, the mean score of the girls is higher than that of the boys, in the second case, the reverse holds. Although the difference in the Dumbarton Group is 3 x P.E. it is not conclusively significant, and it is doubtful whether any large error was introduced by our massing the sexes together.

Table XIII....

Table XIII.

Significance of Differences between Environmental Groups in respect of Woodworth Affectivity Score.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
I. Superior Town Schools	-	0	2.9	2.2	1.7	13.4	6.5	15.7
II. Good Country "	0	-	2.7	2.2	1.4	13.5	6.6	16.9
III. do. South African	2.9	2.7	-	1.2	1.3	7.	4.	9.
IV. Mixed Country Schools	2.2	2.2	1.2	-	0	11.3	5.3	14.2
V. Poor Town "	1.7	1.4	1.3	0	-	8.	4.2	9.6
VI. do. South African	13.4	13.5	7.	11.3	8	-	2.6	1.6
VII. S.African Institutions	6.5	6.6	4.	5.3	4.2	2.6	-	3.8
VIII. Industrial School	15.7	16.9	9	14.2	9.6	1.6	3.8	-

The figures in this table indicate the ratios of differences between groups to their P.E.

As we go down the environmental scale, affectivity increases, to culminate in the delinquent Industrial School Group. Very roughly, we can take the Poor South African Group and the Institutional groups as belonging together. Nevertheless even the Institutional groups are by no means similar. In the case of the South African Institutions we are dealing with destitute and orphan children, with a fairly poor early background, but a comfortable and sheltered life in the orphanage, in some cases from a very tender age. The delinquents are drawn from the very worst type of environment, in which they never had any chance whatever. Sufficient food, health, guidance, or education never came their way.

Among the not significantly different groups we are surprised to find a very poor Scottish Group, the non-qualifying pupils from Dumbarton Academy. From information supplied by teachers we gathered that many of these children run errands, sell newspapers, have extremely poor homes and often have to work hard in the household. Yet they stand closer to the two best groups than any of the others, in respect of this test. How to account for this?

We saw in a previous section that only 46% of them are Active, as many as 61% Secondary Functioning and the exceptional number of 72.8% Non Emotional.

In the ....

In the Industrial School, on the other hand, 38.4% are Active, only 23.3% Secondary Functioning, and 53.4% Non Emotional. (In both case doubtful Actives were transferred to the Inactive side). In this particular case, therefore, a very low affectivity goes with little Emotionality and high Secondary Function, high affectivity with moderate Emotionality and high Primary Function. In the one case we get intellectual apathy, in the other delinquency.

Yet both groups have very poor circumstances in common. It seems therefore that environment has merely exaggerated existing temperamental pre-dispositions. The two instinctive drives Activity and Emotionality are of lower than average intensity, probably due to under nourishment and poor stock. With the Secondary Mechanism this gives general apathy. There are no counteracting, formative influences in the home, attempts to interest the child, stimulate it, try to arouse whatever enthusiasm it has, or guide its deficient volitional force into some channel. With the Primary mechanism, and a slightly higher Emotionality, a characteristic nervous hyperaesthesia develops; there are numerous affective complexes, and the individual is generally Unbalanced, restless, impulsive. On account of the absence of Activity, there is no direction to the Emotional discharge. Again all formative and guiding influence is lacking. Ethical principles are hardly inculcated; no attempt is made to develop some more permanent interest, to reinforce certain social habits. On the contrary, owing to general neglect, roaming about on streets, restlessness, distractability and impulsiveness can run riot. Hunger and want are often intense drives towards theft. We have seen before that in the Primary types, counteracting and more ethical motives are frequently unable to assert themselves in the face of an urgent drive to immediate action in pursuit of some gratification. In these cases, such motives do not even exist, have never been taught, and so this type of environment

favours .....

favours the development of delinquency. In the case of the Dumbarton group, we are dealing with the Apathetic end of a curve of distribution, unfavourable for the formation of Emotional Complexes. The Industrial School group lies at the Nervous end of the curve, where the material and occasion for the genesis of complexes is rife. With favourable treatment and training, good feeding and guidance these two groups would have been considerably less bunched at the opposite extremes of the Temperamental curve. Not only would metabolic processes and stock probably have been better, but the right habit formation and compensating treatment would have counteracted the negative and undesirable tendencies of the types. The reason why we find the Apathetic group exclusively in one of our poor environments, is due to selection. The Dumbarton group was a Non-qualifying group, selected through inability to pass the qualifying examination to the Secondary Department of the school. The Delinquent group was also a highly selected one. It is indeed proof of the usefulness of the typology that these types are found in an environment where we should theoretically expect them.

So far we cannot conclude more than that a poor environment tends to produce poorer Temperamental forms, or rather that extremes of the less valuable Temperamental Types are found with more than average frequency in the poorer type of Environment, and that they develop there characteristic behaviour patterns, on the Type basis. Through low metabolism, the Activity Variable is much decreased in strength, the Emotionality variable to a lesser extent. Both Secondary and Primary Function reveal to a maximal extent their inherent disadvantages. There is a difference between the Dumbarton group and the superior groups, though not reflected quantitatively. In the one case, complexes are absent

because of ....

	Passion-ate.	Phleg-matic.	Choleric	Sanguine	Senti-mental	Apathet-ic	Nervous	Amor-phous.	
	S.A.E.	S.A.N.	P.A.E.	P.A.N.	S.I.E.	S.I.N.	P.I.E.	P.I.N.	T.
SCOTTISH.									
George Watson's School	2	5	2	2	1	1	2	8	23
Royal High School	7	2	5	1	2	-	1	5	23
Shawlands Academy	3	12	6	3	-	3	2	1	30
Douglas-Ewart High School	12	8	6	4	2	5	4	8	49
Stranraer High School	10	7	10	6	3	4	6	12	58
Whithorn School	8	18	6	4	1	4	6	3	50
Stranraer Academy	13	10	10	2	2	6	2	5	50
Vale of Leven Academy	4	5	5	1	1	1	2	-	19
Dumbarton Academy	-	24	9	1	-	12	7	6	60
Dr. Guthrie's School	5	10	14	10	1	2	14	17	73
SOUTH AFRICAN.									
Rondebosch Boys High School	5	6	6	-	-	-	4	4	25
South African College High School	3	6	3	-	-	1	1	6	20
Murzenberg Secondary School	13	11	11	4	-	6	4	13	62
Sydney Street Public School	6	11	10	1	-	2	8	7	45
Wesley Training College	3	6	5	1	-	1	1	4	21
Marsh Memorial Homes	5	2	5	1	1	-	7	4	25
St. George's Orphanage	4	1	1	-	-	1	3	3	13
Total	103	144	114	41	14	49	74	106	645
Dr. Hugo	553	825	164	172	322	498	537	867	3938

TABLE XIV.

Incidence of Types in all Groups.

because of the withered Emotional drive; in the other, because that drive has been suitably conditioned.

Table XIV. gives the distribution of types in all the groups tested. The doubtful Active cases have here not been transferred to the Inactive side.

The groups are much too small for any analytic treatment. Consequently they were brought under four headings: Best, Good, Poor, and Institution. Under 'Best' were included the three Scottish City and the South African High Schools groups. Under 'Good' were classified the Scottish Country Schools, Vale of Leven Academy and Muizenberg Secondary School, South Africa. All these are more mixed than the High Schools, yet on the whole, the pupils are drawn from good middle class homes, or the families of well-to-do tradesmen and farmers. The 'Poor' group contains Dumbarton Academy as well as the two South African poor schools. The three Institutions are grouped together under the last headings.

TABLE XV.

Percentage of Active, Emotional and Secondary Types in Chief Environmental divisions.

	Active	Def.Active	Emotional	Secondary Function.
Best	65.	60.8	45.8	48.4
Good	65.7	55.2	49.	53.5
Poor	61.8	55.6	39.6	52.3
Institution	52.3	42.3	54.	27.9

Once more, a 'purified' Active percentage is given, more indicative of the general level of Activity in the groups concerned. The Activity variable decreases considerably in strength as one gets down the environmental scale. The emotionality drive is weakest in the Poor Group. It is strongest in the Institution group. We have seen, however, that this group is outstanding for lack of Emotional adjustment, complexes, and nervousness. It contains 27.6% of all Nervous cases (P.I.E.) in the whole group, of

which it ...

which it only constitutes 17%. Emotionality, therefore expressed itself in this group in the form of a hyperaesthesia, and numerous ill-balanced reactions, rather than in intensity and strength, while it is also possible of course that it contains the Emotional Section of the poor group which has come to grief in its environment.

There is no difference between Good and Poor regarding Function. In view of all we have said regarding delinquency, the preponderantly Primary nature of the Institution group need hardly occasion surprise. Why this difference should also hold for the Cape Institutional types is difficult to explain. There may be a selective factor at work, relatives sending troublesome orphan children (which the Primary are inclined to be) to an Institution, rather than adopt them into their own families.

We have no explanation to offer for the fewer Secondary Functioning in the superior group. The difference is, however, fairly small.

The evidence on the question of Environmental interaction is consequently meagre. We incline towards the view that Environment can act in a causative manner, by producing a poor stock and feeble metabolism, determining in this way the frequency of Inactive and Non-Emotional Types. Thus it directly affects the strength of the Activity and Emotionality variables, and it may thus determine, or alter the variable-ratio. It acts in a modifying manner, firstly by influencing the course of Emotional responses, assisting in the genesis of complexes, repressions and maladjustment. Secondly by emphasising or toning down the attributes of the Function mechanisms, through success or failure to build up on each the correct habit formation.

We have no evidence that environment is capable of altering the Function of an individual radically. In view of the contentions of the psycho-analytic school we cannot exclude

the possibility ...

the possibility.

It must not be forgotten that only in respect of a few qualities do we get a hundred per cent. correlation. It follows that not necessarily every quality which on the average is correlated with a variable-ratio, is shown by an individual possessing that ratio. It is probably through these very normal discrepancies that environmental and Personality factors manifest themselves.

All these conclusions are tentative; to do justice to this most important problem, a good deal of detailed, individual work is highly necessary.

CHAPTER VII

TEMPERAMENT AND INTELLIGENCE.

The relationship between Intelligence and the variables and types is of paramount importance. For educational purposes it is highly essential to know, not only in what relation 'g' stands to Temperamental type, but also how Temperament favours, or detracts from the effectiveness of intelligence. There is the question of examination ability, ability to adjust to school routine, and hence to be successful in school achievement; there is finally the use one makes of one's intelligence in the general circumstances of life. All these depend to a very great extent on Temperamental factors.

By intelligence we mean here that general factor which Spearman has called "g", and which is a function of some "mental energy" postulated by him. Intellect on the other hand may be produced by an integration of concepts, a mass of acquired relations and interrelations, built up by means of "g" and some other factor such as Function. We have already seen that integration and building up of habit systems is favoured by Secondary Function. It is a well known fact that individuals of great intellectual distinction in one specific field can show lack of intelligent adaptation to other and general situations. Such excellence in one field should not then be mistaken for "g". It is merely a peculiar enhancement of "g". If Secondary Function should be the factor responsible, we have no difficulty in accounting for the concurrent phenomenon of a general intelligent adaptation out of keeping with the excellence displayed in the specific intellectual domain. Secondary Function can have a very narrowing effect. Actions become directed to one end only; stimulability outside the few motive integrations is decreased. The difficulty experienced in attending to such stimulation,

and.....

and in making any responses at all will be great, owing to the strong perseverative effect of the main motivation. Hence adaptation to this general stimulation will be poor, and approximate more to that which is habitual with the Primary and Secondary Inactives.

Hence Intellect and Intelligence may well prove to be different concepts; the same "g" in different people in combination with different Temperamental equipment, may lead to greater or lesser success in adjustment to environment. In the same environment, the same "g" may not be equally effective in Temperamentally different people. The very wide scope of this enquiry did not allow of detailed work on these important sub-problems, but sufficient was done to give a general idea of the relationships involved.

Throughout the analysis of the functions and correlations of the three variables, the Activity variable was found to be associated with Socially valuable qualities, leading to a highly efficient adaptation to environment; throughout we found Activity the greatest safeguard against undesirable behaviour qualities. Not only does Activity favour Cheerfulness, Optimism, Good Humour and Enthusiasm to a maximal extent, it is also the chief determinant in qualities leading to a general effectiveness, such as Accuracy, Ability to grasp a problem and form own opinions, and Ability to remember clearly and concisely.

One would expect a clear connection between this variable and Intelligence. Do we find this to be the case?

The following material is available for the investigation of this problem:

I. National Intelligence Test, Scale B, given to the Industrial School Group and form III., Royal High School.

II. Actual or approximate class positions, based on term examinations for major part of the year, for the majority

of.....

of the group.

III. In the three Scottish City High Schools, the same class was taken for Temperamental examination. This class contained pupils of approximately the same age, the median Intelligence being above that of other classes of the form.

IV. The Dumbarton group of children, all failing to qualify for entrance into the Secondary Department.

Owing to the very low standard of Intelligence in the Industrial school, an Intelligence test was used here, which, when applied to the Royal High School proved far too easy to give a normal scatter. The scores were left raw, being so high that I.Q.'s could not be calculated from the norms provided.

For one or two extremely high or extremely low scores in the Industrial group, an I.Q. was roughly estimated, only one case being dropped as obviously mentally deficient.

Where class positions were given, the average class position for each type was calculated. This of course gives no measure of intelligence, as Intelligence level in different schools varies considerably. But it does indicate which types, given certain intelligence levels, will be most efficient, within the limits set them. We therefore first ranked the types on the basis of average class position, for each class where these details were given, then worked out the average rankings, given in Column A, Table XVI; where no class positions were given, only approximations such as "excellent pupil", "middle of class", "below average", "near the top", etc., we worked out a detailed scale, again ranked the types according to position on this scale, for each class, and then found the average ranking, (Column B). To obtain a final ranking, given in Column C, we added these two together. The table therefore gives the average class and

examination.....

examination work efficiency of Temperamental types, relative to certain standards of Intelligence.

Table XVI.

Average Class and Examination work Efficiency of Temperamental Types.

Type	A Av. Class Pos.	B Rated Av. Cl. Pos.	C Grand Av.	Cases 498
Phlegmatic	2	3.9	5.9	120
Passionate	2.9	3.3	6.2	77
Choleric	3.1	5.	8.1	91
Sanguine	3.5	5.8	9.3	30
Apathetic	4.2	7.9	12.1	34
Nervous	6.1	7.1	13.2	57
Sentimental	4.3	9.	13.3	8
Amorphous	6.1	8.4	14.5	81

Table XVII.

Average Rank differences between bi-polar groups of each variable on Average Class position.

Groups	Av. Rank	Diff.	Cases 498
All Secondary Types	9.4		239
All Primary Types	11.3	1.9	259
All Active Types	7.4		318
All Inactive Types	13.3	5.9	180
All Emotional Types	10.2		233
All Non-Emotional	10.1	-.1	265

Table XVI. shows a decrease in scholastic success from the two Secondary Active types, through the closely following Primary Active types, via Apathetic, Nervous and Sentimental to the Amorphous.

The position of the Sentimental is uncertain, as again there are too few cases in this group (8). Further the Phlegmatic and Passionate change places in the two rankings and the smallness of the average difference between them is proof of the approximate equivalence of the two types, with the scales very slightly in favour of the Phlegmatic.

Table XVII. allows of making a more exact analysis; the very large difference between the group of Active Types and

the group.....

the group of Inactive types once again shows that Activity is the determining factor in scholastic success and in relative class efficiency. This result therefore bears out completely that of our analysis in Chapter IV. We have continually stressed that Function, where there was an apparent overlap in respect of qualities of general effectiveness, was merely a subsidiary factor, that the Secondary mechanism on the average tended to influence favourably, the Primary less favourably, the operation of the Activity Variable, and the results in Table XVII bear out the validity of this argument. For the Rank difference in Average Class position between the Secondary and Primary groups is much smaller than between the Active and Inactive groups (1.9-5.9), while such difference as exists is in favour of the Secondary Group. Again, the Secondary Inactive Non-Emotional Group makes a much better showing than the Primary Inactive Non-Emotional Group (12.1-14.5), which again supports our contention that where Activity is low, general effectiveness will yet be higher in the Secondary type than in the Primary.

Finally we found in Chapter IV. that the functioning of Emotionality was neutralised in respect of qualities of general effectiveness etc. We see in Table XVII. that there is no difference regarding Av. Class position between the Emotional and the Non-Emotional Group. <u>These figures are all in complete agreement with our findings on the functions of variables</u>.

The evidence we have regarding I.Q. of types is unsatisfactory. As already explained, we could only calculate the I.Q. of the Industrial School group, in which there is a low percentage of Actives, and many of those on the border line.

Table XVII.....

Table XVIII

Average I.Q. for bi-polar groupings of Variables.

Industrial School.

Type	Av. I.Q.	Diff.	No. of Cases.
All Secondary Types	97.3	+8.2	18
" Primary "	89.1		50
" Active	94.6	+6.8	38
" Inactive	87.8		32
" Emotional	90.1	-2	32
" Non-Emotional Types	92.1		38

The Active are again considerably superior in respect of I.Q. Table XVIII gives the largest difference, however, between Secondary and Primary Groups, +8.2. Also there is a difference between Emotional and Non-Emotional, -2, in favour of the latter. The group, however, is rather of an unusual nature. A very strong Primary Function, usually accompanied by Emotionality accounts for the presence of many of these boys in the Institution. We are dealing with extremes of the type.

Heymans and Brugmans[1] conducted a number of experiments in which, among other things, the relationship between Secondary Function and Intelligence was investigated. Secondary Function was measured by means of Colour Mixing, threshold for Flicker, Adaptation and Perseveration Tests; Intelligence by means of some rather primitive Intelligence Tests. The correlation was .15, but as data were obtained from only 15 cases, no reliance can be placed on this result.

Table XIX.....

1. Heymans and Brugmans. Zeitschrift fur Angewandte Psychologie Band 7 (1913).

Table. XIX.

Average Intelligence Test Scores for bi-polar groupings of Variables, Royal High School.

Variable	Scores	Diff	Age	Cases
All Secondary Types	158.5	3.9	15.2	11
" Primary "	154.6		15.5	12
" Active "	157.5	3.1	15.5	15
" Inactive "	154.4		15.1	8
" Emotional "	156	-1.3	15.3	15
" Non-Emotional Types	157.3		15.4	8

The Royal High School group is selected, up to a point, on the basis of superiority. Hence the differences between Active and Inactive, Secondary and Primary, are much smaller, but yet consistent in direction. Again Secondary Function is slightly more favourable towards a high I.Q. than Activity, but the difference is very small; these differences only acquire significance from the fact that they are all in the same direction as in Table XVIII.

Table XX.

Distribution of Types (bi-polar groupings) in groups of Selected High School Children and Non-Qualifying Pupils.

	H. Sch.	Diff.	Cases	N.Q.	Diff.	Cases	Entire Gr.	Diff.	Cases
All Secondary T.	50	0	(38)	61	+22.2	(36)	48	-4.1	(310)
All Primary T.	50		(38)	38.8		(23)	52.1		(335)
All Active T.	64.5	+28.9	(49)	46.7	-7.4	(27)	54.1	+8.1	(349)
All Inactive T.	35.6		(27)	54.1		(32)	46.		(296)
All Emotional T.	43.5	-13.1	(33)	27	-45.8	(16)	47.4	-5.3	(305)
All Non-Emotional T.	56.6		(43)	72.8		(43)	52.7		(340)

In Table XX. we have compared the groups known to be of vastly different average intelligence, namely the three selected Scottish High School Classes and the group failing to qualify.....

to qualify for the Secondary School. In addition, the incidence of types in the Total sample has been added for comparison. In all three groups we have transferred the doubtful Active cases - scoring zero for Activity yet on qualitative evidence included in the Active Group - to the Inactive side, so as to obtain purely Active Groups, in which the average strength of the variable is about identical. We should expect a greater number of Active cases in the High School group than in the N.Q. group, if a high I.Q. goes much more frequently with Activity than with Inactivity. As it happened, the batch of papers returned from one of these High Schools was the only one where there was some doubt as to the accuracy of the rating. There were a number of contradictions in the papers which differed radically from variations found in other groups. There was also an appreciably greater number of Inactive cases in this group than in the two other High School groups, notwithstanding the fact that this was the most superior of the schools visited. Yet we did not see sufficient grounds on which to reject the papers; to obviate criticisms, they were included.

But for this fact, the percentage difference between Active and Inactive types in the High School group would probably have been still larger than it is.

In the entire group of 645 cases, the Active outnumber the Inactive by 8.1%. The difference is 28.9% in the Superior High School Group, while the Inactives outnumber the Actives in the Non-Qualifying group by 7.4%. In the superior group there is no difference between Primary and Secondary, nor is the percentage of Secondary types here much larger than in the Total group. The large difference in the N.Q. group is peculiar; we have attempted to account for it in the Section

on environment. .....

on Environment. The Emotionality difference is in the same direction in all three groups, though very large in the N.Q. group.

The most characteristic and striking difference, however, occurs in respect of Activity; the high I.Q. group are considerably more Active than the general average, the low I.Q. group are considerably less Active. Again therefore there seems to be a connection between size of I.Q. and strength of the Activity Variable. The criticism might be advanced that teachers, when rating, attribute either consciously or unconsciously, certain good Temperamental qualities to children whom they knew to be intelligent; a clever pupil is easier to teach and hence might be more in favour and more highly thought of.

We have already discussed the unconscious "halo" effect, and found no grounds for suspecting that it had been operative in the selection of our types. Teachers were not asked to examine abstruse psychological qualities in their pupils and to report on these. They merely had to observe the everyday class behaviour of the child, its adaptations to the class routine. It is not unreasonable to expect from them a modicum of psychological insight into these forms of behaviour, with which through training and experience they are well qualified to deal. Through personal contact with many of those who assisted in the research, we gained the impression that an independent and reliable judgement was being exercised. A number of them had had a University training in Psychology. Furthermore only those cooperated who happened to be interested, which is a further safe-guarding factor. In discussing some of their pupils with me, they often revealed that they did not consider some children of the Phlegmatic type as attractive as the more

sunny and positive ....

sunny and positive choleric type. Yet undoubtedly the latter is on the average a less successful student, and inclined to be very troublesome in class. The poorer temperamental types are often treated with much sympathy and understanding. No further proof of this is necessary than the character sketches which we appended in Chapter V. Furthermore, a systematic error of this sort could never have created the characteristic and consequent differences and trends between the correlated qualities of variables, such as we have demonstrated and analysed in previous chapters. The criticism can therefore be safely dismissed.

We do, of course, find a boy in a superior group, classified as Inactive, and yet possessing a higher I.Q. than a boy in a poor group classified as Active. But after all, ours is a Temperamental distinction. Activity is not synonymous with intelligence. All we can say is "Other things being constant, a high I.Q. goes with strong Activity, a low I.Q. with weak Activity," or still more accurately: "The Active have more often a high I.Q. than the Inactive." Of the other factors which are to be "constant," environment is an all important one. A boy of very moderate activity in a poor group is in an entirely different prestige position in the class from a boy of moderate Activity in a superior class. In the first case there may be continuous tussles for a first place, with other equals, in the second case the bottom position in the class may be a foregone conclusion. This wholly different environmental setting may make all the difference in the respective forms of behaviour produced. And this is only one of a host of possible environmental factors.

We are unable to go here into a further discussion of the supposed part played by Secondary Function in producing

the behaviour we called intellectual as distinct from intelligent. We lack experimental data, although our figures show that Secondary Function favours to some extent greater excellence in School performance. We have been able to show sufficiently clearly that Temperament factors play an important part. We have specified that part in respect of Activity. We have offered a speculative hypothesis in respect of Secondary Function, which it may be worth following up.

We may summarise thus: Given a certain level of Intelligence, the Active are more likely to be scholastically eminent and effective than the Inactive, and within each group, the Secondary more than the Primary. It is also highly probable that the Active have more often a high I.Q. - have more 'g' - than the Inactive.

CHAPTER VIII

Distribution of Types in the Community.

Now that we have some idea as to the manner in which the Temperamental scheme is influenced by such important factors as Age, Sex, Intelligence and Environment, we can proceed with a consideration of the distribution of types in the Community as a whole.

Are there equal numbers of each type in a representative selection of the population, or are some types more common than others? If so, why should this be?

We have type distributions available from five sources:

1. Heymans and Wiersma's Biographic Material.
2. The large "Heredity" group of the same investigators.
3. Wiersma's Constitution group.
4. Hugo's School Group.
5. The school group of the present research.

Of these five, the first is too selected to be much use for the present purpose. The biographies studied were mostly those of famous writers, philosophers, statesmen etc., They are studies of genius, and their type distribution will necessarily be extreme. Nevertheless, valuable corroborative evidence can be provided by this somewhat small group (100 cases).

Most suitable for comparison will be the two school enquiries. These were conducted in different countries, on differently constituted groups, and in somewhat different ways. It would be strong evidence of universality if there should yet be a close resemblance between the two distributions. And if in the other two enquiries, on adults who were classified by means of an entirely different questionnaire, and by different raters, and who were most likely restricted to middle and upper classes of the community, a resemblance still distinctly emerges, then the strong evidence becomes as good as a proof.

Table XXl.

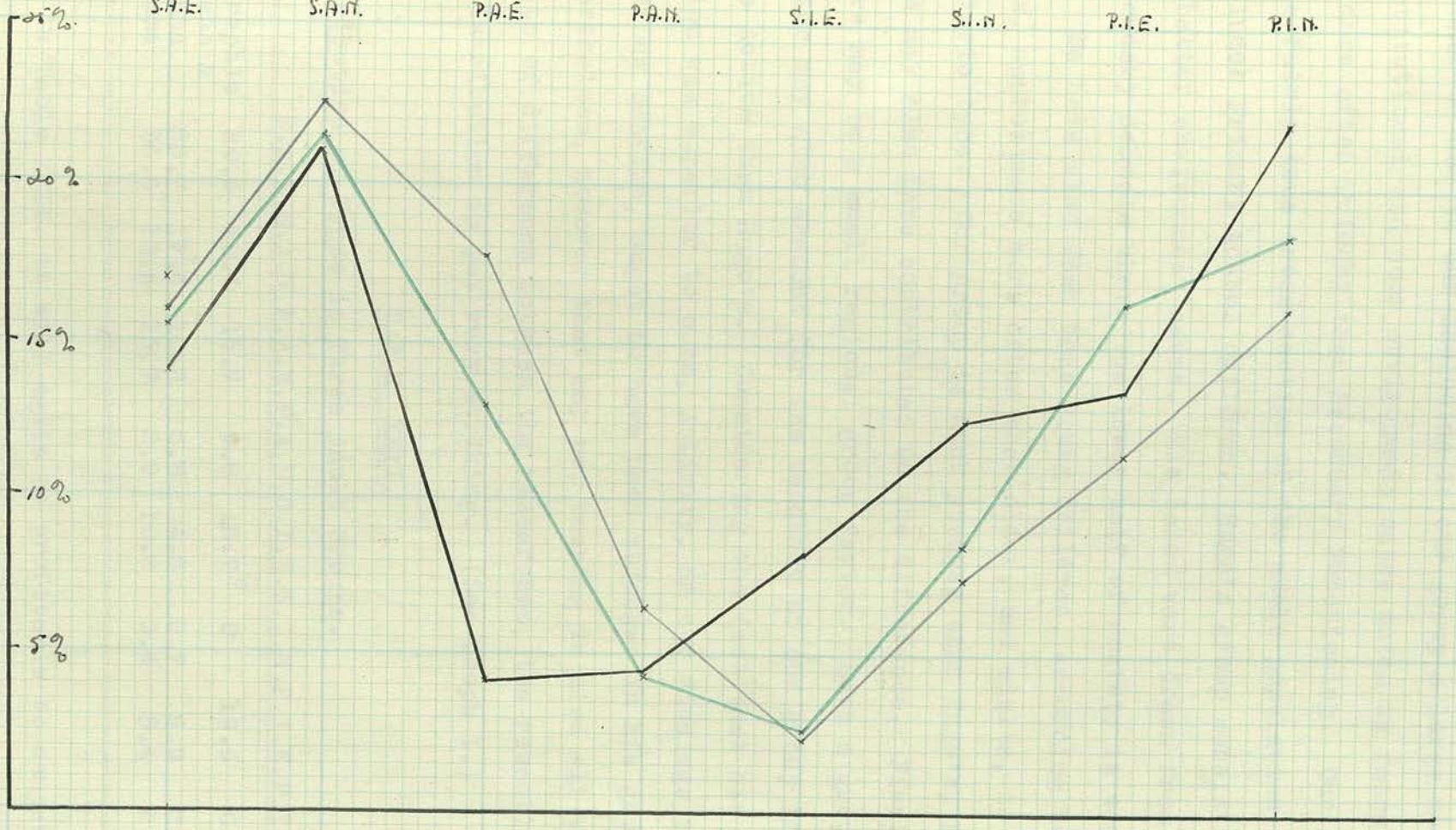
TABLE XXl.

Percentage Distribution of Types in the Present Research and the Heymans-Hugo Enquiry.

Cases	S.	A.E.	S.A.	N.P.	A.E.	P.A.	N.S	I.E.	S.I.	N.P.	I.E.	P.I.	N.
Present Research	645	16	22.3	17.7	6.5	2.2	7.6	11.5	16.3				
Modified	645	15.5	21.4	12.9	4.3	2.6	8.5	16.4	18.5				
Dr Hugo	3938	14.	21.	4.2	4.4	8.2	12.6	13.6	22.				
Maximum Diff.		+2	+1.3	+13.5	+2.1	-6	-5.	-2.1	-5.7				
Mimimum Diff.		+1.5	+ .4	+ 8.7	- .1	-5.6	-4.1	+2.8	-3.5				
P.E.Min Diff.		.039	-	.035	-	.043	.043	.046	.04				

In Table XXI. we have included a modified form of our distribution. It will be remembered that Hugo put into his Inactive group all those who scored zero on the Active - Inactive scale. We always attempted, by means of additional information, or little qualitative touches, to place such cases; but a number of very doubtful cases were in this way incorporated in the active group. In order to make the groups more comparable and neutralise this procedure factor, in our modified distribution all these doubtfully Active cases were transferred to the Inactive Group. This modified form shows indeed a striking resemblance with the Hugo distribution. In respect of the Passionate, Phlegmatic, Sanguine and Nervous Types, there are no appreciable differences. In the case of the Apathetic and Amorphous types, the differences are still less than their P.E; the difference in case of the Sentimental is more appreciable, but yet not significant. Even in our accepted distribution, most of these differences are negligible. The only serious discrepancy occurs in the choleric. It will again, be remembered that we weighted our Function criteria, in order not to prejudice the two Primary Active types, especially the Choleric. We are convinced that such prejudice

must have.....



GRAPH I

Type Distribution in School Enquiries

Present Research

Heyman. Hugo Enquiry

Present Research Modified

must have inevitably occurred by Hugo's method, and that a number of cases must have passed as slightly Secondary Functioning who were really Primary. This accounts also for the more striking and clear-cut way in which correlations were found with our purer types. Part of the difference may further be due to our including in our group a large number of institutional and poor environment cases which we found to be more often Primary than Secondary Functioning. Our group is a fairly true cross-section of the whole population, and includes Primary School children. Hugo's group consists mainly of better environment cases. His cases were drawn from the Secondary Schools where the lower half of society is weeded out.

We have also seen that young children, according to Heymans, approximate more often than older, and adults, to the Choleric type. Our group is much younger than Hugo's, and this may also have contributed to the difference. Finally, there may be a small regional group factor. Such a group factor may also account for the tendency of our group to be more Active than Hugo's. Considering the fact that his selection was superior to ours, Activity, on our findings in the previous section, ought to have been stronger in his group. Nevertheless, however that may be, bearing in mind all the points of difference between the researches, the resemblance in distribution is yet very striking. (See Graph 1.)

TABLE XXII.

Distribution of Types in Three Adult Groups.

	S.	A.E.	S.A.	N.P.	A.E.P.	A.N.S.	I.E.S.	I.N.P.	I.E.P.	I.N.	Cases
Biographic	20.6	20.6	15.7	9.8	13.7	0	19.6	0			100
Heymans & Wiersma	23.7	17.4	10.2	3.8	4.5	3.7	6.9	3.9			2500
Wiersma	36.6	18.6	15.7	3.9	10.6	3.4	8.4	2.9			415

In Table XXII. it will again be profitable to compare the last two researches, conducted in identical manner on identical groups. In the Heymans and Wiersma research, 26% of the cases

were not.....

GRAPH II

Two Adult Inquiries Distributions Compared.

Wiersma Adult Inquiry

Heyman-Wiersma Adult Inquiry

were not classified, being "doubtful"; in the Wiersma research all were selected one way or another. The four types Passionate, Choleric, Sentimental and Nervous, in the Wiersma distribution roughly exceed the corresponding groups in the combined distribution by 26%. These four are all Emotional types. In our section on the part played by Sex, we pointed out that the Heymans Function criteria had a strong bias towards Emotionally toned behaviour; we do not consider them very suitable, as confusion with the Emotional element contained in them makes it possible for a really Secondary Functioning person to be credited with some Primary criterion qualities, with subsequent difficulty of placing him either way. The fact that it is only the Emotional types which show an increase in the Wiersma distribution by an amount almost exactly equal to the number left out in the earlier research as unclassifiable, and spread over both Primary and Secondary types, suggests that this is a valid criticism. Again then, there is a remarkable correspondence between the two distributions, the discrepancies being caused by Emotional types, a number of which could not be definitely classified as either Secondary or Primary in the combined enquiry. Wiersma, in attempting to place the doubtful ones, which he too must have encountered on his faulty and inadequate criteria, probably erred on the side of the Passionate a little. Fundamentally, the two distributions are, however, identical. (Graph 2).

Outstanding in the Biographic material is the absence of both Apathetic and Amorphous. We have often demonstrated that these two types are extremely negative, being characterised by Indifference and a lower intelligence. They are not such as one would expect to find in the illustrious ranks of eminent people, who rise to outstanding biography level. On the other hand the peaks in respect of the Sentimental and Nervous are accounted for by the fact that artists and poets are very frequently found in these categories. There may also have been

a double.....

a double Selective factor operating; the Nervous and Sentimental, with the curious Emotional Complexes and feeling states which these types display, give a wide scope to the biographer. The stuff of biography is made partly of the oddities, whims, and eccentricities of the people described. And these are abundant in the Sentimental and Nervous. Secondly the investigators may have shown a preference for the Biography of these two types. For the rest, the Sanguine are better represented in this group than in any other; the remaining types occur in usual proportion.

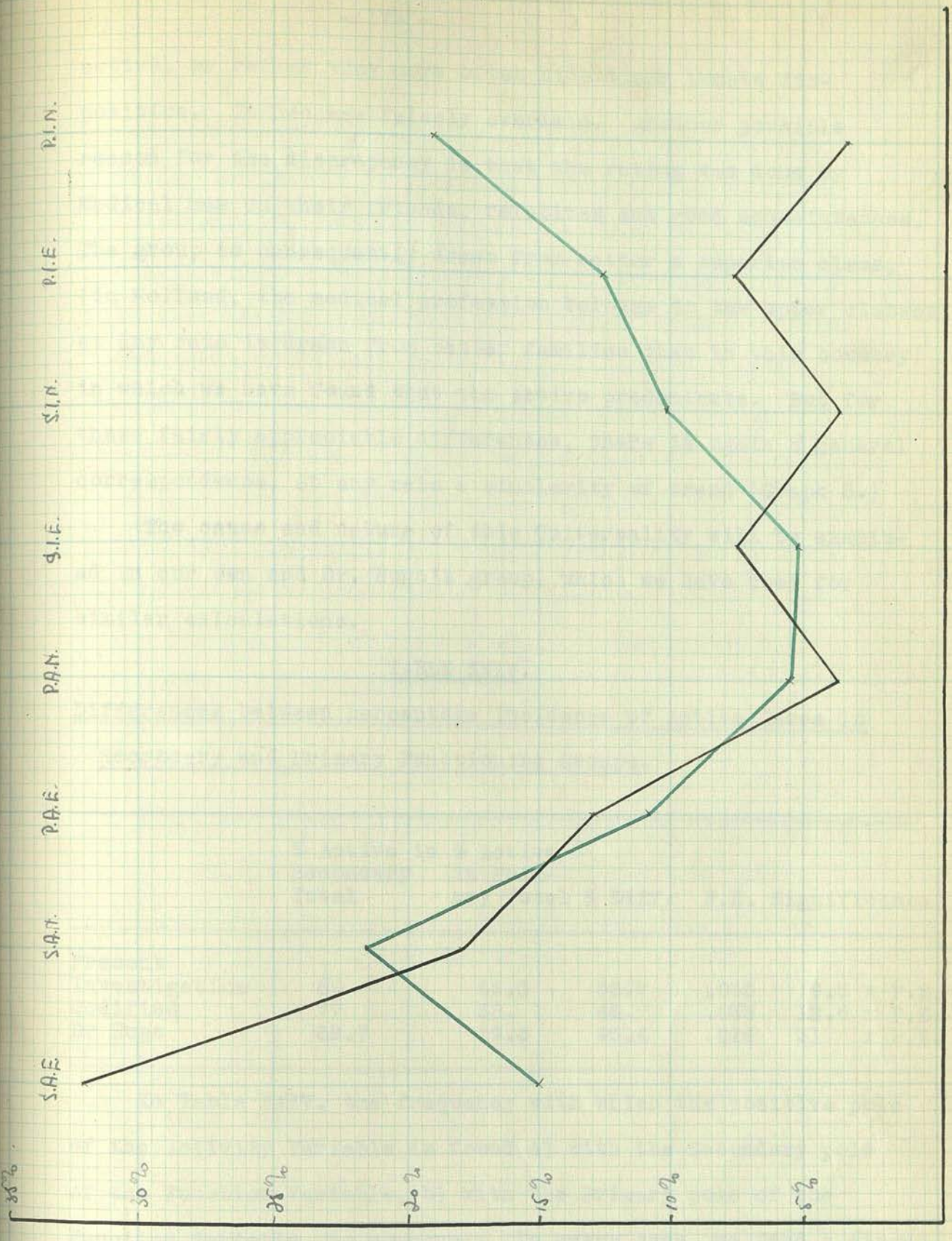
TABLE XXIII.

	S.	A.E.	S.A.	N.P.	A.E.P.	A.N.S.	I.E.S.	I.N.P.	I.E.P.	I.N.
Heyman & Wiersma	30.2	18.	13.	3.8	7.5	3.6	7.6	3.4		
School Enquiries	15.	21.6	10.9	5.5	5.2	10.1	12.5	19		

In Table XXIII. the average distribution of the adult group is compared with that of the school groups. There are appreciable differences in respect of the Passionate, Apathetic, Nervous and Amorphous. The difference in respect of the Passionate is probably larger than it ought to be owing to the unusually large percentage of that type in the small Wiersma group. For the rest, it is obvious that the adult group is much more Active. Within the adult group itself, made up of parents and adult children, Heymans found the parents more Active than their offspring.(1) It is possible that owing to the habit formation, routine and the necessity to earn their own living, the adults more often give the impression that they are

active ....

(1) Heymans and Wiersma. Zeitschrift für Psychologie Band 45.



GRAPH III

Comparison between Average Distributions of the Adult and School Enquiries.

——— Combined Heymans and Wiersma Enquiries

——— Combined School Enquiries

active, or rather they more often hide their innate disposition. It becomes falsely overlaid. Another possible reason for the discrepancy is that the rating was done by Medical men on their friends, relatives and good acquaintances. The group is consequently drawn from rather a superior class, (in Holland, the medical profession belongs to the upper classes; at any rate is drawn from better families than in this country) in which we have found that the Active predominate. But for these fairly appreciable differences, there is again a general correspondence, at any rate a similarity of trend (Graph 3.)

The cause and nature of this Universality will be examined in our own and Dr. Hugo's group, which we have used for similar calculations.

TABLE XXIV.

Differences between percentage Incidence of Active Cases in Secondary and Primary Functioning Groups.

	% Active in Secondary Total	% Active in Primary Total	% Diff.	P.E.	Significance.
Present Investigation	80	46.3	33.7	.035	9.5 x P.E.
Modified	77	33.	44.	.035	12.6 x P.E.
Dr Hugo	62.7	19.3	43.4	.014	31 x P.E.

In Table XXIV. the frequency with which the positive pole of the Activity Variable is found a) with the Secondary pole of the Function Variable, b) with the Primary pole of the Function Variable, is compared. In every case, we find a strong correlation between Secondary Function and Activity. In Hugo's group the difference is no less than 31 times its P.E.; in our modified group, when doubtful Active cases are transferred, a difference of 9.5 x P.E. becomes 12.6 x P.E.

We have explained in a previous chapter how, with the same strength of Activity in both cases a Secondary Functioning Individual is more likely to exhibit signs of directed action

than a.....

than a Primary Functioning one. It is very difficult to say whether it is this factor that accounts for the difference, or whether a lesser strength of Secondary Function goes with a weaker absolute Activity. It may be that those general metabolic factors which determine strength of the Activity Variable also play a part in determining the functioning of the nervous system. This leads us, however, into the realms of mere speculation. It is sufficient, for the present, to note the phenomenon, that the observable, effective Activity of the Primary Functioning is less than of the Secondary Functioning. The Secondary Functioning are more often Active than the Primary Functioning.

TABLE XXV.

Difference between percentage Incidence of Emotional types in Secondary and Primary Functioning Groups.

	% Emotional in Sec. Group	% Emotional in Pr. Group	Diff.	P.E.	Significance
Present Investigation	37.7	56.1	21.6	.039	5.5 x P.E.
Dr. Hugo	39.8	40.3	.5	-	-

Table XXV. shows the Emotional to predominate in the Primary Group, so that a correlation between Primary Function and Emotionality can be surmised. This difference is not observed in Hugo's material; Heymans, on the other hand, on the basis of his adult groups, makes a similar supposition.

Again it would be difficult to say whether it is merely the facilitating effect of Primary Function that causes the Primary to be classified as Emotional more often than the

Secondary.....

Secondary, or whether there is a fundamental physiological connection. In view of the absence of difference in Hugo's group, we incline towards the first alternative. Further experimental evidence is needed for the elucidation of these important issues.

TABLE XXVI.

Difference between percentage Incidence of Emotional Types in Active and Inactive Groups.

	% Emotional in Active Group	% Emotional in Inactive Group	% Diff.	P.E.	Significance
Present Investigation	54	36.2	17.8	.04	4.5 x P.E.
Modified Dr. Hugo	52.4	41.6	10.8	.039	2.8 x P.E.
	41.8	38.6	3.2	.017	2 x P.E.

As one might expect, in all three groups Emotionality is shown to go more often with Activity than with Inactivity. The significance of differences is not the same in the three cases. In Hugo's group it is only twice its P.E., but the trend is nevertheless there.

If the strength of the Activity Variable should depend on Metabolic Function, then more often than not, the Emotionality Variable reflects this strength. There is a tendency, at any rate.

Summing up, we find that the Active are more often Secondary Functioning, and more often Emotional than the Inactive; further that there is a tendency for the Primary to be more Emotional than the Secondary. It is this correlation between variables which accounts for the nature of the distribution of types in the Community.

Heymans.....

Heymans considered the supposition of a correlation between Secondary Function and Activity insufficient to account for his data. It does not explain the much greater frequency of Secondary Actives than of Primary Inactives. Hence he suggests that, in view of the undoubted value in the struggle for existence of both Secondary Function and Activity, the greater frequency of those two is due to Natural Selection, by which gradually the Inactives and Primary Functioning are eliminated. This, according to him, is in agreement with the fact that Primitive Races are Inactive and more Primary Functioning than Cultured Races.

In our group, the discrepancy between the numbers of Secondary Actives and Primary Inactives does not exist. It may be that Heyman's group, as we have already suggested, was not a fair sample of the population. Yet even then his theory would hold, for according to it we should find in the upper and more effective classes, a predominance of Secondary Actives, in the poorer and less effective classes a larger number of Primary Inactives, a result actually obtained by us. The implication follows that these people are in the lower strata of society <u>because</u> of their Temperament, and that of their parents, a temperament less effective and less valuable for adjustment to the demands of present day society. In our Section on Environment, we have taken the point of view that to some extent, though not altogether, these people are Temperamentally what they are <u>because</u> of Environment.

It is possible that the lesser powers of adaptation tend to place an individual so equipped into a slightly inferior environment, and that environmental factors

henceforth.....

henceforth reinforce the tendency to organic inferiority. This could happen in respect of the Active and Emotional drives, which are in part dependent upon the metabolic process, and that again on the quality of stock, health, food, etc.

It is impossible to say where the truth lies. But there is a problem here, as formidable as the Nature - Nurture problem in Intelligence, and much more difficult of attack. Yet its answer is highly necessary for the solution of a large number of social, moral and cultural issues.

CHAPTER IX.

ON THE NATURE OF THE VARIABLES.

Section I.

Secondary Function.

I. Review of Previous Experimental Work.

II. Present Research Experimental Work.

a) Motor Perseveration Tests.
b) The Colour-Mixing Experiment.

Section II.

The Activity Variable.

Section III.

The Emotionality Variable.

After a consideration of the detailed functions of the three variables, their organic nature remains to be examined.

Some of the problems, such as the fundamental nature of the sex differences, the relationship with intelligence, the causes behind the distribution of types in the community, will only be adequately solved when the organic, basic nature of the variables has been accurately and clearly determined.

As the questionnaire method of enquiry has obvious limitations, it will also be necessary to devise a series of tests for clinical use and again therefore a more profound knowledge of the three variables is essential.

Volition, but especially emotionality, are comprehensive and difficult subjects. No thorough research could be attempted in an enquiry as general as the present one, and our treatment of this subject will therefore be suggestive, rather than conclusive.

Section I.....

Section I.

Secondary Function.

Differences in Function, being differences in receptor and effector mechanisms, are more easily verified experimentally than differences in the strength of such drives as Activity and Emotionality. "Perseveration" is a well-known term in English research work, and much time has been devoted to the concept. Secondary Function is that pole of the Function variable which corresponds to Perseveration. Its chief manifestations are: a) persistent after effect of a Sensory experience, b) spontaneous recurrence, without new stimulation, of a past experience, c) the Physiological continuation of past experiences, which can spontaneously recur to consciousness, or which can, from the unconscious, influence, modify, brake new conscious contents and behaviour. Affective reactions, emotional experiences, are similarly subject to Secondary Function. Most tests of Perseveration have been directed towards the first alternative. Indeed, once it has been proved that an individual who is Secondary Functioning in some sensory processes tends to be so in all, and at the same time is Secondary Functioning ideationally and Emotionally, it will not be necessary to cover the whole field, in assessing the relative strength of the Function in him. So far, however, the experimental evidence of the existence of Perseveration or Secondary Function as a Unitary factor has been unsatisfactory. As to the measurement of individual differences, few useful tests have yet been designed.

I. Review of Previous Experimental Work.

Lankes(1) has produced some very thorough work on the subject. His interpretation of Perseveration was very wide,

covering.....

(1) W. Lankes - 'Perseveration.'B.Jrnl. of Psychology, Vol. VII. Pt 4.

covering nearly all possible forms. His experiments were carefully conducted on a fairly small group numbering only 47 cases. His tests, some of which were very ingenious, gave scope for Perseveration in purely Sensory and motor reactions, as well as in the highest activities of the mind. An Interrogatory and rating for Persistence were included. The intercorrelations obtained were far from uniform, and on the whole very small. The Interrogatory correlated +.41 with the pool of the tests; with the Estimate of Persistence qualities it correlated -.26. Of particular interest was Lankes' experiment on Colour Mixing, which we shall have occasion to discuss later. Lankes claims that his results indicate the existence of a common factor, "a native quality of the nervous system, innately different with different individuals."

Bernstein(1) applied a number of Perseveration tests to two groups of boys totalling together 160. These were all tests of the measurement of interference produced by the persistent after effect of one Sensory action on the performance of an immediately following similar one.

Bernstein makes much of the fact that none of his reliability correlations are below .6 and most above .7. He obtained these figures, however, by intercorrelating halves of the same test; e.g. in the inverted S test, which was done in one minute periods, the score for the first half minute was correlated with the score for the second half minute. It is very doubtful whether he would have obtained such a high coefficient had he correlated two forms of the same test, done a week apart.

The average.....

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(1) Bernstein. Brit. J. of Psych. Monograph Supplement VII. 1924.

The average correlations of each test with a pool of the other were:

Group A. .046 .108 .156 .222 .045 .042 .126 .103 .118 .076

Group B. .138 .112 .121 .170 .169 .024 .098 .134 .07 .065

Average P.E. Group A .079. Group B .087. These correlations were obtained from two separate groups.

The highest single correlation obtained in group A is .453, in group B .302.

Bernstein also had estimates made, by independent judges, of the way the boys settled down to a new task. The correlations between estimates and a pool of all the tests were .48 and .54 for the two groups. As we have seen, however, this quality is largely determined by Activity and not by Function, so that much cannot be expected from correlations of the Estimate with individual tests. This expectation is indeed realised:

Group A.	.17	.44	.16	.33	.30	.18	.17	.14	.15	.08
Group B.	.36	.34	.21	.46	.42	.23	.32	.30	.31	.11

Correction for attenuation yields the following coefficients:

Group A.	.23	.58	.22	.41	.46	.25	.24	.20	.21	.14
Group B.	.47	.44	.29	.59	.58	.32	,42	.42	.43	.17

Considering the fact that Bernstein's tests were all very similar, that he was only testing one form of Perseveration, his coefficients are very low. Yet this result was obtained after a considerable amount of time had been spent in practice. Nor do we, for reasons stated, place much value on the relationship established between the Estimate and the pools of Perseveration tests.

In the University of Cape Town Psychological Laboratory, some similar experiments (results in theses, University of Cape Town Library) by Potgieter and Cook were conducted.

Potgieter .....

Potgieter gave 5 tests, three borrowed from Bernstein, 2 original, to 100 students, of whom 57 completed all.

These tests were 1. Tapping test, normal rate, 2 periods of 30 seconds each.

2. Similar Descriptions test. Two very similar stories were read, subjects were given 24 questions, which they were told referred all to the second story. Seven of these questions merely tested memory. The others gave scope for Perseveration. The index for P. was the number of questions in which there was a 'hangover' from the first description.

3. Subjects were first given 5 minutes practice drawing a wavy line, then 5 minutes drawing an angular line. In the last 5 minutes they were asked to begin with angles, and change over as often as they wished. The P. index was the average number of undulations in wavy sections divided by average number of angles in angular sections.

4. Bernstein's Inverted S test and

5. Bernstein's Triangle test.

The correlations were:

1.	Tapping	-			
2.	Similar Descriptions	.063	-		
3.	Wavy-Angular lines	-.136	.125	-	
4.	Inverted S. Test	.30	.145	.21	-
5.	Triangle Test	.15	.055	.29	.127	-

P.E. of highest coefficient: .086

Again, the correlations are so small that, if there is a factor of Perseveration, these tests certainly fail to measure it.

Cook's tests were rather more unusual and covered a wider and more varied set of reactions. The correlations are based on 53 cases. The tests were 1. Pulse Rate, 2. Tapping Rate, 3. Dotting Tests, from which two indices are obtained: a) speed of dotting, multiplied by accuracy.

b) In.....

b) In this test, subjects were left alone to go on dotting as long as they wished. The index was the time the subject kept on dotting, the speed being constant for all. 4) A Cheerfulness test. The subjects were shown eight series of five nonsense syllables. At the sight of one half of these they were asked to make pleasant associations, to the other half unpleasant associations. They were merely to indicate when the association was made, and were under no obligation to give it. The time they took to do this in each case was taken. Firstly a mean reaction time for all associations was calculated. Next a positive or negative Cheerfulness Index, by finding the differences between the quotient of pleasant and unpleasant mean reaction times and the mean reaction time of all responses. The last test is the one in which an attempt to measure Secondary Function in the affective field is made. These were the only indices used for intercorrelation:

Pulse	-				
Tapping	-.05				
Dotting (Speed + Accuracy)	-.15	+.15	-		
Dotting (free)	+.19	-.11	-.06	-	
Reaction time Cheerfulness Test	+.16	-.05	-.02	+.12	-
Cheerfulness Index	+.25	-.29	-.02	-.02	-.04

Once more, in this wider and more general field, we find no evidence whatever that Perseveration is measurable, or exists at all.

Consider the Tapping test; it is found that, in Lankes' series of experiments, it correlates positively, though slightly, with all other tests in the battery (See p.416 B.J.P. Vol. VII.) Yet in Bernstein's two groups the average correlation of tapping with the pool of the other tests is -.046 in the one group, +.138 in the other group. In the one group, Tapping correlates -.368 with Inverted S test, in the other +.302, with Triangle Test -.053 and +.301. In Potgieter's material we find the Tapping test correlating +.30 with

Inverted .....

Inverted S. Test. -.15 with Triangle test. As long as such flagrant contradictions are possible, it seems there is something very much wrong with the whole system of measuring Perseveration; any correlations that are produced must be taken with the greatest circumspection.

A more recent investigator, J. W. Pinard,[1] gave the orthodox S and Triangle tests, as well as an Alphabet and Number test and a Mirror Image test. In the Alphabet and Number test, series of 7 numbers and of 7 letters, all consecutive, were practised. The series were then combined, so that a number followed each letter. In the Mirror Image test a series of capital letters were first practised normal then inverted, as in a mirror. These tests were given to 194 children, five times after five practices. The following table shows the intercorrelations.

S. Test	-			
Triangle Test	.34	-		
Alph-Number T.	.29	.37	-	
Mirror Image T.	.37	.33	.36	-
Averages	.33	.34	.34	.35

The writer, after examination of tetrads, concludes that there is a group factor of Perseveration, at least for these four tests. Nevertheless, he mentions the possibility that this apparent Perseveration could be due to unwillingness on the part of subjects to do the tests (the experiments were carried out in an Institution).

He also finds that 75% of the most difficult and unreliable children are extreme perseverators or extreme Non-perseverators, 75% of the most self controlled and persevering subjects only showing a moderate degree of perseveration. We have often stressed that both excess of Primary and of Secondary Function, especially when accompanied by strong Emotionality, can lead to socially less valuable behaviour qualities. The strongly Passionate may be as obnoxious and

difficult.....

(1) J. W. Pinard, British Journal of Psychology, Vol.23, Part I. "Tests of Perseveration."

difficult as the strongly Choleric, but in a different way. Pinard's work suffers from lack of analysis on the subjective side. His conclusion is in no way contrary to any of ours, but by itself, his division is quite useless for a complete understanding of the nature of Temperament. This investigation is sufficient argument for that.

The latest investigation is that of R. B. Cattell(1) who introduces a number of interesting and new Perseveration tests, including tests on the persistence of rhythm, of Colour Images, Apperceptual perseveration, and Attitudes perseveration. He worked out a pooled P. score for each subject, including in this pool only certain tests, which were again separately weighted. He arbitrarily based his weighting on the fact that some tests had been used more often by previous investigators than others, and had been found more useful. In view of the universally low correlations in the preceding investigations, and all the weaknesses perseveration tests are subject to, considering also that investigators borrowed from each other in spite of poor results, the procedure seems to us to be questionable. The highest intercorrelation coefficient in the selected group does not exceed .23, nearly all being totally insignificant. The correlations between the pooled P. scores and the various character and Temperament factors discovered by Cattell are as follows:

	Surgency. (c)	Character (w)	'm'	'a'
P.	.11	-.21	.02	.05
P.E.	.08	.08	.09	.09

These are.....

(1) R. B. Cattell. Temperament Tests II. B.J.P. Vol XXIV Pt. 1 p. 20.

These are insignificant except the coeff. between P. and 'W', which corroborates the finding of Lankes and Webb that Perseveration is quite distinct from Volitional Persistence.

Cattell produces some evidence in support of Pinard that very high and very low perseverators lack 'm'. Only after a very close study was he able to distinguish qualitative differences in subjective behaviour qualities between these two groups. These are of such a nature as to suggest that there is a Primary element in the strong Non-Perseverators, a Secondary element in the strong Perseverators. The two groups did not differ in respect of his trait estimates.

He could discover no correlation between Lankes' Questionnaire and High, Moderate and Low Perseveration tests scores. The fault lies probably both with the inadequacy of the P. tests, and with the classification of the subjective behaviour qualities.

Important work was done by Wiersma[1] on the nature of Secondary Function. He conducted three tests: (1) Adaptation to light. The subjects were left in a dark box for 15 minutes. Their threshold for a very faint light was determined. They were then taken for 2 minutes in a brightly lit room, and then returned to the experimental room. The interval between the re-entry and their just being able to see the light at threshold intensity again was measured.

(2) The threshold for weak electric current was found in subjects. A strong current was then applied for two minutes. The time elapsed before sensitivity to the weak electric current at threshold strength returned was measured.

(3) A disc, containing two sectors, red and blue-green in 55-305 degrees proportion, was revolved at increasing speed, until complete fusion was obtained. Secondly, beginning with

high speed.....

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(1) E. Wiersma, Journal für Psychologie und Neurologie, Band VIII, 1906 "Die Sekundär Funktion bei Psychosen" pp 1-24.

high speed, and complete fusion, the speed was reduced until the colours could again be seen distinctly. At each threshold, the speed of the motor was carefully measured. Wiersma tried out a few other experiments, but gives full data on these three only. As subjects he used normals, manic-depressive cases, both when in manic state and when depressed, sufferers from mania, and paranoid cases. In all these cases he obtained free association data, as well as observations, from moods, movements etc., on their Primary or Secondary Function behaviour patterns. Unfortunately there are only 39 cases in all. This is offset, however, by a most careful and exhaustive method of experimentation, which left very little to chance. In the colour-mixing experiment, for instance, he measured the threshold 50 times with speed increasing, 50 times with speed decreasing, over a period of five days. He publishes full figures, and in view of the variability these tend to display, not so much on the one day as from day to day, it is doubtful whether any subsequent experimentation in this field will have any value, unless individual experiments are as carefully and elaborately conducted. Large groups are no help whatever in securing reliability, when the individual experiments are inadequately conducted. In the light adaptation experiment he measured the threshold 25 times, spread over five days, and in the Electric current experiment as often as 20 times in four days. These frequencies varied a little with some subjects. One feels therefore that differences, when obtained between measurement so carefully made, merit serious attention even when based on few subjects.

	Manic	Normal	Melancholic & Paranoia
Light Adaptation	33.5 (7)	102.9 (4)	>232.2 (8)
Electric "	0 (3)	39.6 (5)	>205.5 (4)
Colour Mixing	27.2 (11)	15.7 (9)	12.2 (18)

These.....

These averages we abstracted from Wiersma's complete figures. In the case of the two adaptation experiments, the figures give the duration in seconds of the after effect ("~~Hemmung~~ Nachwirkung") of the strong light and strong current. In the colour mixing experiments they give the rotation speed in revs. per second at which fusion took place. These figures are undoubtedly striking. In the Manic states, there is a lack of "braking" (Hemmung). The after effect is very evanescent. In the colour mixing experiment, for some time different in different individuals, sense impressions remain, after the causative stimulus has already gone. The fusion to grey when red and green are rapidly presented in continuous succession, as by rotation, is caused by the superimposition of objective stimulus on after effect. The longer this after effect (Nachwirkung), the less will the rotation speed of the motor need to be to produce fusion to grey. Hence we find the highest rotation speed among the Manic. They display the Primary Behaviour pattern in excessive degree, and react indiscriminately to any superficial stimulus. The melancholic and paranoid, on the other hand, show the Secondary Pattern excessively, with inability to get away from obsessional and unpleasant ideas, total lack of interest in the world around them, failure to react, in short, altogether too much "braking." A very low rotation speed brings about fusion. Normals are mid-way. In 6 of the melancholic cases, the threshold for colour mixing is very high, viz., 15.7, 26, 15.3, 22.5, 19.4 and 22.6 revs. per sec. respectively. In all these cases, however, there were pronounced anxiety states. Fear had put the "hemmung" characteristics quite into the background. The subjects displayed the characteristic picture of Primary Function - restlessness, inability to concentrate,

quick.....

quick movements. There are further observations which favour the reality of the differences shown in the table. In manic states, circulars showed almost total absence of Perseveration when tested; in the depressed state they perseverated strongly. Similarly, consistent differences were shown to exist between the testings of patients, while still ill, and when discharged as recovered. On the whole, where the mental disease is accompanied by the characteristic Primary subjective qualities, there is a short, neural perseverative effect. Where the Secondary Behaviour pattern is shown, the perseverative after-effect is long. When anxiety states intervene, the Secondary Behaviour pattern, and similarly the neural Secondary Function, are counteracted, and to a great extent disappear.

The results of these experiments are therefore in strong support of the existence of Secondary and Primary Function as forms of neural behaviour, and of their relationship with consistent subjective patterns such as we have outlined and discussed in the foregoing chapters.

Lankes also conducted a colour mixing experiment. His manner of experimentation was different from Wiersma's. He used four sets of colours. Subjects were asked to report what they saw, and had 18 shades of colour in front of them, to compare their visual impressions with. The colours, also rotated on a wheel, appeared in a slit 3 cm. by 13 cm. and the speed was either decreased, or increased at four sittings, through 12 speed ranges each time. The motor power was a set of gears worked by hand. The illumination was a 32 candle power lamp, $3\frac{1}{2}$ ft. distant. (Wiersma used diffuse daylight.) Subjects sat in front of the apparatus, in a group of two arched rows. The criticism against this procedure is that subjects were not equidistant from the colour disc, nor did they see it at the same angle. These are serious faults as

we found.....

we found both distance and angle to have an important influence on the speed at which fusion occurs. The method of turning the disc by hand seems also questionable. Although a fairly constant average speed is no doubt kept up there are bound to be important intermediary fluctuations. The highest inter-correlation between the four series, each with a different colour combination, was .41. For the black and white disc, the coefficients were .16, .26, .27. The only significant correlations obtained by Lankes between colour mixing and other tests of Perseveration were: Ascending from low to high speed with Tapping .31, with Narratives .27.

Descending from high to low speed with Tapping .39, with letter writing .27, with cancellation .40, with Drawing Test .50, and with Interrogatory .29. The Ascending and Descending forms of the test intercorrelated .34. Compared with the usual magnitude of coefficients in Perseveration work, these intercorrelations are fairly satisfactory and it seems indeed that this rather direct method of measuring Neural Function, when more standardised and if sufficient readings are taken, could become quite useful and accurate, at any rate more so than other methods so far devised.

The Present Research - a) Motor Perseveration Tests.

In the present research, a number of the foregoing Perseveration experiments, with modifications, were given to a class of students, numbering 180. These were taken in groups of about eight, a most time-consuming procedure, which precluded the giving of much practice, or the obtaining of reliable data through successive repetition on the same people.

We followed the system of giving some tests to the whole group, and others, with modifications and checks, to portions of the group, so that the fullest possible light should be

thrown.....

thrown upon the nature and function of these Perseveration tests. The experimental sittings were long, lasting for 1½ hours. They were broken up in the middle by the giving of an Intelligence Test, lasting 30 minutes, which provided a change of interest, as well as allowing the hand to rest, all the perseveration tests being hand-writing tests.

I. Capital S test. Subjects were instructed to write the capital S for three 1 minute periods, separated by rest periods of 1 minute, then after the usual rest of 1 minute, they wrote the reversed form for 30 seconds. They were asked, as in all these experiments, to work as rapidly as they could, to keep the letters clear and legible, and not to practice in the 1 minute intervals. This test was given to the whole group.

To obtain a measure of P. (Index of Perseveration) in this test, we counted the number of letters made in each trial. Any letters which were too badly formed to be distinguishable as an S were omitted. In extreme cases, the subject was discarded. In the reversed form, only those were counted which were reversed, and 1 was subtracted for each straightforward letter. Sums so arrived at we shall call e (for "efficiency").

e^1 was discarded in this experiment, as misunderstanding of instructions often occurred, and lack of practice was very marked in this first trial, producing all sorts of irregularities. Lankes discarded the results of his first week altogether, as they intercorrelated very poorly with those of successive weeks. Our measure of P. in this experiment was obtained by the formula $P = e^3/e^2 - e^4/e.^3$

II. a) Letter Sequence Test. - "bcdefghij" had to be written, successive sets to remain joined, for three 1 minute periods, separated by rest periods of 1 minute, the 3rd period being followed by 30 secs. of the reverse "jihgfedcb". P was obtained by identical method and formula as in Exp. I. The

first.....

first trial was likewise discarded. This experiment was twice modified.

II. b) Was conducted as follows: The sequence "jihgfedcb" was given for 30 secs. first. The subjects were allowed to copy the sample down. Then, separated by the usual 1 minute rest periods, "bcdefghij" was given twice for 1 minute each time, and finally again 30 secs. "jihgfedcb". The data yielded by this experiment were merely used to compare efficiency in writing the unusual sequence, before, and after the practice of the usual one.

II. c) This was a reversion to the form of Exp. II a., except that "jihgfedcb" was written for 1 minute, and that subjects had no previous warning of it. Previously, we used to outline the whole experiment first. This had the disadvantage that, although it was forbidden to practice in the rest periods, yet the subjects could do so mentally, or at any rate accommodate themselves mentally, to the sequence. Hence in II c, the full strength of the Perseveration phenomenon ought to be evident. P was calculated as in Exps. I and II.

III. Three 1 minute periods of drawing triangles a) apex up, b) apex down, c) alternately up and down; separated from each other by 1 minute periods of rest. Calculation of e as in Exp. I. Following Bernstein, P was obtained by the formula:

$P = \frac{1}{2}(e' + e')/e^3$

After this Experiment the Intelligence Test intervened. This was the National Institute of Industrial Psychology's Group Test Series 33.

IV. Capital S test. Reversed Form. Three 1 minute periods of Capital S reversed were given, each separated by a rest period of 1 minute, the last trial followed immediately by

the.....

the straightforward S for 30 secs. This test is therefore the exact reverse of Exp. I. P was calculated for a number of cases from formula: $P = e^3/e^2 - e^4/e^3$.

V. A similar reversal of Exp. II., the Letter Sequence Test, except that the last minute period of "jihgfedcb" was followed immediately by "bcdefghij" for 90 secs. Lankes remarked that in the Letter test, Perseveration became more noticeable after some time, so in this experiment we have made everything favourable for a considerable perseveration measure. The 'back to normal' form followed without a break, and for a much longer period than usual. P obtained as in Exp. IV.

Va. Triangle Test. After a while Exp. V. was discontinued and a Triangle Test as in III. was substituted, except that now first the triangles were drawn with the apex down, then up and finally alternately down and up. This test was introduced mainly to be correlated with Exp. III. for a measure of reliability. Calculation of P as in Exp. III.

VI. Modified S test. The capital S was written in the straightforward way for 1 minute. After 1 minute's rest, four continuous 30 second periods followed in this way: a) S straightforward, b) S reversed, c) S straightforward, d) S reversed. On the theory of Perseveration, this fairly rapid change over must have been particularly difficult for the Perseverator. After trying out a number of complicated measures of P, we found the following simple one to do as well as any: $P = e^2/e^4$

VIb. Two 30 secs. periods, each followed by 30 secs. of rest, of alternating S straightforward and reversed, thus SƧSƧ etc. Finally two 1 minute periods of the same, separated by a 1 minute period of rest. Subjects who were given this test has already had $3\frac{1}{2}$ minutes of both reversed and straightforward S, so that their rate of making these letters was known, and could be compared with the rate when the two forms were.....

were alternating. A complicated measure of P was used for this test.

$$P = \tfrac{1}{2} (eI^{3} + e\,IV^{3}) / (e\,VIb^{1} + e\,VIb^{2})$$

eI^{3} is the last 1 minute period of straightforward S in Experiment I; eIV^{3}, the last period of S reversed in experiment IV; $eVIb^{1}$ and $eVIb^{2}$ are the two 30 second periods of alternate S and 2 in the last experiment.

We intended these experiments as a final attempt to measure Perseveration in the orthodox manner. If it failed, what were the reasons, and what other method could be suggested?

Correlations.

Between the two forms of the Triangle Test. Exp. III. and Va. r = .40 P.E. .08. This is in the nature of a reliability measure, as the two tests are more or less similar, and performed within 40 minutes of each other. The correlation is disappointingly small, but as good as the best reliability measure obtained by Lankes, in the Letter Sequence Test, done on four successive days, and yielding the coefficients .16, .32, .41.

We conclude, therefore, that it is not our experimental procedure, but rather the unsuitability of the test, or the uncertain nature of the function of the phenomenon which is responsible for the smallness of the correlation. As the Capital S test, Exp. I, was done by all subjects, we shall give as many correlations as possible of P obtained in this test with the measures obtained in others.

With Letter sequence Test. Exp. II.

r = .26 P.E. = .086

With Triangle Test. Exp. III.

r = .12 P.E. = .054

With Letter.....

With Letter sequence Test. Exp. IIc (No warning given.)

r = .036

(Instead of larger, as expected, the coefficient is considerably lower!)

With Capital S test. Reversed Form. Exp. IV.

r = -.11 P.E. = .09

With Letter Sequence Test - reversed. Exp. V.

r = .09 (59 cases)

With Modified S test. Exp. VI.

r = .23 P.E. = .06

With Modified S test. Exp. VIb.

r = .18 P.E. = .09

Further correlations are no better:

Triangle Test. Exp III.

With Letter Sequence Test. Exp. V.

r = .19 P.E. = .09

With Modified S test. Exp. VI.

r = .18 P.E. = .06

With Letter Sequence Test. Exp. II.

r = -.27 (P.E. = .08)

Yet these tests are almost identical in nature and design!

With Modified S test. Exp. VIb.

r = .07

Nor did this correlation improve when the second triangle test, which immediately preceded Exp. VIb., was used:

r = .09

Finally we tried correlating the measures of P obtained from Exp. IV. and V. the Capital S test, reversed form, and the Letter sequence Test, reversed form.

r = -.19 (59 cases).

These tests were identical in having the straightforward form following after practice of the reversed form.

These.....

These correlations are no better than any obtained by other investigators.

The various forms of the S test intercorrelate to a fair degree: .26, -.11, .23, .23, .18. The negative correlation is obtained between straightforward and reversed forms of the Capital S test. Actually, if Perseveration is measured by the "interference of one activity with a very similar one, immediately following", the correlation ought to have been positive; this condition obtained in both cases. Let us examine this case in somewhat greater detail.

In the 3rd minute trial of Exp. I., the average efficiency reached in writing S was 53.3. (171 subjects.) In the 3rd minute trial of Exp. IV. the efficiency reached in writing Ƨ was 50.3. Consequently, there was an almost equal facility in writing these two forms. Yet, instead of the similar huge drop in efficiency which followed after the straightforward S, we find a facilitation after the reverse S, for the efficiency reached in writing S straightforward in the 30 sec. period of Exp. IV. rises to 59.5! This is not only more than the efficiency in the immediately previous reversed trial, but also a good deal in excess of the previous best efficiency straightforward. Was it perseveration, which produced the drop in efficiency in Experiment I, when switching over to the reversed form, or was it merely the difficulty and unusual character of the task? Or is the straightforward form neurally so firmly established that from the unconscious it interferes with the execution of the reversed form? The first question raises a most important point. In some Perseveration tasks, it is questionable whether the two forms are equivalent at all, and whether, even with infinite practice, the one would not always take a longer time to perform than the other.

In.....

In Experiment IIb., we gave 'jihgfedcb' for 30 seconds at the beginning, then 2 minutes 'bcdefghij', finally 30 seconds 'jihgfedcb'. The efficiency before 'bcdefghij' was 52.4 letters (per 30 secs), after 'bcdefghij' it was 60.6 letters. The practising of the opposite (perseveration-causing) form has a facilitating effect! The lesser output in the first trial must be either due to greater difficulty, the result of lack of practice, or to the unconscious interference of the long established sequence with the reversed one. That is, an ideational perseveration occurs even in the first trial. But then, a fortiori, this influence would have been still stronger after the further reinforcement of writing the actual alphabetic sequence, which we found was not the case. Did practice obliterate it? In that case these perseveration tests are useless, for such a practice factor cannot be eliminated. Furthermore, our reliability correlation of .40 is as good as that obtained by Lankes after much practice. And again, if it is really the unconscious perseverating effect of the alphabetic sequence, acquired through years of practice, which was operating, is it likely that 30 secs. of practice would to any extent overcome it? We can only conclude that the reversed form is more difficult to write, because of lesser practice, and not because of the immediate or unconscious perseverating influence of the alphabetic sequence.

In an attempt to counteract inequalities in facility in doing the two forms of a test, Cattell first gave the usual form preceding the unusual, then the unusual preceding the usual. The intercorrelations between the two measures of P. so obtained were with two exceptions negative, and he concludes that these intercorrelations "give scarcely any ground for supposing the existence of an effect of this kind, i.e. of an inertia perseveration independent of whether the change is from old to new, or from new to old habits."

"If.....

"If such findings are confirmed by further investigation of perseveration test techniques, a new conception of perseveration must be accepted, namely perseveration as the readiness of functioning of an old-established habit relative to a new habit involving a re-arrangement of the old elements. Perseveration as a general inertia, manifesting itself as a hindrance effect in passing rapidly from one activity to any other kind of activity, may indeed be the same thing, but it is in the disparity of fluency of old and new motor habits that the tendency is most readily revealed and by which we can best hope to measure it.(1)" According to this argument, the Perseverator experiences greater difficulty than the Non-Perseverator in changing from an old and familiar task to a new one; the extent to which he does so is the measure of his Perseveration. If Perseveration is to be intelligible physiologically, this relative difference must be due to some inertia element, and if that is so, then there is no reason why in changing from the new to the old, this inertia factor should not to some extent reveal itself. The Non-Perseverators might show no difficulty, the Perseverators some difficulty in the change from unfamiliar to familiar. Cattell of course admits that we may be dealing fundamentally with an inertia element, but he misses the point when he suggests that his new formulation will provide a more convenient form of measurement. He cannot account for the universally low coefficients obtained in Perseveration work. The whole trend of our analysis has been to show that the poor measures of P are due to an imperfect testing technique, the most vitiating element being the change from familiar to unfamiliar involved in many tests. Hence it

is not.....

(1) op. cit. pp. 26 - 27.

Hence it is not Inertia Perseveration which is not measurable, but the type of test, considered most useful by Cattell, which does not measure it. We therefore prefer our conclusion to that of Cattell. It may be stated thus:

The first recommendation, of any Perseveration test, is that the two forms of Activity should be equivalent in all respects, so that true interference, and not a difference due to greater intrinsic difficulty, or less practice, is being measured.

Two other correlations that deserve some attention are the following: 1) The correlation between the Triangle Test, Exp. III., and the Letter Sequence Test, Exp. II. The two tests follow each other, are similarly conducted, and should yield a high correlation. Yet we find

$r = -.27$ (P.E. = .08)!

2) The correlation between the Capital S test, reversed, and the Letter Sequence Test, reversed, again two very similar tests, following each other.

$r = -.19$ (59 cases).

Such faults as we have discussed already will presumably operate similarly in these two tests and cancel each other out. Apparently, however, each has such peculiarities and difficulties of its own, that uniformity in changes of efficiency is totally absent; otherwise, though how is not quite clear, changes of efficiency are differently determined in the different tests.

This leads us to point out a number of other weaknesses. There is no guarantee, in most of these tests, that subjects are actually doing the same thing.

In the Triangle test, there are a number of ways in which the combination of triangles, apex up and apex down

could.....

could be drawn. e.g.  and  . In the first set, the hand goes clockwise in both cases, in the second set it goes first clockwise, then anti-clockwise. Obviously it makes a difference which way this is done; unless the test is done in <u>one way</u> by <u>all</u> subjects, they are not doing the same test at all. There are further numerous individual ways of making triangles, large, small, with rounded corners, or gaps at corners, equilateral, isosceles, etc. Some subjects begin with one form and end with another. This especially applies to the S test, where variations in size, shape, constancy are frequent. In the reverse form, subjects usually started making the figure 2, which, being as firmly neurally established as capital S, successfully abolished all "perseveration". Hence the drop in efficiency in switching over from one form to another may be due to any number of factors, unfamiliarity, discrepancy in practice, greater absolute difficulty of the task and true Perseveration. Little private makeshifts and associations sometimes altered the character of tests entirely for certain individuals. None of this ought to be permissible in Perseveration tests. There are some further considerations: 1) Fatigue will come about quicker with some subjects than with others. 2) One cannot prevent mental practice between the trials. Some will do it, others not. 3) It is difficult to ensure that all work at top speed. 4) The subject is able to see what he has done, and, in writing "jihgfedcb", or S2, simply copy this as he goes along. Also he can see errors he has made.

It is quite hopeless to expect correlations of more than negligible magnitude while the measuring tools are subject to so many and such fatal errors. There is qualitative evidence that a Motor-Perseveration phenomenon exists. But it is not even approximately measured by these tests, and they are certainly useless for the accurate determination of individual differences.

We.....

We attempted to devise some tests which were not open to to all the above objections. A cancellation test, in which from a piece of Printer's Pie, containing equal numbers of vowels and consonants, first vowels, then consonants, and finally alternately vowels and consonants were crossed out, failed to satisfy. The alternate form of the task contained factors which made it more difficult, per se, to perform.

Great promise, however, is shown by a Substitution test. For a set of 12 different letters, a set of twelve different numbers has to be substituted. The subjects should learn the key by heart, as they go along, not previously, rather than keep on referring to it. After a number of trials, a new key is introduced, in which the same figures and letters now occur in new combinations. How does the efficiency in the first trial of the new key compare with the first trial of the first key? These two tasks are equally unpractised, of equal difficulty, can only be done in one way and any difference in efficiency can only be due to interference of the first key with the second. The tasks are quite equivalent.

In order to ensure that subjects memorise as they go along, they may be warned that the key will only be on view for a limited period. In order to make certain that they shall not copy merely from the previous lines, the work could be done with a stylus, the substitution sheet being placed over carbon paper. The test has the advantage of not easily becoming automatic. Concentration remains necessary, and to ensure this, the key can be made fairly large, containing more than 12 letters. For reliability work, a large number of new combinations with the same set of letters and figures can be worked.

Successive.....

Successive tasks are always equivalent, for difficulty and complication do not alter. Practice does not enter, because it is always the first trials which are compared. Long established neural bonds are not involved more in one trial than in another, and in all respects, successive tasks are comparable. Differences in rate of learning are not likely to interfere, as rate of learning will operate similarly in the same individual in consecutive substitutions. The method lends itself very well, however, to measuring rate of learning, and, to be doubly sure, this factor could be partialled out. We had no time to test this method out on a large group, but it holds out better promise than any of the foregoing tests, and is worth further investigation.

These criticisms are of course not applicable to such tests as Lankes' Essays and Narratives Tests, which may have other weaknesses as measuring instruments.

b.) <u>The Colour-Mixing Experiment</u>.

As this experiment, from the results of Wiersma and Lankes, seemed by far the most suitable for the measurement of Secondary Function, we decided to try it out on some of the subjects in the school enquiry.

The apparatus was especially designed for the purpose, and, though capable of improvement, seems an advance on that used by Lankes. It was built to our specification by the Electrical Department of the Heriot Watt College, Edinburgh. Especially its speed-recording device is superior, infallibly accurate, and yet so cheap that the smallest laboratories could acquire it.

The apparatus consists of a 1/40 H.P. Electric Induction motor. Geared at right angles to its spindle is a turn table, as used in a gramaphone, on which a stroboscope is fixed. A

metal disc .....

metal disc carrying the colours is on the motor spindle. The ratio between turntable and colour disc must be known; in this case it was 20:1 which is very convenient for the stroboscope device. The current is supplied to the motor through a transformer. By using half, or the whole of the transformer, and a large number of tappings, operated by switch, the voltage supplied to the motor can be so controlled as to give a range from very low speed, just sufficient to carry the load and to revolve the colour disc, to faster speeds than will ever be needed. In addition there is a small dial rheostat which completely covers the difference in supply of voltage between two tappings. Hence not only is a continuous, unbroken increase in speed possible, but this increase or decrease can be controlled very accurately so that minute alterations of speed can be effected and measured. In addition, a magnet is fixed around the colour disc in front, to act as a brake, and smooth out any irregularities in running; the very low speeds are only obtainable by means of the load which this magnet imposes on the motor. The stroboscopic device is based on the 50 cycle period of the alternating current. A Neon lamp is fixed above the turntable. The stroboscope consists of a disc on which are inscribed a large number of concentric rings, each divided, by radial lines, into a large number of equal sections. For each ring there is a particular speed of rotation such that, when the disc is viewed under the light of the Neon lamp, the radial lines dividing the ring in question will appear to be standing still. The ring seems not to be moving. This occurs when the lines are so spaced that the movement of each to the position of its neighbour coincides with the period of minimum illumination of the lamp. At the brightest illumination period, each line has exactly

reached .....

reached the position of its neighbour. We know then that in 1/100th sec., the turntable goes through a known number of degrees. From that the time taken to do one revolution, at that particular speed can be calculated, and, the ratio between turntable and colour disc being known, the number of revolutions per second of the colour disc at that particular speed are obtained. As the cycle of the electricity mains is constant, whenever that particular ring is observed as standing still, the speed of the colour disc is known. By slightly increasing or decreasing the angle between the lines in successive rings, one can get a set of rings to cover any range of speeds one desires. Interpolations are also possible. If one ring moves clockwise, another anti-clockwise, the speed lies between the speeds, represented by the two rings when still. If the two rings move in opposite directions at equal rate, the speed is half-way between. The speed is always nearer to the one going slower. As the stroboscope can be so constructed as to make successive rings add one revolution per second to the colour disc, and as by inspection one can judge quarters between rings, one can read accurately to about .125 revs. per sec. e.g., if ring 3, when still, indicates 15 revs. per sec., ring 4 16 revs. and the threshold is measured as between $3\frac{3}{4}$ and 4, the speed will be, at the threshold, 15.875 revs. per second. In order to get this fine reading, however, it is essential that the gearing between spindle and turntable should be perfectly made. In our apparatus, the gears did not pull quite evenly, so that there was a tendency to slight variation in speed through mechanical interference, which could be neutralised by means of the rheostat, but which made readings

to a very ....

to a very fine point difficult. The stroboscope of course is an extremely delicate instrument, and records such minute changes in speed immediately. Error is impossible. Every reading one makes is correct, even though it may not have been made at the exact speed one wants to make it.

All the subject saw of the apparatus was a screen, in which there was a circular hole, about 1¼ inches in diameter, immediately against the revolving disc. The subject was seated opposite this screen, at a distance of about 2 yards, which distance was kept absolutely the same for all subjects. The disc consisted of two equal sectors of black and white. We decided not to use colour. Firstly there is the problem of colour blindness; secondly, there is the difficulty subjects have in deciding whether they can still see the colours. Instead we concentrated entirely on flicker. Colours were not mentioned. Subjects were merely asked to report whether they could see any flicker, or whether the disc was quite steady. We believe that errors of interpretation are less likely to occur here. One can still imagine one sees a colour in a steady grey surface which is a colour itself. It is more difficult to imagine one sees movement or flicker in this steady colour. It is easier to make the discrimination in this way. The colour disc was illuminated by a small 3½ volt. globe and reflector, run off a 4 volt. accumulator and always at a fixed distance from the disc. The cycle in alternating current interferes with the revolving sectors, creating harmonic effects, so that direct current has to be used. Daylight is useless, as its intensity cannot be controlled, and it is absolutely necessary that the illumination on the disc should be constant for all subjects. Differences in intensity of illumination and differences in

distance .....

distance from the disc materially alter the threshold. It is also important, when the subject is giving his reaction, that he should look straight at the disc, not wink, nor move his head. Any movements of that sort tend to produce the flicker for brief flashes. The procedure adopted was therefore as follows: the subject first was shown a very obvious flicker, then the motor was speeded up so that there was no possibility of flicker at all. The subject was then told "Whenever I ask you to do so, look straight, without moving, at the disc. If you can see the flicker, say 'yes'; if you cannot see it say 'no'. Make quite certain whether you can, or cannot see it. Look down in front of you, while not reporting. Only look at the disc when asked to do so." We began with a low speed, increasing this by small amounts until the subject reported the flicker was gone. We then began with a high speed, reducing it until the subject reported he saw flicker again. We did this about three times. Then we took a large number of readings, in random fashion, in between and a little beyond the limits so arrived at. This does not follow any orthodox scheme of threshold measurement, but it lent itself particularly well to the measuring device and the function to be measured. It was usually quite easy to determine the position of the threshold within one revolution per second, and as accuracy of fine measurement was the main point, the many readings in a confined range of speed proved most suitable. Usually about 30 readings were taken, often more, sometimes less. The threshold was taken to lie between the two most frequent limiting positions, which as a rule were only a quarter of the range between two rings apart.

This experiment was performed on two groups, one numbering 19 boys, the other 23 boys. For the first group the apparatus was set up in the Department of Animal Genetics, Edinburgh.....

Edinburgh University, for the second in George Watson's College. We tried as far as possible to keep conditions constant, but both distance from disc, and illumination were different in the second group. Hence the two groups are kept separate, and only magnitude and direction of differences compared.

In each group we calculated the average threshold for flicker for the Primary Functioning and the Secondary Functioning Types.

	Secondary	Primary	Diff.	P.E. diff.
Royal High School	35.3	37.5	2.2	.84
George Watsons	31.6	33.1	1.5	.386

In the first group the threshold difference between Primary and Secondary is nearly three times its P.E., in the second it is four times its P.E. As these differences are in the same direction, this can be taken as fairly significant.

Hence the subjective qualities of Primary and Secondary Function are found to be based on actual differences in neural function. In the latter, the after effect of a nervous impulse tends on the average to remain longer than with the former. This result fully corroborates the findings of Wiersma. Lankes' best correlation coefficients were obtained with a similar experiment.

In view of our evidence it can be taken as conclusively proved that the characteristic Function patterns are correlated with that neural quality which determines the Flicker Threshold. There is strong evidence, but no conclusive proof, that a general perseveration factor exists, and that it is related on the one hand to the subjective Function pattern, on the other hand to the neural quality determining the Flicker Threshold.

This puts the existence of the Function variable on an organic basis, but leaves unanswered the question: "What is

this.....

this neural quality determining the Flicker Threshold?" Neurologising on insufficient data is dangerous and unprofitable from the point of view of Psychology as a science. There are, however, a number of known characteristics of nervous conduction which make the occurrence of functional differences such as Primary and Secondary Function both possible and likely. We refer to the "local excitatory process" and "refractory period" in single neurons, the phenomena of "after-discharge" "Inhibition", and "integration" in reflex arcs and the Central Nervous System generally.

Before a propagated disturbance sweeps over the neuron, the local excitatory process has to reach a certain intensity. The necessary degree of stimulation differs in different nervous systems.

During the refractory phase, no stimulation can occur. This phase also has a characteristic duration and hence determines stimulability to some extent.

Differences in after-discharge provide exactly that basis which is demanded by the concept of perseveration. Forbes(1) states that this after-discharge must be accounted for on the grounds of a multiplicity of fibres ("Sufficiently elaborate and extensive paths, including chains of neurons, each adding a considerable measure of synaptic delay"), all taking part in a single reflex activity, conducting successive impulses which result from a simultaneous stimulation of the receptors, to the central process or the effector arc. "The most prolonged after-discharge....would require a sort of central reverberation, that is some central paths would be traversed repeatedly.(2)

Inhibition.....

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(1) A. Forbes. "The Mechanism of Reaction" Foundations of Experimental Psychology" p.152.

(2) op. cit. p. 152

Inhibition and disinhibition as described by Pavlov play an important part in habit-formation. Their neural nature is not altogether clear, however.

Forbes further says:(1) "The nervous system in higher animals is characterized not merely by the orderly working of definite reflexes, but more especially by the integration of these reflexes into adaptive patterns of behaviour. He quotes MacCurdy as saying that speed of conduction is an essential in co-ordination.

Differences in these aspects of neural conduction exist, and must become evident in behaviour and conscious states; it is extremely likely that they manifest themselves as differences in stimulability, quickness of reaction, and integration generally, all of which are covered by the Function variable.

"If we had fuller knowledge of conduction as it occurs in peripheral nerve, should we not see Inhibition, Summation and After-discharge as the natural and inevitable consequences of that one conduction process, working under conditions of varying complexity?"(2)

Our evidence can do no more than indicate that neural conduction is such as to warrant the assumed existence of a neural quality which could produce the various Function phenomena.

SECTION II.

The Activity Variable.

It is not so easy to subject the nature of the Activity variable to experimental verification. We can, however, gather.....

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(1) op. cit. p. 160

(2) K. Lucas. "The Conduction of the Nervous Impulse." London 1917. (Quoted by Forbes. op.cit. p.147)

gather together the threads provided by our own work and that of others, incidentally bearing on this subject, to arrive at a definite conclusion. It may be as well to reiterate here that Heymans defined an individual as Active on the basis of the frequency and energy of his activities, in proportion to their motives. The nature and strength of motives leading to action differs widely in different individuals. Some will only be moved to act under pressure of some very vital and important motive. Their inactivity is explained by their lack of will-power, their inability to make an effort. Others will always be about and doing, without any apparent effort. A multitude of small motives will set them off. They are always busy and occupied in spare time. In emergency, or in the bigger issues of life, they are capable of much greater determination and persistence by concentrating their drive into a great, willed effort. Activity is an index of Volition. Activity for Heymans is Willed Action.

We were often set a problem, on finding children on some of the criteria completely Inactive (inclined to give up when encountering a difficulty; inclined to dawdle and waste time, inclined to be lazy) yet prominent and keen in sport. The combination "physically active, mentally inactive" often occurred This mental inactivity was not mere stupidity, but total lack of effort. Which way were we to classify these children?

On 274 cases, evidence is available from question 31 of the questionnaire, on the nature of Activity. The figures are given in Table XXVII.

Table XXVII.....

TABLE XXVII.

Percentage Incidence of certain degrees of Activity in Active and Inactive Groups.

	Active Group.	Inactive Group.	Average Whole Group.
a) Active	9.	1.	6
b) Intellectually	16.5	2.	11.5
c) Physically	15.	13.5	14.5
d) Both	45.	2	30
e) Neither Marked	10	24.5	15.5
f) Def. Inactive	2.5	57	22

This table indicates that on the whole, our judgment on the basis of criteria coincided fairly well with the teacher's estimate. It shows also that there is no appreciable difference between the two groups in respect of purely physical activity (15%-13.5%-14.5%). Physical activity is therefore no criterion for the Activity variable. The explanation, it seems to us, is the following: Physical Activity manifests itself mainly on the sportfield. Sport being usually a recreation, we can stamp this as Activity in pursuit of pleasure. In a large number of cases it satisfies certain personal and social drives (self assertion and distinction in a group; ascendancy of one group over another). Volitional Activity does not enter into this type of behaviour to the extent in which it is involved in Intellectual Endeavour, Activity motivated by duty, in pursuit of higher social, altruistic or moral values. Hence where such Volitional drive is weak or absent, the individual, when endowed with sufficient metabolic energy, can yet be physically active satisfying these more instinctive and egoist drives. The thoroughly active person will be Active both physically and Intellectually. The Inactive, in so far as he has the metabolic energy, will only be physically Active. Our Activity variable therefore becomes something very much different from Physical Energy. Some other energising force must be behind it. Webb's work[1] provides interesting support for this argument ....

1. Webb. Brit J. Psych. Monograph "Character and Intelligence" (Vol. I, Part III.)

for this argument.

"Perseverance in the face of obstacles" correlates with "Bodily activity in pursuit of pleasure" .07[1] (corrected for attenuation and influence of 'g' eliminated), with "eagerness for admiration" -.45[2]. (In a number of our cases, special notes were added that eagerness to be in the limelight, or to be admired, led some otherwise Inactive children to concentrate on sport.

Our data have also shown that Activity goes with a) excellence of school performance, b) probably with high I.Q.

In a group of boys, Webb found that an experimentally measured 'g' correlated +.45 with perseverance, +.44 with "mental work in usual studies," +.57 with "Bodily Activity in school hours,"[3] only +.04 with Bodily physique, +.27 with excellence in athletics, and +.26 with "Bodily Activity in pursuit of pleasure."[4]

In his College group he found "work on study" correlated +.60 with 'g' "work on pleasure" -.15, bodily physique -.07, bodily activity for pleasure -.19.[5]

If we now consider his quality "Perseverance in the face of obstacles", we find it correlates with four different forms of intelligence .72, .77, .59, .69,[6] with examination ability .41, with an experimentally tested 'g' .28. Perseverance as opposed to wilful changeability correlates as much as .34 with 'g'.[7]

These figures...

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1. B.J.P. Mon. Supp.Vol.I.III. Table XXIV. p.58.
2. do. " p.58.
3. do. All page 43
4. do. All page 42
5. do. All page 42
6. do. Table VI. and Table XXI. P. 54.
7. do. page 42.

These figures are all in strong support of the qualities which we found to go with Activity; they also support our argument that it is Willed Activity, which may be mental, or physical, or both, and not "Activity in pursuit of pleasure," which our variable denotes. The core of its significance is the volitional factor. It has a fair relationship to 'g', but is certainly not identifiable with 'g'. It would be interesting and of great value to trace further points of correspondence between Webb's work and ours. This cannot be attempted in the present research. There is, however, one point of paramount importance which cannot be passed by.

Webb states[1] after a superficial analysis of a minor article of Heymans and Wiersma (Eine Stichprobe:Geizige und Verschwender, Zeit. für Psych. Bd. 49 pp.414-439, in which a comparison is made between the psychology of the miser and spendthrift, and the differences obtained compared with those in a similar study by a different author). "We are again tempted to identify our factor (w) with their Secondary Function, and if that is true, the other two, (emotions and Activity) are not generalities at all."

After a study of Webb's figures, of which we quoted a few, we on the other hand, would have sought a relationship between Webb's 'w' factor and Heymans' Activity Variable. The "spend-thrift" and the "miser" belong respectively to Heymans' Amorphous and Apathetic types, hence Primary Functioning, Inactive, Non Emotional, and Secondary Functioning, Inactive, Non Emotional; and a short list of qualities, nearly all personality qualities, is appended to each.

It is in the first instance unfair to draw conclusions from such a superficial comparison. Secondly, there being only a

Function/....

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1. Op. cit. p. 61

Function difference, it is no wonder Webb could see no justification for the existence of the other two variables.

Of the six qualities, which occur under the heading Emotions in Webb's list, the first two (usually cheerful, and quick oscillations between cheerfulness and depression) are qualities which we definitely found to be related to Function. Three of the other four are concerned with anger, and in all an important Function element enters. He therefore hardly covers the Emotional side of Temperament.

Again, in the qualities which Webb uses in his Tables XXI and XXV.(1) there is not a single Inactivity quality as so understood by Heymans, except "Activity in pursuit of pleasure," which correlates negatively with the others. Nor do Emotional qualities come in. The difference is therefore again purely one of Function.

Though we can discount Webb's suggestion that Emotionality and Activity do not exist, we have not disposed of his point that 'w' is identical with Secondary Function.

Webb distinguishes between "Profoundness," "Common Sense," "Quickness" and "Originality" as different forms of Intelligence. 'W' Qualities have a higher correlation with the first two than with the last two. The "Quick and Original" Intelligence group shows evidence of containing a factor which cannot be squared with 'W' at all, a factor producing a counteracting tendency to 'W'. We need only give the following correlations:(2)

Perseverance.....

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(1) Op. cit. p.54 and p.59.

(2) These figures taken from Spearman: Abilities of Man, p. 350

	Profound.	Original
Perseverance v. Changeability.	.75	.48
Readiness to become angry	-.39	-.09
Cheerfulness	.26	.58
Sense of humour	.49	.79
Love of large gatherings	-.16	.44
Excitability	-.29	-.09
Kindness on impulse	.19	.30
Occasional great anger	-.18	.14

We may further quote Spearman:(1) "But there evidently exists an important remainder, - most conspicuous in respect of quickness, originality and humour, - that fails to be reducible to these two factors". The two factors are 'W' and 'g' and the third factor introduced to account for these and other conflicting qualities is Garnett's 'C', which Spearman again identifies as "the obverse of inertia," in other words, as Primary Function. The existence of Function as a separate variable has thus to be admitted, while its influence in producing the different correlations of 'W' with different forms of Intelligence is quite unambiguous. In the first place, "profoundness" and "common sense" are mainly characteristic of Secondary Actives, "Quickness" and "Originality" of Primary Actives. We have repeatedly demonstrated that Primary and Secondary Function each give specific effect to the Activity variable. In the Primary, the beneficial accompaniments of Activity are always somewhat less evident. The difference between the correlations we have quoted is plainly due to the influence of Primary Function on Activity.

The qualities....

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(1) "Abilities of Man" p. 354

The qualities of "profoundness" and "Common sense" are therefore due to 'W', 'g' and Secondary Function, the qualities of "Quickness" and "Originality" to 'W' 'g' and Primary Function.

True 'W' and Secondary Function have not been properly separated by Webb. We saw in the course of our research that Activity and Secondary Function are very closely related, that they combine together to form certain complex qualities, especially in the realm of character, and that there is evidence of some organic connection between them, for which we have so far no explanation. Yet of their distinctness there can be no doubt. Imperfect analysis will always manifest itself sooner or later, and in this case this happened when the correlation of 'W' with the "quickness and originality" group was examined. The introduction of Garnett's 'C' factor became necessary, but its opposite pole, Secondary Function, remained an unanalysed part of 'W'. Hence Webb's frequent confusion between 'W' and Secondary Function. Webb ascribed to 'W' what is really due to 'w' and Secondary Function, in those frequent cases where the two variables collaborate in the production of certain qualities. In other cases, certain qualities are explained as due to 'W' and 'C', the pure Activity element in 'W' being operative only, Function collaborating in its negative capacity, which is of such a nature that it could not possibly be confused with 'W', so that the existence of Garnett's 'C' was inferred. Briefly, it was possible to confuse Activity with Secondary Function, as they are so often operative in the same direction; it was not possible to confuse Activity with Primary Function as they are often operative in different, and even opposed directions. It may be noted here furthermore that the extent to which 'W' correlates with the qualities of

"Quickness....

"Quickness and originality" is a measure of the part played by the Activity Variable in their production. With all reservations we express it as our opinion that the fundamental and 'unitary' element in Webb's 'W' factor is closely akin to Heymans' Activity Variable, both Primary and Secondary Active types being credited with the possession of 'W'.

We may quote his own words: "We therefore venture to suggest (tentatively and with much desire for further evidence), that the nature of the second factor, whose generality would appear to extend so widely in character, is in some close relation to 'persistence of motives.' This conception may be understood to mean consistency of action, resulting from deliberate volition or will[1], and this is almost identical to Heymans' definition of Activity, although the emphasis on 'consistency' reveals the confusion with the positive pole of the Function variable.

However useful Webb's factor may be for an Intelligence scheme, it is of paramount importance that a clear distinction should be made for Temperament purposes.

As final proof of the distinctness we may point out that the Spearman school have always stressed the great difference between Perseveration and Persistence. Lankes, Webb and Cattell establish a negative relationship. Secondary Function corresponds to Perseveration not to persistence, Webb's factor. The negative relationship seems rather strange. It is indeed only slight, but our evidence points to a positive one. The exact relationship between Secondary Function and Perseveration has, however, not yet been established.

Having regard also to the very imperfect nature of the perseveration tests used and to the possibility that the Primary Inactives, through apathy and indifference or

unwillingness.....

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(1) B. J. P. Monograph. Vol I., III. p. 60.

unwillingness should be mistaken as "perseverating," too much weight cannot be put on this slight tendency towards negative correlation. It is sufficient to note that Perseveration and persistence are separate entities.

We may summarise thus:

The Activity Variable is distinct from mere physical activity. It is a Conative force, perhaps better called "Willed-Activity." It is clearly associated with some form of metabolic energy, most likely in some highly integrated form; whether it is this integration element, or the energy element which is fundamental, or what the precise physiological nature of each is, we do not know. Spearman looks upon it as the controlling and directing agency in his mental energy concept, a highly speculative point of view, which does not throw any light on the organic nature of this factor.

SECTION III.

The Emotionality Variable.

Our Emotionality Variable has been found to be the dominant factor in all feeling or affective behaviour, both socially valuable and socially reprehensible. In a research conducted by Wiersma,[1] which we shall discuss more fully in the next chapter, it was found that Emotionality was preponderantly associated with activities of the Autonomic Nervous System. Emotional subjects have higher body Temperature than non-Emotional subjects, quicker pulse, more restless sleep, and higher sweat secretion. The only experimental evidence we have on this Variable, has been obtained from the Pressey X-O and Woodworth Tests. Both these tests purport to measure "affectivity", or "Emotional Instability."

It seems.....

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(1) Wiersma. Zeitschrift für Angewandte Psychologie Band 33.

	SAE	SANN	PAE	PAN	SIE	SIN	PIE	PIN	Whole Group Av.
Av. Woodworth Score	17.2	15.4	18.5	19.1	16	15.7	20.7	19.2	17.7
Av. Pressey I.	52.4	55.7	58.7	58.3	54.9	52.8	56.3	56.1	
" " II.	65.9	62.9	67.6	57.7	60.5	58	63.6	66.4	
" " III.	40.3	40.9	43.6	45.2	43.6	38.3	44.6	43.9	
" Average	52.9	53.2	56.6	53.7	53	49.7	54.8	55.5	53.7
Deviation from Av. Whole Group	-.8	-.5	+2.9	0.	-.7	-4.	+1.1	+1.8	
Age. Whole Group	12.3	12.8	12.8	13.4	13	12.8	13.2	13.1	
Age Woodworth T.	12.6	13.2	13.1	13.5	13	13.2	13.3	13.3	
Age Pressey T.	12.6	13.1	13.1	13.5	13	13.3	13.4	13.3	
% Boys & Girls Woodworth	58-42	60-40	68-42	77-33	64-36	56-44	59-41	75-25	
% Boys & Girls Pressey	58-42	60-40	68-44	76-34	64-36	55-45	60-40	76-24	

TABLE XXVIII.

Average Score for each type on a) Woodworth Test, b) Pressey Tests.

Deviation of each type from Average for Whole Group on Average Pressey Score.

Average Age in each type for each of the tests.

Proportion of boys and girls in each type, for each of the tests.

It seems reasonable and logical to presume that among the Emotional "Affectivity" is higher, and Emotional complexes or instability are much more frequent than among the Non-Emotional. On the other hand it is possible that complexes only arise owing to inhibitions and repressions, so that the apparently unemotional are only so on the surface, complexes taking the place of overt and uninhibited emotional behaviour. On either hypothesis the Emotional types ought to differ in these two tests from the Non-Emotional. Table XXVIII. shows complete uniformity, not only for the Emotional - Non-Emotional groups, but for all the Temperamental distinctions in respect of Pressey Affectivity Score, or Woodworth Emotional Adjustment Index. Whatever it is these tests measure, it is neither Temperament nor Emotionality. The very slightly higher means in the Primary types are of no significance, as in each case the variability is very considerable. The quantitative data provided by these tests are useless in a Temperament or Personality study.

By definition, the Emotionality variable denotes, in terms of behaviour, the strength and frequency of Emotional reactions in relation to their causes.

We can, however, offer no proof of any organic unity underlying this general behaviour unit. We have seen that there is a good deal of disagreement on this issue, some postulating a general Emotional factor, others "innate tempers of different Emotions," It is our general impression that the Emotional exhibit those qualities in which feeling and feeling-reactions enter, and that these feeling states tend to colour other forms of behaviour as well. It seems therefore likely that in the Emotional there is both a readier and a more plentiful discharge of some form of instinctive energy. This may be either a general function of the glandular and autonomic nervous system as a whole, or there may be a hierarchy of glandular reactions. Emotionality constitutes, however.....

however, a tremendous problem by itself. The Wittenberg Symposium is proof of the diversity of problems that can be studied under the heading "Feelings and Emotion" and the great divergence of opinion they give rise to. In a general enquiry of the kind we have conducted, no special provision could be made for the detailed investigation of this type of problem. We have demonstrated that a general Emotional behaviour factor, as defined, exists. It is a general variable from the point of view of Temperament, i.e., it adequately accounts for those aspects of behaviour which are of importance in the Temperament concept.

Within the general framework of Emotional potential and stimulability, there is room for the study of a large number of qualitative differences.

Our requirements would be best met by postulating the existence of an instinctive energy, (different in intensity in different individuals) capable of being discharged by means of a variety of responses to qualitatively different stimuli. It is an open question whether such organic unity exists.

CHAPTER X.

I. THE NATURE OF THE KRETSCHMER TYPOLOGY.

A. The Cyclothyme Group.
B. The Schizothyme Group.
C. Criticism of the Kretschmer Scheme and its relation to Activity, Emotionality and Secondary and Primary Function.

D. The relation between the Concepts of Introversion and Extraversion and the three variables.

II. Experimental Evidence on the relationship between the three Variables and the Kretschmer Typology.

In recent researches, much attention has been given to the Kretschmer Typology, in which character and Temperament are studied as functions of Constitution.

It is therefore of great importance to trace the relationship between this typology and the three Heymans variables we have studied in this research. As physique qualities can be objectively measured and studied, an accurate knowledge of their temperamental implications will be invaluable from the point of view of clinical psychology.

Kretschmer's theory(1) is based on a long experience in a Swabian Mental Hospital. He corroborated his findings further on a group of 150 whom he selected from a few hundred healthy people, well known to him, as showing unambiguous physique characteristics and finally in a study of genius. Except for details on his hospital material, of physique characteristics, he gives no statistical analysis of subjective Temperament qualities. Case studies, little pen portraits, purely qualitative analysis are the grounds on which his theory rests. His variables on the organic side are physique qualities; on the subjective side, he concentrates mainly on difference in affective behaviour. This is an understandable consequence of the psychiatric approach. We shall give a very brief summary of his scheme.

He distinguishes...

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(1). E. Kretschmer "Physique and Character" London, Kegan Paul, 1925.

He distinguishes two main constitution groups, Pyknic and Asthenic, also referred to as Leptosome, and covering a sub-group, the Athletic. Each group has characteristic physical affinities, which can be diagnosed in each individual case by a detailed examination.

To the Pyknic group correspond the Cyclothyme Temperament, to the Leptosome group the Schizothyme Temperament. At the Extremes of each group are again two characteristic forms of insanity, resp. Manic-Depressive Insanity and Schizophrenia.

Kretschmer studies Temperament as it manifests itself in three forms of behaviour. 1) Psychaesthesia and Mood, 2) Psychic Tempo, 3) Psychomatility, of which we shall say more later.

A. The Cyclothyme Group.

In this group he differentiates roughly three sub-groups 1) the sociable, good natured, friendly, genial, 2) Cheerful, humourous, jolly, hasty, 3) Quiet, calm, easily depressed, soft hearted.(1)

In respect of Mood, this group displays what he calls the "Diathetic proportion", the various types ranging from the pronouncedly gay to the sad. Their psychic tempo varies from mobile to "comfortable", their psychomatility is "adequate to the stimulus", rounded, natural and smooth.(2) In exasperating situations, cyclothymes are "unhappy", rather than irritated, agitated or nervous. At one end of the cyclothyme scale are the "Hypomanic" (3) they have a very quick tempo, which tends to become with them a chronic fickleness and changeability.(4) They have....

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1. op.cit. p.124
2. op.cit. p.258
3. 'Hypomanic' in Kretschmer does not imply anything diseased. It is a characterological term; similarly 'depressed' merely gives a general characterisation.
4. op.cit. p.130

have a lightning quickness of perception, conditioned by the moment, they abandon themselves to any impression fresh in the mind. There is a close temporal relation between re-action and stimulus. In his movements, the hypomanic is swift and varied, very mobile but never inhibited, jerky stiff or awkward. There are never quick and continuous alternations in mood; there are rhythmical, wavy variations. With some the midpoint lies close to the hypomanic, with others close to the depressed pole, and there are minor differences in the rapidity and durability of the phases. By no means all Cyclothymes will display this wavy variation. Many will be permanently gay and cheerful, many permanently good humoured with a touch of melancholy, many always at a balanced mid point between these.

At the other end of the scale is the "depressed" type. They have a slow tempo and slower, though comfortable movements. Instead of the "Sanguine, quick-silver temperament of the hypomanic", they display "deep, warm hearted feelings". (1) "In its salient features, the psychic tempo of the more depressive cycloids is similar to that of the hypomanics as regards the lack of tenacity, system, and sequence, and the absence of complicated inhibitions and complex mechanisms." (2)

"Cycloid men have 'hearts'. The word 'heart' better perhaps 'good nature', brings one nearest to an expression of that which is common to the majority of these natures." "We find humour especially in the middle region of the cycloid temperament, where the capacity for laughter from the hypomanic side, and the depth of feeling from the depressive, come together here in a successful mixture." (3)

The.....

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1. op.cit. p.128
2. " p.133
3. " p.128

The Cycloids are always, whether hypomanic or depressed, men of tireless energy, men of action and of drive. One does not, however, find among them cold, masterful natures, with all absorbing power of action, which remain steadfast and inflexible to the end. There is more a "dashing impulse to work" than a "burning thirst after a high placed end." "From the middle region down to the depressive side, we find outstanding energetic perseverance."(1)

B. The Schizothyme Group.

Again he differentiates three sub groups: 1) The Unsociable, quiet, reserved, serious, humourless, eccentric. 2) the timid, shy, but with fine feelings, sensitive, nervous, excitable, fond of nature and books. 3) Pliable, honest, kindly, indifferent, dull witted, silent.

In group 1) are found the characteristics of the whole Schizoid class, a marked tendency towards autism. In 2) are found the phenomena of over-sensitivity. In group 3) one gets psychic insensitivity, dullness, lack of spontaneity, "Affective imbecility". "The Schizoid temperament lies between the extremes of excitability and dullness, in the same way that the cycloid temperament lies between extremes of cheerfulness and sadness." (2)

They verge from types which are all nerves to the cold, humbled, almost lifeless. "We see a man who stands in our way like a question mark, we feel that we are in contact with something flavourless; what is there deep under all these masks? Perhaps there is nothing, affective anaemia."(3)

Other.....

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1. op.cit. p.132
2. " p.152
3. " p.146

Other Schizoid individuals are referred to as showing "yawning emotional emptiness, the cold breath of an arctic soullessness".(1) Most of these remarks and quotations so far refer to psychaesthetic mood proportion, from hyperaesthetic to anaesthetic. These poles again tend to split up, the hyperaesthetic in "sensitivity, susceptibility, and a passionate violence which springs from the presence of complexes", the anaesthetic in "Dullness (with or without affective lameness), coldness and total indifference."(2) Although the Schizoid is often characterised as "good natured", it is a different good nature from that of the cycloid. It is a "shy animosity", compounded out of timidity and "affective lameness". Timidity is the universal characteristic of the type. Their love of books and nature is due to their flight from humanity and excessive autism.

In respect of psychic tempo, they display a jerky curve, as compared to the wavy one of the cyclothymes. They are neither mobile in their general behaviour, thoughts, actions, nor slow, nor alternating evenly between these. Instability, sudden alternations between thought and feeling, or hard, cold, tenacity, never yielding, are more characteristic of them. "Their jerkiness is now rather indolent instability, and now active caprice; their tenacity takes on the most varied shapes: steely energy, stubborn wilfullness, pedantry, fanaticism, logical systematism in thought and action."(3)

In respect of psychomotility their reactions are often inadequate to the stimulus, restrained, lame,

inhibited.....

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1. op.cit. p.246
2. " p.164
3. " p.259

inhibited, stiff. They are irregular in movements, don't know what to do with their limbs, reckless, clumsy, bad at gymnastics.

The "affectively lame", (i.e. their affective reaction is contorted, does not meet the situation well, is out of proportion, inadequate to the stimulus) though not necessarily affectively dull, are often behind their cold exterior hyper-sensitive. The outside world does not know it. They have no enthusiasms. Unshakeable peace of mind, phlegmatism, is one of the more normal forms of emotional coldness in other Schizoid types. As types in the cyclothyme group, Kretschmer gives portraits of "the Gay Chatter Box", "the Quiet Humorist", "The Silent Good Tempered Man", "The Happy Enjoyers of Life", "The Energetic Practical Man", in the Schizoid group: "The Polite Sensitive Man", "The World-hostile Idealist", "Cold Masterful Natures and Egoists", "The Dried and Emotionally lamed."

C. Criticism of the Kretschmer Scheme and its relation to Activity, Emotionality and Secondary and Primary Function.

Our outline is necessarily very sketchy. We have attempted to throw the main elements in the Kretschmer typology in as bold relief as possible; its salient features will emerge, and we can make a superficial comparison with our scheme.

What strikes one immediately is that Kretschmer's Temperament curve is bi-modal. Though the Diathetic and Psychaesthetic link at one end through a number of transition stages of mixed physique, in each, the greatest number of cases lies at the middle. In the one case we get uninhibited Emotionality as the chief characteristic with emotionally toned actions, a warmness, an easy though

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not necessarily uncontrolled discharge. In the other case, there is excitability, sensitivity, nervousness, complexes, emotional coldness, or anaesthesia, with latent, repressed emotional charge. The emotions are not freely externally discharged. We have stated at the beginning that Kretschmer's emphasis was on the affective side of behaviour. The difference in psychaesthesia and hence between the two large temperament groups is essentially one of Emotional expression. There is continual stress laid on the "neurotic" nature of the Schizoid group, their autism, their complexes, on the check which is put on the natural expression of the instinctive drive, and on normal feelings. When referring to Inactivity, Kretschmer always means affective Inactivity. Psychic Tempo and Mobility are similarly considered from the affective side. He declares (1) that the merely indolent have no great characterological interest. Dullness, "lameness", indifference are for him variants of affective insensibility. It strikes us, therefore, that the essential character of the Kretschmerian scheme is a study of the discharge of the Emotional drive. There are two modes in his Temperament distribution because he is dealing with two entirely different groups, in one of which the Emotional discharge tends to be repressed, inhibited, blocked in certain ways, in the other of which it colours all actions freely and has a normal and adjusted outlet. This is a reversion to the Jung dualism of Extrovert and Introvert. Neither Function, nor true Activity - Inactivity are considered by him as such. Now we have seen in the course of our research that when Primary Function and Emotionality combine, in the Inactive, we get a hyperaesthetic, nervous type as a result, with maximal alternations in mood, restlessness, maximally impulsive.....

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1. op.cit. p.177.

impulsive, lacking in good humour, and badly adjusted. With Secondary Function replacing Primary Function, the Sentimental type results, sentimentality and timidity are other outstanding characteristic of the Schizoid group. Heymans says of these two types: "the strong affects, engendered by Emotionality are unable, on account of a weak Activity, to effect an external discharge; hence they remain locked in consciousness, and can bring about serious disturbances in the cognitive processes, accompanied by violent expression phenomena ("affecten") some times." "As regards the Activity of these people, they consequently need strong Emotional motives to bring them into action, so that, though they are able to get through a good deal of work sometimes, they always do it irregularly, now in a burst of feverish zeal, then again nothing at all for a considerable time."

All this is eminently applicable to the Schizothyme. If we further bear in mind the large amount of indifference which we found in these groups, the lack of enthusiasm, the sentimental and romantic love of nature (à la Rousseau) remarked on by Kretschmer, then it becomes fairly certain that both these types would fall in Kretschmer's Schizothyme group. Similarly, the term "total indifference" seems to cover the Non Emotional Inactive Types.

It is also likely that certain extreme forms of the Phlegmatic and perhaps a few Passionate might be found here; the first when an extremely strong Secondary Function and extreme Emotionality would combine to form a "Cold Masterful Nature", provided with a tenacious unbending drive, and following a logical, abstract, systematic line of action; the second when owing to strong Secondary Function and Strong Emotionality the conscious stream had so deepened that "a burning thirst after a high placed end "consumed them.....

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1. Inleiding tot de Speciale Psychologie Part 1. page 196.

them. Heymans says of them: "we are then dealing with people who are ruled by their passions, strong and lasting special desires, which force back all other conscious content, or at any rate colour it; in extreme cases with people of one idea for whom everything external does not exist, which at any rate does not exert a noticeable psychical influence." (1)

The Schizothymes are therefore a mixed group, containing mainly Primary and Secondary Emotional Inactives, and Non-Emotional Inactives (though a good few of these are ignored by Kretschmer as having no characterological interest. He would only include those where he suspected a totally inhibited Emotional drive somewhere hidden away) as well as those extreme cases of the Secondary Actives who show strong autistic qualities, or a very strongly marked set behaviour, of a 'complex' nature. The correspondence with the Introvert of Jung is clear.

The cyclothymes stand in all respects in the sign of Activity. We have seen that they vary from the men of tireless energy on the hypomanic side to the conscientious persistent workers on the depressive side. Our correlations have shown that, in both Primary and Secondary Functioning Activity tends to produce Good Humour, Cheerfulness, optimism in a maximal degree. The Good Humour most frequently in the Phlegmatic, the cheerfulness most in the choleric. In the Cyclothymes, a cheerfulness which bubbles over is found at the hypomanic end of the Diathetic scale, a quiet good humour in the more melancholic region. Heymans stresses as a most important aspect of the Emotional Active types: "the alliance of strong Emotionality with a definite direction of the mind towards actions has as its prime consequence that attention is directed to the outside world.....

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1. op.cit. Pt.II. page 40.

world, rather than inwards; the emotions are therefore not nursed in an inner sanctuary of the mind, as they are with purely feeling natures, and therefore they do not easily acquire a morbid character; rather do they immediately give rise to conscious awareness that something should be done about it, and they are discharged in the subsequent practical considerations, or the consequent actions themselves." (1)

Kretschmer finds the outward direction of thought and emotions the most marked characteristic of the cyclothymes. Hence, that Activity is a fundamental quality of this group there cannot be any doubt. This is how Kretschmer describes a "hypomanic type: "the hypomanic is 'hot-headed', he is a man of a quick temper, of the knightly hot-bloodedness of a Fritz Reuter (one of the case-studies) who flares up all of a sudden and is soon good again. He cannot halt behind a mountain; when anything gets in his way, he sees red at once, and tries to get what he wants by making a row. He is not made so that he can swallow his indignation and carry it around under a gentle exterior, while it causes him internal agony; but for that reason he bears no malice; lying in wait, intrigue and sensitivity are foreign to him."(2) He says further about the cycloid: "Every mood stimilus finds in them at once its resonance; no inhibition hinders them, and there is no long thought-out purposefulness with its complicated after-effects; they are able to give themselves up to the momentary mood of the milieu, and at once to swing with it, to take part, and to identify themselves with it." (3)

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1. Inleiding Part II. p.29
2. Physique and Character p.127.
3. op.cit. p.128-129.

The first quotation undeniably characterises the Choleric type. In the second, Primary active qualities, many of a more sanguine nature, are also strikingly evident.

At the centre, and towards the depressed pole, Secondary Active qualities become more and more frequent. We have had references to slow tempo, energetic perseverance, general evenness, depth of feeling; "their thoughts take time, the decisions ripen slowly", "they are practical men, who first observe the men they have to deal with, and the real possibilities, and then turn to the principle;"(1) there is the silent good tempered man" a good fellow, a bit phlegmatic, he has a soul. He moves with caution and does not like to commit himself."(2)

On the face of this evidence, we are inclined to identify the Cyclothymes with the Primary and Secondary Actives; the Diathetic proportion scale would range the type in this order probably: The Choleric at the Hypomanic, quick silver, overflowing end, the Sanguine and Passionate next, shading over and coinciding with each other, the Phlegmatic at the comfortable, depressed end, Activity accounting for the Good Humour, the 'extraversion' of them all, and for the ready, uninhibited expression of the Emotions. If that is so, then the types, which have Constitution as a variable, are not unitary at all. We have attempted to show in this research that between the eight Heymans types there are characteristic and important differences, that the three variables exist, subjectively as well as objectively.

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1. op.cit. p.130
2. " p.210

The Kretschmer types definitely take no account of Function, look upon Emotionality from a psychiatric point of view, as freely expressed, or inhibited and developing complexes; and consider Activity only indirectly, and again as closely related to affective process. Hence a large number of very pertinent temperamental differences cannot be directly or indirectly related to the Kretschmer Variables.

Pfahler [1] criticises Kretschmer very much along the same lines as we have done. He considers the affective volitional side over-emphasised and one sided. It is not possible to explain all the qualities which belong to the cyclothyme, as distinct from the Schizothyme, on Kretchmer's temperamental and Constitution basis. Pfahler seeks a cognitive factor, or factors which according to him take up a pre-eminent position in the determination of fundamental types. Like Heymans, he postulates a Function mechanism, which is either 'perseverative', or 'associative'. The qualities which he correlates with each leave us in no doubt that he is dealing with Secondary and Primary Function.

E. Jaensch [2] criticises the Kretschmer typology on the same grounds: "the so-called Schizoids are by no means a uniform group. It contains synaesthetics, disintegrates, the purely inwardly integrated types, and the I_1 type etc." Kretschmer himself, of course, never claimed that his types were unitary. He says: [3] "At first we have the feeling - but that is not a judgment that can be proved - that the mass of the Cyclothymic group, in their bodily as well as in their psychic build, make an impression which is simpler and more narrowly defined, than can be said to be the case with.....

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1. G. Pfahler, System der Typenlehren Leipzig 1929.
2. E. Jaensch, "Eidetic Imagery" p.115.
3. Physique and Character, p.179.

with the outwardly very heterogeneous types of physique and character which make up the Schizothymic class; and yet this greater external variety is no absolute proof that there is not an inner unity, at least from certain points of view.(1) Our purpose here is only to characterise as far as possible, both physically and psychologically, the general features of the Schizothymic types, in contradistinction to the general features of the cyclothymic type; but without saying whether the Schizothymic and cyclothymic types form unities in themselves or whether, besides these great groups, there are other fundamental constitutional classes which we do not know of".

The test of a Temperament Scheme lies in its usefulness adequately to account for as many Temperament phenomena as possible, to reduce these to as few subjective variables as possible, and to investigate the biologic, physiological foundations of these variables.

Kretschmer has established an important correspondence between Constitution, and the discharge, direction, course and nature of the Emotional process. We know the effect of endocrine secretions on body build; we also know their close relationship with emotional and excitability factors.

In the course of his psychiatric work, Kretschmer again and again has come up against evidences of this relationship. From a psychiatrist the affective side of temperament naturally receives most attention. But we have seen that it is impossible to range all the relevant facts of Temperament under the heading of Affectivity, hence that it is impossible to relate them purely to Constitution factors. There are other variables as well. Constitution is an index which in future cannot be left out of account.

But.....

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1. Our underlining.

But it cannot hold the field alone. The wide range of portraits which Kretschmer gives, all with numerous qualities and characteristics which do not follow logically or deductively from the Physique Temperament scheme fundamentals, even if the fullest physique details were available, all these signify the defeat of the scheme as a working Temperament proposition, or as a complete statement of the nature of Temperament.

The Relation between the Concepts of Introversion and Extraversion, and the three Variables.

Interesting information has emerged about the nature of Introversion and Extraversion. We discussed these concepts in the introduction and suggested that they might not be fundamental, unitary processes at all, but characteristic gestalten, corresponding to a particular configuration or configurations of variables. We gave a simple illustration as to how such variables would not themselves emerge at all, and how important qualitative differences would occur in both groups, owing to the unanalysed complexity of the two concepts used for classification. The critical examination of the Kretschmer typology bears out our contentions. We see that both the Introvert and Extrovert groups contain a diversity of types. Introversion results generally from a combination of the negative pole of the Activity variable, with the positive pole of the Emotionality variable, function being constant. To these combinations, Heymans ascribes a pattern which we recognise as Jungs Introversion and Kretschmer's Schizothyme pattern. The further attributes of these combinations we have also, in our research, found to be consistent with the general characteristics of Kretschmer's Schizothymes. In our opinion, the Introversion

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pattern can also result from peculiar discharges of the Emotionality variable in combination with strong Secondary Function. In other words, the various types of autism are functions of characteristic variable patterns, and not functions of one specific Introversion variable.

The types not characterised by autistic qualities are not necessarily all Extraverts in Jung's or Kretschmer's sense. The latter considers the Apathetic and Amorphous of no characterological interest. It is also questionable whether a certain range of the Phlegmatic type would be considered Extravert. Hence Extraversion is similarly a behaviour pattern, accompanying a number of variable - ratios in which strong Activity is particularly evident. Introversion and Extraversion cannot therefore together account for the whole range of Temperament types. And so, as we anticipated, the arbitrary adoption of a concept to serve as a basis for a typological division without its adequate analysis into constituent elements, turns out a failure from a general Temperamental point of view, however useful it may be for the specific purpose of psycho-therapy.

The factor of direction of emotional discharge, which we found important and frequently occurring in Temperament theory, can therefore be stated in terms of the three fundamental variables.

II. Experimental Evidence on the relationship between the three Variables and the Kretschmer Typology.

Wiersma[1] conducted a detailed research on a group of.....

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1. E. Wiersma. "Körperbau verschiedener Rassen und Konstitutionen" Zeitschrift für Angewandte Psychologie Band 33.

of 415 normal adults in Holland into relationship between the three Heymans Variables and Race, Constitution, and physiological behaviour forms. Both Temperament material and Constitution material, the latter by means of a very detailed series of questions, all involving actual physical measurements, were obtained from medical practitioners in Holland. His method was first to divide his material into Racially, next into Constitutionally and finally into physiologically distinct groups. Under each heading he worked out first intercorrelations of race, constitution and physiological qualities, to make sure that he was in fact dealing with groups truly characteristic of each. Then he determined differences in Temperament qualities between the various race groups, between Constitution groups, and between groups obviously distinct in physiological function.

He first of all pointed out that Race and constitution are not synonymous terms. He remarks: "there are differences in Constitution which occur within the limits of each race." It is noteworthy that Kretschmer not so much as mentions this distinction. His material was nearly all drawn from Swabia, and from the farming population there. It is very likely that they were a fairly pure racial group. Jaensch adduces interesting material on the difference in race. It was found that people with dark eyes, dark skin, dark hair, were predominantly red-sighted, particularly those who were easily browned by the sun. Persons with light blue eyes, fair skin and hair were without exception green-sighted. Red-sightedness is sun adaptation, green-sightedness shows sun adaptation to be absent.

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The red-sighted belonged to Jaensch's Integrated type, the green-sighted to the disintegrated type.(1) Hence, geographic position, and consequently race, may influence Temperament to a very considerable extent. It is also well known that in certain areas, owing to salts present or absent in water supply etc., certain forms of endocrine functioning are endemic. We shall see in due course that considerations such as these, unfortunately ignored by Kretschmer, have a very fundamental bearing on the whole of his typology.

Wiersma, by means of recognised Anthopological criteria, sorted out of the heterogeneous group of Dutch population all the Nordics and all the Alpine Types. He found the first more frequently in the North of Holland, the second more often in the South. The most important conclusion he arrived at was that the tall, narrow-skulled, blue-eyed and fair-haired Nordics were predominantly Secondary Functioning, the shorter, dark, round skulled Alpine were more often Primary Functioning. They did not differ in respect of Activity and Emotionality.

Wiersma divides his group according to Constitution into three classes, which correspond to Kretschmer's Physique types:

a) The slender and delicately built (fein und zartgebaute Typus), which is Kretschmer's Asthenic or Leptosome Type.

b) The 'squat' type (gedrungene Typus) corresponding to the Pyknic type.

c) The coarsely and heavily built (grob und forschgebaute Typus) the 'Athletic' type.

Again he finds that a large number of physical qualities under each heading intercorrelate.

Further.....

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1. E. Jaensch. Eidetic Imagery p.109-110

Further that the slender and delicately built are less Active, more Emotional, equally Primary and Secondary Functioning. Hence the Asthenic, Leptosome, or Schizoid type tends on the average to correspond to the Sentimental and Nervous types of Heymans.

This result bears out the conclusions we arrived at after the analysis of the Kretschmer Schizothyme group. This independent experimental source, shows our analysis to have been substantially correct. Wiersma found this slender type further to exceed the average for impulsiveness, intolerance, introversion, awkwardness, egoism, talent for acting, lack of naturalness in conduct, fear in danger and tendency to mental aberrations. These are all qualities ascribed by Kretschmer to his Schizothyme group. The 'squat', Pyknic type is found to be Active, considerably less Emotional, and considerably more Secondary Functioning than the general average.

Finally the Athletic type is of average Activity, with a very slight tendency towards greater Emotionality and Primary Function.

This is a somewhat unexpected result. The Alpine type and Pyknic constitution, which tend to resemble each other, are found to be characterised by the opposite poles of Function. Willemse[1] says: "His results from our point of view are startling - - - - opposed to all the writings of Kretschmer, Pfahler, W. Jaensch, Enke and to our own experience". Characteristically, he seeks to account for the finding that the Pyknic type is Secondary on the grounds that Wiersma did not differentiate between "true emotions

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1. W. A. Willemse "Constitution Types in Delinquency" Kegan Paul 1932, p.p. 241-243.

and feelings", which on the one hand may "overflow in the comfortable and in the hypomanic pyknics", and, on the other hand, "the nervous irritability or excitability and sensitivity" of the hyperaesthetic leptosomes. This remark - though of course as a criticism not based on fact, as the mere existence of the 'Nervous Type' proves - again illustrates what we have stressed before, that the Kretschmer typology is essentially based on Affectivity. Willemse did not realise that Pyknic and Alpine were not the same; in fact, he refers to the different results obtained by Wiersma in respect of these as an "outrageous" contradiction in the statistical material. We shall show, however, that far from being an outrageous contradiction, the findings fit in very nicely with our analysis of the Kretschmer Cyclothyme group, are in fact the only ones which can meet all the relevant facts.

Wiersma's data can be summarised as follows:-

	Positive Pole.				Negative Pole			
	Slender	Athletic	Squat	Av.	Slender	Athletic	Squat	Av.
Active	65.5	65.7	73	66.6	25.3	23.9	20.5	23.7
Av.Other Activity QUESTIONS	48	47.4	60.3	51	26.4	21.3	23.8	23.4
Emotional	68.9	66.2	57.1	65.3	18	18.3	14.3	16.9
Av.other Em.Questions.	33.6	27.2	26.2	30.3	28.4	38	38.6	32.9
Function	46.9	44.3	53.2	46.5	24.6	24.5	18.6	24.1

The % differences are quite appreciable and in a number of questions, of which the average is given, all in the same direction.

Wiersma's investigation into the relationship of the Temperamental variables with physiological functions, and the way these again are related to Race and Constitution, re-affirms his previous findings on the Temperamental nature

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of Race and Constitution types. Wiersma distinguishes between automatic and autonomic functions in physiological behaviour forms. The first covers reaction time, tempo, gait, movements, posture, facial expression, body movements, and the like. The second metabolism, respiration, sweat secretion, defaecation, pulse, temperature, sleep, digestion etc. He discovered a marked relationship between Emotionality and the Autonomic Functions. Emotionality only affected automatic physiological qualities by increasing restlessness, mobility, lack of smoothness in movement. Upright posture, expressive and piercing look, directed outwards to the world are correlated with Activity. These are all typical Cyclothyme qualities.

On the other hand the Inactive are more commonly spineless, with crooked bent posture, uncertain movements, unenergetic gait, little facial expressions and little articulation. They have dreamy eyes and carry their heads bent down. Secondary Function tends to produce quiet and evenness in the automatic reactions, Primary function adds considerably to expressiveness, and alert attitude to the world.

The automatic functions are covered by Kretschmer under the headings of his Psychic Tempo and Psychomotility, and it is plain that differences in these must be sought largely in the sphere of variables, other than an Emotionality variable.

Summing up we find that predominance of Activity goes with the positive, alert aspects of automatic physiological functions, predominance of Inactivity with the negative aspects; Function modifies the automatic functions towards the mobile side on the one hand, towards the even, slow

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side on the other; pronounced Emotionality, although tending to assist in increasing mobility on the automatic side, yet is most marked in being strongly related to increased strength of autonomic functioning.

When relating these various physiologically determined behaviour patterns to Race and Constitution, we find that both Nordic Race and Pyknic constitution are slow and restful in movement, gait and speech, with pensive eye, expressive face, regular writing and articulated speech. The Alpine type are quicker and more restless, but also more expressive.

The slender Asthenic type is marked throughout all activities (automatic behaviour) by uncertainty and restlessness, general awkwardness and lack of alertness in posture and nervousness.

This result is highly interesting. Those Psychic Tempo and Psychomotility qualities which Kretschmer states are characteristic of the Cyclothyme group are here found to be determined by the positive pole of Activity Variable with Primary Function accounting for the Hypomanic pole, Secondary Function for the depressed pole. This once more bears out our statement that the Cyclothyme group is composed of Primary and Secondary Active types, regardless of Emotionality. Similarly the Asthenic Psychic Tempo and Psychomotility qualities are correlated with Inactivity, the positive pole of the Emotionality variable being involved somewhat more frequently than the negative.

We can now give an answer to the problem, how it is that Kretschmer's Pyknic group, which according to him constitutes the Cyclothyme Temperament, contains both Secondary and Primary types. We have found that

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the Pyknic type is Secondary Functioning, and exhibits mainly the more even, depressed type of the Psychic Tempo and motility. This was re-affirmed when Wiersma found again the Secondary Active physiologically determined behaviour pattern as characteristic of the Pyknic group. Throughout this analysis, however, we have identified the Cyclothymes with both Primary and Secondary Actives, the Pyknic with Secondary Actives only. We are, therefore, tempted to ask: "Is Kretschmer's Cyclothyme group a pure Pyknic Group?" It struck us immediately that if we added the Alpine type to the Pyknic, the whole Cyclothyme range, from quick, restless, and great expressiveness, to slow, restful movement, pensive eye, regular writing and articulated speech would be accounted for on the organic side, which it definitely was not when only the Pyknic type was held to display the Cyclothyme Temperament. For we have seen that the Alpine type are predominantly Primary Functioning and display the very mobile type of tempo and motility. We have, therefore, come to the conclusion that Kretschmer's Cyclothyme group, which is made up of Secondary and Primary Actives, cannot be accounted for on the basis of the Pyknic type alone, but on the basis of a combination of the Pyknic constitution type and the Alpine Racial type. A little further study of the matter shows that this is indeed highly probable. The province of Swabia was that Southwest corner of Germany, bounded on the South by the lake of Constance, on the West by the Rhine. It lies in the Alpine race area.

Furthermore, Kretschmer's conclusions are based on material drawn largely from the farming population of

this area. Farmers, especially in mountainous country, tend to live for countless generations in the same locality; they intermarry, and keep their race pure. That Kretschmer dealt therefore almost without exception with the Alpine type seems fairly reasonably sure.

Both the Racial Alpine type and the Constitutional Pyknic type tend towards the same physical appearance; that they are temperamentally distinct is strange, but not unintelligible. We have seen from Jaensch that extraneous factors, such as sunlight adaptation can have a marked Temperamental influence. A number of these factors may, by selective influence, have become fixed in the racial types. Constitution, however, is not determined by extraneous factors, but by functional ones in the individual which are determined by heredity which have no relation to race. Whichever of the two is dominant determines the nature of the Temperament. A Pyknic Alpine may be either Primary Functioning, or Secondary Functioning, according as race factors, whatever they may be, or constitution factors are the stronger represented in him. Kretschmer in selecting Pyknics, automatically must have selected Alpine as well, as his groups was Alpine, and he therefore selected Primary as well as Secondary types. On the Schizothyme side, he also must have selected Alpine, which agrees with the fact that the two poles of Function are equally distributed in that group.

Kretschmer did not mix up Constitution and Race qualities. Race was constant. Hence he ignored it, and on account of this ignorance came to ascribe to his Pyknic type the whole range of Cyclothyme qualities, to part of

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which only it was entitled. The Pyknic is a Cyclothyme, not the Cyclothyme. Hence the heterogeneous nature of the Kretschmer Typology came into being, a heterogeneity which Kretschmer failed to appreciate on account of his onesided emphasis on the affective side of Temperament.

In this analysis we have been forced to make one or two assumptions. We have had to use scanty evidence, and were often guided by inference, venturing into fields which Psychology so far has hardly touched - the psychological nature of Race, its genesis and influence. But our explanation is one which fits the facts, such as they are, and which has bridged the gap between two self-contained Temperament systems in many respects at first sight hopelessly contradictory.

We offer it tentatively, in the hope that it may serve as a useful starting point for further and more detailed investigation.

SUMMARY.

1. After a critical analysis of Temperament theories, we were led to the conclusion that a satisfactory solution of the problem must in the first place account for all those behaviour qualities which have commonly been considered Temperamental. These qualities and behaviour patterns should be reducible to a few fundamental variables, functionally distinct, and capable of a physiological explanation. The resulting typology, a convenient classificatory scheme, should be dynamic so that each type is intelligible in the light of the interrelation of these variables. Only quantitative variation should be possible within each type, the temperamental make-up of an individual depending entirely on the ratio in which the variables are present in him. As the function of each in terms of behaviour, at any given strength, both singly and in combination, is known, his temperamental behaviour pattern can be accurately described.

The diagnosis of individual differences, either by assessment of criterion qualities or direct measurement of variables by means of clinical tests, should be possible. This would satisfy the requirements of both General and Individual Psychology.

2. Our analysis led to our acceptance of the three variables of the Heymans typology: Secondary - Primary Function, Activity - Inactivity, Emotionality - Non-Emotionality, as a basis for further research. We have found that they satisfy all the requirements stipulated: They are real behaviour Units each functionally distinct, though certain complex behaviour patterns can only be understood in terms of their interrelations; they can also have a modifying influence on each other's function. It is therefore necessary to distinguish between their true causative function (i.e. the quality concerned would not exist

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with a minimum value of the variable) and a modifying or facilitating function (i.e. the quality concerned would be somewhat quantitatively different, more or less marked or intense, with a minimum value of the variable.) The resulting Typology is dynamic; we found the attributes of each type entirely consistent with its variable ratio.

3. There is no evidence that distribution of types is different in different age-groups.

4. On our data, girls are more often Secondary Functioning than boys; contrary to the finding of other investigators, we found no difference in respect of Emotionality between the Sexes.

5. The theoretic function in terms of behaviour of the variable ratios can be modified by environmental influences. The precise nature of the environmental influence is not known. It can profoundly modify the operation of the Function mechanism, enhancing, facilitating, braking, the most pronounced qualities of each according to the degree to which habit formation has taken place. Environment favours the development of delinquency in the Primary Functioning, of extreme inertia in the Secondary Functioning. It may actually determine the strength of the Activity and Emotionality Variables.

6. A useful relationship has been discovered between two of the variables and Intelligence. Given a certain level of Intelligence, the Active are more likely to be scholastically eminent and effective than the Inactive, and within each group, the Secondary more than the Primary. It is also highly probable that the Active have more often a high I.Q. - have more "g" - than the Inactive.

7. A study of the various researches of the Heymans school and of our own, reveals a universality in the distribution of types in the community. In an unselected sample, the Active are more often Secondary Functioning and more often Emotional,

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than the Inactive; further that there is a tendency for the Primary to be more Emotional than the Secondary. Heymans attempted to explain this relationship on evolutionary grounds. Its true nature will only be clearly understood, when the organic basis of each of the variables is accurately known.

8. A study of the technique of Perseveration testing reveals the inadequacy of nearly all tests in giving a measure of either the neuro-muscular or the subjective aspects of the concept. Yet there is strong evidence that such a factor exists, and tentative suggestions are made for its measurement.

A statistically significant relationship is established between the Function variable and that neural quality which determines the Flicker Threshold, which previous investigators have taken to be a manifestation of Perseveration. There is evidence that this relationship is explicable in terms of neural conduction and that the initial assumption as regards the neural basis of Secondary and Primary Function is warranted.

9. The Activity variable refers to willed Action and is distinct from mere physical Activity. It is probably identical with the conative element in Webb's "w" factor.

10. The Emotionality variable cannot be measured by such tests as the Pressey and Woodworth Tests. Our evidence does not enable us to decide whether a unitary organic process, a central emotional core, underlies this behaviour variable. It is probably determined, however, by some function or functions of the Endocrine glands and the Autonomic nervous system.

11. The Kretschmer Temperament groups, Cyclothymes and Schizothymes, are based on differences in Emotional discharge. Within each important qualitative Temperament differences occur and the scheme fails to satisfy our postulated requirements. Constitution does not single out subjectively unitary Temperament divisions. The Cyclothymes are largely made up of Alpine

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and Pyknic types on the organic side, Primary and Secondary Active types on the subjective side. The schizothymes, at any rate in Kretschmer's group, largely of Asthenics and Asthenic Alpine types on the organic side, of Primary and Secondary Emotional Inactives on the subjective side. The Non-Emotional Inactives are not dealt with by this typology at all.

12. The Heymans Scheme thus forms the starting point for an adequate Temperament theory. The salient elements in other noted typologies can be accounted for on the basis of its variables in conjunction with environmental factors. By means of these variables, it has succeeded, more than any other theory, in reducing Subjective Temperament phenomena to a practical, useful and fundamental typology without sacrificing the dynamic subjective interrelation and the direct connection between this interrelation and organic processes.

BIBLIOGRAPHY.

BARKER. L. F. — Article on Endocrinology in Encyclopaedia Britannica, 14th edition.

BLOOR. C. — "Temperament." Methuen 1928.

BURT. C. — "The Young Delinquent."

BRUGMANS. H. J. F. W. — See Heymans and Brugmans.

BERNSTEIN. — B. J. P. Monograph Supplement VII 1924. "Quickness and Intelligence."

CATTELL. R. B. — "Temperament Tests." I and II B. J. P. Volume XXIV.

COOK. A. J. T. — Thesis. Dept. of Psychology. University of Cape Town.

DOWNEY. J. — "The Will - Temperament and its Testing."

ELLIS. HAVELOCK. — "Man and Woman."

FORBES. A. — "The Mechanism of Reaction," Foundations of Experimental Psychology. (International University Series.)

GROSS. O. — "Die Cerebrale Sekundär - funktion."

GUILFORD. JR. & R. B. — Psychological Bulletin. Volume 29. No. 9.

HEYMANS. G. — "Ueber einige psychischen Korrelationen." Zeitschrift für Angewandte Psychologie I 1908.

----- — "Inleiding tot de Speciale Psychologie." Haarlem, 1929.

----- — "Die Psychologie der Frauen." Heidelberg. 1910,. 1924.

----- & BRUGMANS. — Zeitschrift für Angewandte Psychologie, Band 7.

----- & WIERSMA. — "Beitrage zur speziellen Psychologie auf Grund einer Massen Untersuchung." Zeitschrift für Psychologie. 42, 43, 45, 46, 49, 51, 52, 80.

HUGO. T. J. — "Karaktertiepes van Skoolkinders en hulle Behandeling." Thesis published 1918, University of Groningen.

----- — "Karakter studie en Opvoeding." Pretoria, 1922.

JAENSCH. E. — "Auseinandersetzungen in Sachen der Eidetik und Typenlehre VIII." Zeitschrift für Psychologie, Bd. 126 Heft I.

----- — "Grundformen menschlichen Seins." 1929.

----- — "Uber den Afbau der Wahr - Nehmungswelt." 1923.

Eidetic.....

--------- "Eidetic Imagery." 1930.

JUNG. C. "Psychological Types." 1923.

KLÜVER. H. "Eidetic Phenomena." Psych. Bulletin, Vol.29, No.3.

KRETSCHMER. E. "Physique and Character."

LANKES. W. "Perseveration." B.J.P. Vol.7. pt.4.

LUCAS. K. "The Conduction of the Nervous Impulse." London, 1917.

MC. DOUGALL. "Outline of Psychology."

MULLER. "Gedachtnis." 1900.

OATES. D.W. "Group Factors in Temperament Qualities" B.J.P. Oct. 1929.

PAVLOV. I. "Conditioned Reflexes." 1927.

PFAHLER. G. "System der Typenlehren." 1929.

PINARD. J.W. "Tests of Perseveration." B.J.P. Vol 23, Pt. I.

POTGIETER. Thesis, Dept. of Psychology. University of Cape Town.

RICHERAND. "Physiology."

SHAND. A.F. "The Foundations of Character." 1914.

SPEARMAN. C. "Abilities of Man." 1927.

WATSON. "Behaviourism."

--------- "Psychology from the Standpoint of a Behaviourist."

WIERSMA. E. "Die Sekundär funktion bei Psychosen," Jrnl. für Psych. und Neurologie, Vlll 1906

--------- "Körperbau verschiedener Rassen und Konstitutionen." Zeit. für Angewandte Psych., Bd. 33.

--------- See Heymans and Wiersma.

WEBB "Character and Intelligence." B.J.P. Monograph. Vol.1. Pt. III.

WILLEMSE. W.A. "Constitution Types in Delinquency." 1932.

WITTENBERG SYMPOSIUM. "Feeling and Emotion." Internat. University Series.

YULE. U. "An Introduction to the theory of Statistics.

APPENDIX.

TEMPERAMENT AND CHARACTER - QUESTIONNAIRE.

INSTRUCTIONS TO TEACHERS.

Below are 31 questions, each seeking information on some aspect of Temperament, Personality and Character.

Please examine carefully what each requires with reference to the particular pupil, concerning whom this information is wanted. The data obtained in this questionnaire are used for scientific purposes, everything being strictly confidential. You need not hesitate therefore, to give frankly, and without bias, your judgment on the various points of the inquiry.

You will find that a few questions can be answered by a mere affirmative or negative. Write "yes" or "no" behind those questions, as the case may be.

In most questions, there are a number of possibilities. Underline either a/, or b/, or c/, or d/, or any one of the alternatives as the case may be.

You may also find that none of the alternatives given in a question quite meet the case, the subject showing only a degree of the traits in question. In such cases, state this very briefly in the space provided after each question, indicating whether the subject inclines to a/ rather than to b/ and c/.

Where at all possible, answer the questions, and choose one of the definite alternatives. You may affix any remark, observation, or criticism to any question, if it is conducive to the accuracy of your reply.

Kindly fill in also the following details:-

Name of Pupil:

Age:

Sex.

School:

Form:

Average position in class for year, or at final examination:

Any remarks you wish to make about the pupil:

Has, Is, or Does the child,

1. (a) Regularly work with application and zest,
or (b) With periods of "slacking" and "easing off."
(c) Lazy.

2. (a) Usually attentive
or (b) Easily distracted
or (c) Playful
or (d) Often busy with other things than the lesson, (scribbling, scratching, or drawing on desk?

3. Immediately cease attending at the end of a lesson or bell-ring? (puts books away or stops writing and starts with something else.)

4. Inclined to sulk? (e.g. after supposed unjust punishment?)

5. (a) Retain the previously learned (the information "sticks", as witnessed by questions asked by the child at a later discussion of a kindred subject)
or (b) So heard, so forgotten; (never thinks of the matter again, or does not recollect it)?
or (c) Thinks over those matters which were found interesting, but yet finds it easy to dismiss everything from the mind and attend completely to something else.

6. (a) Impulsive
or (b) Cautious?

7. (a) Cheerful
or (b) Depressed
or (c) Alternatively either
or (d) Always even of mood?

8. (a) Irritable
or (b) Quickly offended
or (c) Good-humoured
or (d) Unable to be angered?

9. (a) Accurate (punctual at school, work finished at required time),
or (b) Inaccurate (careless mistakes, forgetful, comes late)?

10. (a) Try to grasp a problem, think it over and form his own opinion,
or (b) Accept and merely learn by heart what is taught?

11. (a) Remember what is learned clearly
or (b) Inaccurately and in a muddled fashion?

12. (a) Quick and ready in answering
or (b) Slow?

13. (a) Constant in friendship
or (b) Inclined to be very "thick" for a while and to break off completely and develop a craze for someone else?

14. (a) Restless and inclined to fidget (never sits still, preference for rough games),
or (b) Calm and quiet,
or (c) Lifeless and inert?

15. (a) Get down smartly to set class-work and finish it,
or (b) Inclined to dawdle and waste time?

When in difficulties
16. (a) Inclined to give up
or (b) Try to fight through with determination?
or (c) Ask for help.

17. After school hours occupied at sport, or walking, or hobbies, or handwork, or reading or music?

18. Member of athletic or gym club?

19. Member of debating club? Serve on committee and so be in the limelight?

When...

20. When scolded or reproved

(a) inclined to cry,
or (b) be rude,
or (c) argue,
or (d) sulk,
or (e) assume an annoying and defying attitude in desk,
or (f) take it calmly and with resignation?

21. At examinations

(a) calm,
or (b) nervous?

22. (a) Depressed and slightly pessimistic,
or (b) Usually bright and optimistic?

23. (a) Quickly enthusiastic (about people, historical or living, nature, art, etc.)
or (b) Indifferent,
or (c) More reserved in expression of appreciation?

24. After making a bad mistake

(a) Angry,
or (b) discouraged,
or (c) eager, to correct and make good,
or (d) indifferent?

25. (a) Emotional (feelings frequently exhibited),
or (b) Non-emotional (cool, controlled, undemonstrative)?
or (c) Feelings not on the surface, but probably yet there?

26. (a) Critical (disparaging of others, inclined to notice preferably bad traits),
or (b) Idealising (inclined to take the best, or too good a view of human nature)?
or (c) Neither

27. Headstrong (inclined to passive resistance, persevering in something wrong through false sense of shame)?

Polite...

28. (a) Polite and affable,
or (b) Insolent and rude,
or (c) Indifferent in manner?

29. (a) Inclined to show a temper on certain occasions (when teased, punished, thwarted, etc.),
or (b) Not?

30. (a) Inclined to be a ringleader, or involved always in trouble, scrapes and naughtiness,
or (b) Belonging to the law-abiding and well-behaved,
or (c) Merely apathetic?

31. Is the pupil in your opinion an active, or an inactive type? Does the pupil display mainly intellectual activity, or mainly physical activity, or both, or neither in any marked degree, or definitely neither?