A STUDY OF INDIVIDUAL DIFFERENCES IN ACCURACY OF TIME ESTIMATION UNDER DIFFERENT EXPERIMENTAL CONDITIONS WITH SPECIAL REFERENCE TO THE PERSONALITY FACTOR OF "EXTERNALIZATION."

by

Sybil Biran, B.A. (Hons.).

Submitted to the Department of Psychology, University of Cape Town, in fulfilment of the requirements for the Degree of Master of Arts.

May, 1965

ACKNOWLEDGEMENTS

The writer wishes to acknowledge her gratitude to Professor K. Danziger whose generous guidance was invaluable throughout the course of her work on this thesis.

She also wishes to express her thanks to Miss R. Evans for her rapid and efficient typing.

TABLE OF CONTENTS

LIST OF TABLES

——oooOooo——

SUMMARY

A. MAIN AIMS AND HYPOTHESIS:

In order to explore the role of personality factors in determining accuracy of time judgement it is necessary to establish the stimulus and response conditions which are most suitable for the detection of individual differences in this respect. Our aim was therefore twofold: (a) having regard to the interaction between internal and external factors, to establish a set of external conditions suitable for the testing of a specific hypothesis about the role of one kind of personality factor, and then (b) to test this hypothesis under the conditions previously determined.

(a) Our specific aims in regard to the exploration of external conditions were as follows:

(i) To determine the influence of different kinds of stimulus content on the apparent duration and accuracy of estimation of time intervals.

(ii) To compare various methods of reproduction as to their relative sensitivity for detecting individual differences in time estimation.

(iii) To compare various stimulus durations in regard to their relative sensitivity for detecting individual differences in time estimation.

(iv) To investigate the role of the visual and auditory sense modality in determining individual differences in time estimation.

(b) Having established appropriate conditions of stimulation and reproduction for the detection of individual differences in time estimation, we aimed to test the following hypothesis about the role of personality factors in the determination of accuracy of time judgement:

Individuals above the median in accuracy of time judgement with meaningful stimulus content are more likely

to score high on personality measures of intraversion than those below the median in accuracy.

B. TEST PROCEDURES:

Two experiments were conducted.

EXPERIMENT L

1. Aims:

The first experiment was a pilot study concerned essentially with external stimulus conditions. It was specifically designed to gain information in regard to the influence of experimental variables, so that the findings could be used in the structuring of the second experiment, the latter being more particularly concerned with the interaction between these and personality factors.

2. Procedure:

The durations 1.4", 4.2" and 8.4" were presented and reproduced three times by all three methods of reproduction. This procedure was adopted for both the auditory (pure tone and sound effects) and the visual stimulus conditions, (lights and slides containing T.A.T. cards).

3. Treatment of Results:

In each case error score was calculated and only the mean error for each duration was used. An Analysis of Variance was computed using mean error scores and ignoring the sign.

4. Results:

(a) The introduction of "meaning" into the stimulus conditions was responsible for significant differences in error scores. These differences were only significant for the auditory stimuli: the change in visual stimulus conditions did not lead to any significant increase in error scores.

(b) The greater sensitivity of the handle in regard to individual differences in accuracy of reproduction was established.

(c) The longest duration was shown to be the most appropriate for an experiment investigating personality differences: it was always the duration associated with the larger error in time judgement.

(d) We decided that auditory stimulus conditions were more appropriate for our purposes.

EXPERIMENT 11

1. Aims:

This experiment was designed to explore the role of certain personality factors in determining relative accuracy of time judgement.

2. Procedure:

(a) Time Estimation:

(i) Each type of stimulus was presented six times - three presentations of the two durations. (8.4 seconds and 17.2 seconds).

(ii) After each stimulus presentation the subject was required to reproduce his estimation of the duration by means of the method of controlled linear arm movement.

(b) Personality Tests:

(i) Measure of Dissociation: (Arithmetic)

Subjects were presented with cards containing arithmetic problems which they were required to solve to the sound of harsh background noise.

(ii) Rorschach:

Subjects were required to respond to the five colour cards. The number of colour and movement responses was recorded.

(iii) T.A.T. (Thematic Apperception Test):

Four T.A.T. cards were presented: numbers 3BM, 6BM, 12M and 18BM. Responses were scored with reference to three categories (using the scoring system devised by Henry: "The Analysis of Fantasy").

(a) Interpersonal relations (empathy score)
(b) Reference to inner life, and
(c) Direction of Emotional Energy (Active - Passive)

(iv) Questionnaires:

At the end of the session subjects were required to fill in the following three questionnaires:

1. A shortened MPI.

2. The Taylor Manifest Anxiety Scale.

3. The third questionnaire was essentially concerned with the subject's awareness of his own strategies in the situation. (e.g. did he attempt to devise a private pace-maker?).

3. Results:

(a) Time Estimation:

(i) The Arithmetic item was shown to be the most compelling item. Subjects systematically produced larger error scores in response to this stimulus condition than to any other.

(ii) The Music item was the most differentiating in terms of the personality characteristics investigated here. Classification of subjects according to their responses to this stimulus condition showed it to be the most sensitive instrument for detecting individual differences in response to the Questionnaires, the Rorschach and the T.A.T.

(b) Personality Tests:

(i) The Measure of Dissociation Test failed to produce any significant differences between accurate and inaccurate subjects.

(ii) Rorschach:

Subjects who were relatively accurate in time estimation when confronted with meaningful stimulus content had a significantly higher proportion of movement to colour responses than those who were markedly affected by the nature of the stimulus.

(iii) T.A.T.

Subjects who were relatively accurate in time estimation when confronted with meaningful stimulus conditions scored significantly higher in regard to "empathy" and "reference to inner life".

(iv) Questionnaires:

Our Externalizing - Internalizing groups established on the basis of accuracy of time estimation were found to resemble strongly the profiles

claimed to characterise the Eysenckian Extrovert - Introvert. The picture revealed by the Externalizer in particular was strikingly similar to the orthodox Extrovert. (He significantly more often affirmed five of the items said to characterise the Extrovert in the MPI - the instrument Eysenck uses in his classification of Extroverts and Introverts.)

C. GENERAL CONCLUSIONS:

1. Individual differences in the reproduction of temporal intervals appear to be significantly related to personality differences.

2. The personality pattern of intraversion appears to be a crucial factor in determining individual variation in accuracy of temporal judgements.

3. It would appear that accuracy of time estimation is a function of external and internal factors and their interaction.

---oooOooo---

CHAPTER I

FROM "CONSTANT ERROR" TO INDIVIDUAL DIFFERENCES

A. FOCUS ON THE STIMULUS:

The way a question is asked limits the ways in which the answer to it may be given. The psychologist's interest in time may be seen as the progress from philosophical speculation to the slow shaping of the boundaries of the psychologist's field. One can trace the steps taken by the psychologist as he rejected philosophical speculation and translated metaphysical problems into propositions more amenable to investigation. Thus psycho-physical investigation displaced philosophical speculation. The classical studies of time perception are a good illustration of Boring's conception of a scientist as a thinking unit in a psycho-social matrix, unconsciously plagiarizing the zeitgeist. Psycho-physical parallelism was basic to so much of the conceptual thinking of the experimental psychologist of the later 19th century that its principles then seemed almost axiomatically valid. Thus when the psychology of time shifted from the philosopher's armchair and came under the systematic security of experimentation, the laws of psycho-physics assumed prime importance : does Weber's law apply ? are there constant errors in the perception of time ? Other influences which filtered through to the laboratories were Kantian philosophy and Newtonian physics. It was the goal of the Leipzig laboratories to achieve generality and universality for the psychological unit of time. Since the universal was what was sought, the fact that these early findings often generalised from a single subject appeared to be no handicap. Newtonian physics assumed an absolute time and it was the goal of the early investigators to establish a specific time sense that apprehended time. Obviously within this framework individual differences existed only as errors.

It is not surprising, therefore, that the earliest classical studies found a wide range of individual differences. In the studies of the Vierordt Indifference Interval no two investigations could find the same value, though 0.5 to 0.7 seconds were most often reported. Vierordt found that short intervals were overestimated and long intervals underestimated. Blakely investigated empty intervals. Scott filled the interval with a tone and Quasebarth filled it with light. Woodrow investigated the reproduction of intervals. In all these there were great individual differences in discrimination. In studies of time order error no interval valid for all subjects could be found. Sometimes no indifference interval was present; at other times there were several.

Woodrow found it necessary to distinguish between objective and subjective attitudes in approaching experimental tasks and attempted to establish a control for these, characterising an objective attitude as one in which the attention was centred on the characteristic of a stimulus and a subjective attitude as one which ignored the stimulus and concentrated instead on the whole experience of duration.

Recently there have been attempts to fractionate temporal intervals and establish a psycho-physical scale. Ross and Katchmar used the technique of fractionation to construct a psychological scale for intervals up to 60 seconds. They used empty intervals bounded by two clicks and required the subjects to judge the lapsed intervals. They identified the unit as the "chron".

Investigating the effects of anchoring on temporal judgement, Postman and Muller used durations of 250 to 1,000 milliseconds at varying anchoring durations. They found that in all cases the introduction of an anchor produced a shift in the expected direction. The subjective scale was extended upwards with a decrease in the number of judgements in the higher categories. The closer the stimulus appeared to the anchor the more its relative position was affected by the shift of the scale. In addition to the shift of the scale a

grouping of judgements occurred so that discriminations became less exact. This experiment which does demonstrate subjective scales and the ability to contract or expand makes no effort to control such personality variables as the ability to shift anchorage points and flexibility and schematization of reference levels that Klein and Schlessinger (1950) allude to. Individual differences are still treated as "error".

The stimulus error was a ubiquitous decoy in the classical experiments of time. Each experimenter was forced back upon the subjective equation to account for the wide range of individual differences. They evoked such subjective factors as personal tempo, phrasing, attitude and response to instructions, anchorings, contrast and assimilation. Despite the recognition of these subjective factors they were not able to free themselves from their theoretical notion of the stimulus as given and "real".

B. THE SIGNIFICANCE OF EXPERIMENTAL VARIABLES:

More recently the role of experimental conditions has been acknowledged.

Harton (1939) investigated the influence of success and failure on the estimation of time. His subjects were allowed to experience success and failure on performance with a mental maze, and were reinforced or discouraged by comments from the experimenter. Two groups of subjects were consistent in estimating successful periods as shorter than failure periods. Harton believed that success induced a greater degree of unity of organization in the individual's activity than did failure.

Burton (1943) studied the relation of time estimation to monotony. He used 45 students who were tested in small groups. They were asked to perform a simple repetitive task and during varying intervals were required to make judgements on the amount of time spent during the interval. The subjects rated themselves on a boredom scale.

Boredom increased markedly from beginning to end of the task and results indicated a group tendency toward the increasing overestimation of time with increasing monotony. The increase, however, was not statistically significant and it was established that under the monotonous conditions although some individuals overestimated the time, other individuals underestimated. The individual differences and the lack of consistency of the results did not seem to warrant the implication that monotony could be a consistently significant factor in the estimation of time.

Rosenzweig and Koht (1935) studied the variables "need tension" and motivation and found that these may determine the internal quality of filled and unfilled time independent of the external quality of the stimulus. They found that during periods of greater tension there was more underestimation than when tension was not so great.

Closely related to their experiment is the perception of time as a function of perceived rate of progress towards a goal. Using 198 subjects, Filer and Meals (1949) tested the hypothesis that subjects motivated to have time pass will estimate a given period to be of longer duration than subjects not so motivated. This hypothesis was confirmed. They suggested the possibility that an attractive goal affects the psychological distance to the goal.

The traditional interest in experimental investigations was focused on the characteristics of the stimulus. This had now been displayed by an interest in the situation in which the judgement took place. Among the variables considered within a behaviourist orientation have been such qualities of the stimulus as order of presentation, length of and space between intervals, content of the interval, unity of organization of the tasks and such situational factors as anchoring effects, delay between interval and response, physical activity of the subjects, motivation and monotony. Since these investigations acknowledged the malleability of time judgements, they were not guilty of the stimulus error. However, although it was demonstrated that these factors constitute some, though not consistently significant effect,

the range of individual differences still operant is so marked that the definition and control of the central, subjective variables are still necessary if "error" is to be reduced.

C. THE ROLE OF PERSONALITY STRUCTURE:

Contemporary efforts to relate perceptual processes to personality theory suggests that the perception of time, too, may be associated with measurable personality variables. The penetration of contemporary trends to studies of time estimation was evidenced in the spreading awareness of the feeling that the constant error and individual variation found in all experiments might be accounted for by measurable differences within the responding organism.

Investigations of the role of personality variables may be roughly divided into three groups :

(1) Attempts to establish a constitutional basis for individual differences.

(2) Studies of psychiatric patients.

(3) Attempts to relate individual differences to Time Perspective.

(1) Attempts to establish a Constitutional Basis for Individual Differences:

Gilliland, reviewing the literature for the period 1933-1946, evaluated earlier studies which sought to determine the influence of breathing fatigue, digestive processes and other internal cues that aid in the perception of time. In examining some of the following studies he rejected all physiological concepts :

> Francois increased the temperature of the subject by the use of high frequency currents and found that the tapping rate of subjects was thereby increased. Sterzinger investigated the chemo-psychological factors in the human sense of time. He established that with different chemicals the subject's ability to estimate intervals of time was modified. With quinine, the five minute interval was a critical one and was habitually underestimated while longer and shorter periods were overestimated. Alcohol caused underestimation for intervals from 15 to 25 minutes and overestimation for longer periods. Hoagland sought to demonstrate that the subjective sense of time acted as if directly proportional to the speed of some internal chemical pacemaker.

Jasper and Shogass determined that the alpha rhythm of the brain was in no way related to the estimates of time. Gilliland and Shafer determined no existing relationship between pulse rate, heart and lung work, blood pressure, breathing rate and the estimation of time.

Gilliland concluded it was necessary to discard all of these physiological hypotheses and believed the available evidence suggested that the factors in the estimation were external. Time was inferred from events taking place outside the body rather than from physiological processes within.

(2) Studies of Psychiatric Patients:

Orme (;962) has studied verbal judgements of periods of 20 and 30 minutes and found that hysterics and psychopaths make longer estimates than neurotics and psychotic depressives. He found no relationship between Extraversion and time estimation in a normal sample. The difficulties involved in interpreting verbal estimates of time will be dealt with in the following chapter.

Dobson (1954) studied the problem of whether patients who are disoriented in time also showed disorientation in their judgement of short durations; and he also investigated the hypothesis that greater anxiety would be associated with longer estimates of time. In his study 16 normal, 16 neurotics, 16 time-oriented schizophrenics and 8 time-disoriented schizophrenics were used as subjects. The subjects were asked to estimate a variety of filled and non-filled periods of time ranging from 17 seconds to 2 minutes under conditions of set, (expecting to be asked to judge the time) and non-set (unprepared to estimate the time). He found that schizophrenic patients who are disoriented for time are not significantly different from time-oriented schizophrenics, neurotics or normal subjects in their estimates of time, but they seem to show greater variation. Since the samples are so small his results are not conclusive. If the neurotics are used as the criterion group for anxiety then the hypothesis that anxiety is related to longer time estimate does not hold. The neurotics were found to be more accurate and consistent than the other groups.

Guertin and Rabin (1960) also investigated the verbal time judgements of schizophrenics and found they tended to be very variable. They concluded there is a functional disability in their time judgement.

(3) Attempts to relate Individual Differences in Time Perception to Temporal Horizon:

Siegman (1961) conducted a study to explore the relationship between time perspective, time estimation and impulse control. The subjects used were 30 delinquents and 22 non-delinquent army inductees, who were selected in an effort to control the effects of institutionalisation. In both groups, a positive correlation between future time perspective (given by the average distance from the present of ten future events named by the subject) and higher estimation of time was found.

The study conducted by Knapp and Green (1959) has shown that a tendency to think of events as close to the present is associated with low estimate of time. Both are in turn associated with high n Achievement. This tendency to underestimate the time which separates past events from the present and to underestimate the time taken by a moving point to reach a mark is probably congruent with Siegman's finding that long future perspective is positively associated with high time estimate.

Probably the most encompassing study of individual differences in time judgement is that of Loehlin (1959). Loehlin obtained verbal estimates of the duration of 16, 2-minute intervals from 105 college students. These intervals were spent in a variety of ways. Among the occupations in these periods were, counting the incidence of the in a prose passage, anagrams, arithmetic, repeated writing, pleasant thoughts and concentration on time. Other intervals were also estimated. Two short periods of 1 second and 4 seconds were estimated four times to the nearest 10th of a second. One 2-minute period was also estimated. Short time intervals were compared and a period filled

with an accelerating pulse was compared to a period filled with a decelerating pulse. Subjects were also asked to fill in a questionnaire on attitudes to time. Fluency scores were computed from each subject from the number of I's written by the subject in two minutes, the number of solutions of an easy anagram in two minutes and the number of questionnaire items completed in two minutes. Analytic perception was measured by detection of figures in the Gottschaldt test and by the number of the's counted in the prose passage. Finally, MMPI's were completed voluntarily several months later by 74 (70%) of the subjects. The data were correlated and factor analysed. Several factors were extracted. Factor I was found to be general to the 2-minute estimates and appeared to reflect characteristic individual differences in the length of the time estimate of two minutes. Two determinants appeared to contribute to these individual differences. The first was personal differences in the conception of one minute and the second was the degree of interest in the tasks : bored subjects had higher estimates. Factor II had variance specific to short intervals and also reflected a tendency to estimate the second of two periods of a repeated activity as relatively long. There were positive loadings on the perceptual ability measures. (Gottschaldt figure test and difficult anagrams). It is suggested that this factor is intellectual. Factor V loadings suggest an Activity-Passivity dimension. Subjects with high scores on this factor tend to overestimate periods spent passively and to write a large number of I's. The MMPI differences were not as expected. Passive subjects were, as expected, high on the Pt, Hy, and D scales but active subjects were not high on the Pd and Es scales.

Questionnaire items which correlated with Factor I seem to relate to differences in time perspective. Examples of such items are :-

1. "I have a poor memory for the past events of my life".
2. "Often the days go slowly, the weeks and months seem to fly by".
3. "The future is too uncertain for a person to plan very far ahead".

Questionnaire items also correlated with Factor II and seemed to reflect differences in the development of a sense of the conventional scale of time. Persons high on Factor II agreed with an item such as :-

"A period of a few minutes often seems like hours to me".

Persons low on Factor II agreed with such items as :-

1. "My father is a rather dominant person", and -
2. "I sometimes feel we would have been better off if clocks had never been invented".

Subjects with high scores on Factor V - those who seemed to be less subject to time illusions, also agreed with certain items in the questionnaire more often than with others. These items were :-

1. "I have a pretty definite idea what I will be doing next summer".
2. "I usually have a pretty accurate idea what time it is".

The high items reflect a feeling of control of time which seems to be consistent with the Active-Passive interpretation of this factor.

The literature covering studies of the relation between personality structure and time experience is restricted by the paucity of studies guided by articulate theories. Moreover, very few experiments are designed to test a priori hypotheses. The extensive scope of Loehlin's study is due, in part at least, to the fact that it was not shaped by an integrated set of predictive hypotheses. Its underlying assumptions were too broad to generate directly testable predictions : clear cut hypotheses could only crystallise after the application of factor analysis. His basic position that "it is a commonplace of daily experience that time seems to pass more rapidly under some conditions than it does under others" has no more predictive value than the anticipation of intra- and inter-individual variation in response to different interpolations. It is an indication of the immature state of research in this field that its most comprehensive study is still

fact-hungry. A probable reason for this is the fact that few Typologies of Personality state their postulates and predictions in such a way that they are directly amenable to testing. (The need for typological postulates containing clear-cut predictions is particularly pressing in the field of time perception where investigation is still so groping and its findings have only heuristic value.) The Eysenckian typology is a striking exception to this. Eysenck's theory of Extraversion - Introversion is framed in such a way that predictions flow easily from it. The experimental value of these predictions has been taken up by Du Preez of the University of Cape Town who explored the validity of the postulate which states that "..... Extraverts generate excitatory potential weakly and slowly and reactive inhibitions strongly and quickly"; and vice versa for Introverts. But Du Preez' study is primarily concerned with the efferent aspects of time judgement; it was specifically designed to test the relationship between judgement of time and mode of expression. Interpolations were not varied.

Underlying Loehlin's study is the assumption that different stimulus conditions affect apparent duration because their "meaning" is differently received by each individual. This assumption is congruent with developments within the frame of contemporary functionalism which relates perceptual behaviour to personality theory. There is no reason for the principles of perception proposed by such writers as Postman and Bruner, Hebb, etc. not to apply also to the perception of time. Postman and Bruner maintain that perceiving takes place within a "tuned" organism that is prepared rather than randomly set. Determining tendencies, cognitive predispositions, a generalised state of readiness to respond selectively to classes of events is operant. The view that there exists persistent, generalised, enduring patterns of perception has arisen in psychology in many forms which need not be described here. It is sufficient to note its general application as a valuable guide in the study of time. Loehlin's elaborate variations

of the content of his durations instead of simply stimulus conditions (variations of duration, time order) is a tacit acknowledgement of the fact that "meaning" is differently received by the character structure of the responding organism.

The role of "meaning" or content in the time experience is a subtle one. On the one hand, "we have no sense for empty time". (James 1950. Vol.1. p.619): on the other "our notion of duration becomes more and more independent of what happens in it". (Fraisse p.283) These two quotes provide the concentrated essence of the two broad dimensions of our time experiences. James' choice of words, was as usual, very apt: our experience of a duration of time is derived from no specific sense, but is an upshot of the interacting effects of all our senses. Moreover, our senses cannot react to "empty time" : cues will be supplied from within if they are not provided from without. Hence, the experience of duration is derived from the psychologically heterogeneous events constituting our context. We never have a direct experience of the world of homogeneous physically measurable sequences.* It is only once our operational thought processes mature and we bring to bear our powers of synthesis, analysis and abstraction, that we achieve a concept of time which is emptied of all affect and its related experience. At its highest level this representation is "detached from the first images which constituted it and is nothing more than the idea of a uniform and continuous background". (Fraisse p.283). Since it is our experience of events which is responsible for the perception of duration, these perceptions must be contaminated by the special field effects involved. Unlike our other perceptual illusions, temporal illusions are well known even to the layman. He has become aware of the extended impression of time he has when he is bored and the contracted

---

* This is why it is not necessary for the layman to adjust to the esoteric revisions of the classical concepts of time precipitated by Relativity theory. The sophisticated concepts of time developed in the physicists' laboratory play no part in temporally organized behaviour since they "do not arise from the direct action of man upon things, but from his scientific activity". (Fraisse p.287)

impression he has when he is interested. A knowledge of the cunning of his events to expand and shrink is of pragmatic value (not only scientific interest) and has become so "built-in" that in the attempt to construct a functional scale of duration, he automatically corrects for these. In fact, each individual develops some sort of workable notion of the amount of mental content which constitutes his minute. In a sense he lives simultaneously in two times : one arising from his awareness of duration and a corrected version of time which obtains its cues from operational thought. As we learn to empty our experiences of their "meaningful" content, we are in fact exercising our self-reflexive ability (and at the same time creating a new dimension of meaning). The ability to detach ourselves from our experiences - to freeze as it were the flux of external events, in order to examine their impact - is more specific to certain personality types than others. It is well established that some people are more prone or more able to dissociate themselves from their environment than others. They react more frequently to an internal frame of reference than to external stimuli.

The above is the theoretical framework of this study. An experiment designed to elicit an estimation of the durations of engaging stimulus conditions is specifically concerned with the individual's powers of dissociation. If we accept the above it follows that the individual's typical frame of reference would determine his ability to estimate time. Those individuals who are more vulnerable to or dependent on external stimulation should yield more inaccurate time judgements than their opposites. The inner-orientated individual should be able to resist the impact of a stimulus and sustain an internal cue system in the face of compelling stimulation. One could object that an experiment of this nature does not, in fact, test the proneness of these groups to these areas of stimulation since their instructions predispose them : they have been initially primed to dissociate.

However, the individual's response is a function of his history and will be facilitated or hindered by his habit patterns.

What we have called the "power to dissociate" is an important dimension of a substantial body of personality theories (if one equates for differences in nomenclature). In fact, the dimension of self-environment differentiation has been the basis of the typologies proposed by writers whose concepts have been most influential in creating modern personality theory. A brief account of the writings of these theorists will help to provide an indication of the general theoretical framework of the present study. Jung, Eysenck, Kretschmer and Jaensch will be the chief sources quoted here. Since our objective will be to extract only what is strictly relevant for our purposes, over-simplified accounts are unavoidable.

TYPOLOGIES CONCERNED WITH SELF-ENVIRONMENT DIFFERENTIATION:

(1) Jung:

Jung sees the main cause of typological differences in the extraverted or intraverted tendency of the libido. He postulated two major attitudes of the libido : an introverted attitude in which the libido turns inward to the self, and an extraverted attitude, in which the libido turns outward to the external world. The Extravert and Introvert are further distinguished in terms of four styles : thinking, feeling, sensation and intuition. The thinking Extravert is governed by practicality and necessity, the thinking Introvert by absolute principles. The feeling Extravert tends to have a powerful but rather coarse emotional expressiveness but the feeling Introvert is characterised by a delicasy, restraint and distinction of feeling. The sensational Extravert searches for new contacts with the environment via exteroceptors and the skeletal-musculature but the sensational Introvert may resort to drugs or drink, obtaining his sensation by alterations of the internal environment. The intuitive Extravert may take to games

of chance or indulge in risky undertakings to obtain success, but the intuitive Introvert tends to mysticism.

Jung's scheme not only exerted a considerable influence on later theorizing: it also gave rise to a considerable body of experimental investigation. Moreover, his typology led to the construction of a variety of scales designed to measure the dimension of extraversion-introversion. Eysenck's work is the most well-known.

(2) Eysenck:

Eysenck favours the use of factor analysis in the attempt to arrive at a satisfactory taxonomy of personality. His own application of factorial methods has led him to the development of a hierarchial structure of personality of which one of the dimensions is Extraversion-Introversion. A vast number of articles and books summarise his thinking and research findings in this area. In fact, the largest portion of his work is concerned with the perceptual and motor correlates of this dimension.

Eysenck's analysis of Extraversion-Introversion differs somewhat from that of the popular American version which conceives it largely in terms of gregariousness versus shyness, withdrawal and introspection. His interpretation is closer to Guildford's factor of Rhathymia which centres around spontaneous outer expression versus inhibited, self-controlled seriousness. Eysenck considers this to be nearer to Jung's concept and to the hysteric-dysthymic dichotomy.

An important feature of Eysenck's typology is its emphasis on the constitutional origin of this dimension. He has attempted to attribute this dimension to autonomic differences or to characteristics of neural functioning. The view that there are neural differences in the speed of production and strength of excitation and inhibition is responsible for his central Typological Postulate which states that Extraverts generate excitatory potential weakly and slowly and reactive inhibition strongly and quickly . This postulate has important implications in the field of time estimation. According to the theory

Extraverts would be expected to show a greater tendency towards negative time errors. In fact, the prediction that Extraversion is negatively correlated with time judgements has been taken up, not only by Eysenck himself (1957), but by Claridge (1960), Lyn (1960) and Orme (1962). In support of Eysenck's prediction. Lyn found that extraversion was associated with lower reproduction scores. On the basis of their scores on the MPI, Claridge chose 30 extraverted neurotics and 30 introverted neurotics and analysed their estimations of time intervals of 5", 10" 20" and 30". Extraverts showed the larger negative time error as predicted by Eysenck. The study conducted by Orme (1962) however, failed to reveal the co-variations Eysenck predicted. Orme studied the verbal judgements of 20 and 30 minutes. He found that hysterics and psychopaths produce longer estimates than neurotic and psychotic depressives. However he found no relationship between extraversion and time estimation in a normal sample. The latter finding is important since it questions not only Eysenck's conclusions, but also his procedure. The evidence supplied by Eysenck and Claridge was obtained from studies which used neurotics as criterion groups. Although both their results favoured the hypothesis, the dubious validity of their methods as well as the incongruent finding reported by Orme, leave the issue unsettled.

(3) Kretschmer:

Despite their overall differences in orientation, Kretschmer and Eysenck concur in one important respect : they both reject the type of approach which attempts to understand the total personality as an unique organisation. Moreover their typologies start off with very similar definitions of "type". Kretschmer's definition (" a concentration of concentrated traits") is almost identical to that of Eysenck ("observed constellations or syndromes of traits"). However the resemblances between their theories end here. Given the above definition of "type", we find that the particular system of correlations which Kretschmer chooses lies in the field of body types. He attempted to differentiate three body types with respect to their psychological

functions. His main dichotomy is that of the pyknic and leptosomatic versus the athletic types. He also attempted to establish the physiological correlates of these, particularly in the areas of autonomic functioning and endocrinology.

Having laid his foundation in terms of body build Kretschmer proceeded to establish its correlates in the mental field. He suggests that there is a close affinity between the manic-depressive type of insanity and the pyknic body build, and between schizophrenic disorders and the leptosomatic type (the athletic body build was identified with epilepsy). Going beyond the correlation of psychotic disorders and body types he believes that Schizophrenia and Manic-Depressive insanity are mainly extremes of contrasted psychological syndromes : the CYCLOTHYME and SCHIZOTHYME respectively. His formulation of the dimension Cyclothymia-Schizothymia is the superstructure of our own study. The following hypotheses are pertinent:

(a) Colour-Form Reactivity:

Kretschmer suggests that the cyclothyme shows a distinct tendency towards colour reactivity : the schizothyme was believed to show a corollary tendency toward form reactivity.

(b) The Dissociative-Integrative hypothesis:

Kretschmer holds that dissociation is of importance in understanding schizothymia just as its opposite, integration, is important in understanding the cyclothyme.

Dissociation is defined as "the ability to form separate and partial groupings within a single act of consciousness ..... from this results the ability to dissect complex material into its constituent parts". The greater ability of leptosomatics and schizophrenics to withstand disturbing stimuli is explained in terms of their dissociative ability, i.e. the concentration on one aspect of the total situation to the neglect of any other.

Integration: The absence of the ability to dissociate leads to a concrete synthetic way of looking at mental content. The cyclothyme (and in exaggeration, the manic-depressive) is credited with a mind which is synthetic, global or "integrative". *

Our theoretical debt to Kretschmer is quite explicit.

(4) Jaensch:

Another line of thought which converges with the above is that of the German typologist Jaensch, who orders his typology around the dimension of "Integration". His typology postulates three personality types translated as : (a) the outwardly-integrated, (b) the non-integrated and (c) the inwardly integrated type. Although Jaensch's writings do not have the same heuristic value as that of Eysenck - he does not provide an integrated set of predictive hypotheses - his work was more directly the source of our own study. This is because Jaensch specifically attempted to explore the relation of character structure to time estimation. His pupils were required to investigate the effects of the above personality factors on the appreciation of duration as part of their work on typology. They found that -

(a) The outwardly integrated type, that is, the individual who tends to interpret what he perceives in a personal way, is most sensitive to the content of a duration when he has to evaluate it: he does not make much attempt to dissociate the objective duration from his impression.

---

* Empirical support for this hypothesis was provided by experiments conducted by Van der Horst and Enke. Van der Horst's study was a complex reaction time experiment. The disturbing effect of various agents was measured in the case of normal pyknics, normal leptosomatics, schizophrenics and manic-depressives. It was found that the influence of distracting stimuli lengthened the reaction time of normal pyknics and of manic depressives much more than those of normal leptosomatic and of schizophrenics. The greater ability of leptosomatics and schizophrenics to withstand disturbing stimuli was explained in terms of their dissociative ability.

In the experiment conducted by Enke, the subject was required to remember the number of differently coloured squares on a card which he himself is pushing at his own speed into an envelope, the theory underlying the experiment being that the schizothyme with his dissociative ability would be easily able to carry in his mind the number of different categories into which to classify these various coloured squares. He should, therefore, be quicker and more accurate in the total task.

(b) The non-integrated type who analyses his projections without projecting himself on to them, tends to evaluate the duration objectively, he is therefore more accurate.

(c) Finally the inwardly-integrated type, the Introvert who concentrates entirely on himself, has a tendency to underestimate durations.

Our own study is an adaptation of Jaensch's typology. Types (b) and (c) were merged so that Jaensch's version of the Introvert (the inwardly-integrated) was redefined in order to focus on the dissociative rather than the introspective dimension. For this reason, we preferred the term "Internalizer" to Introvert. Thus, unlike Jaensch's Introvert our Internalizer was expected to estimate duration accurately.

The typological postulate that people differ in their ratio of susceptibility to internal and external stimulation is directly amenable to testing in the context of time perception. We have already seen how the experience of duration derives from the stimulus conditions of our environment. A prerequisite for the accurate estimation of time is the ability to dissociate from the effects of temporal stimuli during the actual experience of them. This tendency is not common to all personalities; rather the ability to resist the impact of external stimulation is determined by the individual's loading on the "dissociative" factor. To the extent that time estimation is a function of a definable personality dimension, it is possible to structure an experiment which specifically taps this dimension. An experiment which presents potent stimulus conditions and holds duration constant should elicit some measure of the individual's vulnerability to external stimulation. Thus it is possible to explore the role of personality variables in the time experience. One would predict that the individual who does not frequently dissociate will be affected by the quality of the stimulus and experience a subjective distortion of duration. The inwardly-integrating, since he tends to dissociate himself from his environment, should be less affected by the content of the stimulus and capable of producing a more accurate estimation.

The present study was an attempt to test the above hypothesis. Do personality factors such as the individual's dissociative tendencies have a determining influence on time estimation ? A summary of this chapter will elucidate its theoretical orientation :

1. Early investigators of time attempted to establish a specific time sense and establish a universal differential threshold in the judgement of time : they focussed on the qualitative characteristics of the stimulus and were bemused by the marked individual differences found.

2. These attempts were unsuccessful as indicated by the ubiquitious appearance of the "constant error".

3. The behaviourist bias with its reluctance to explore personality factors led, as the limitations of Structuralism also had, to a virtual scrapping of the problem.

4. Operationalism directed attention away from fixed entities to the process of knowing : hence later attempts to explore time focussed on the subject and the experimental situation in which the judgement took place. Such factors as length of and space between intervals, content of the interval, anchoring effects and motivation began to assume significance.

5. Decreased reverence for the stimulus was replaced by an acknowledgement of the significance of the responding organism. Contemporary efforts to relate perceptual behaviour to personality theory suggested that the perception of time, too, may be associated with measurable personality variables.

6. Some investigators concentrated on extra-organismic factors while others explored intra-organismic variables, such as visceral cues, chemical pacemakers, heart and lung work, and so on.

7. Few of these studies were steered by either an explicit theoretical position or incisive predictions. In other words, they were all fact-finding.

8. The present study is an attempt to explore an a priori theoretical position. Its syllogism is as follows :

   (a) Time estimation is both a function of stimulus conditions and personality type.

   (b) One of the most important dimensions of personality involved in the estimation of time is what Cattell has called the "Integrative Dissociative" dimension. This is interpreted here as the individual's characteristic orientation

   (c) Since an estimation of duration is largely concerned with the individual's powers of dissociation, it is predicted that the dissociative personality (the inner-oriented) will be more likely to produce an accurate time judgement than his opposite - even in the event of potent stimuli.

---oooOooo---

CHAPTER II

E X P E R I M E N T I

I I N T R O D U C T I O N

Since the personality types explored are differentiated specifically by their dependence on the content of external stimuli, the major variables are the stimulus conditions. However, we considered it necessary to control for variables which are known to influence time judgement, e.g. the method of judgement and the sense modality involved. By establishing the role of these, we hoped to discover the conditions under which the effects of stimulus content would be most effectively revealed. We were after the following type of information : is the introduction of meaning more potent when it involves the auditory or the visual sense ? In what way does the method of judgement influence the judged duration ? In this way we hoped to create the optimal experimental conditions for the impact of stimulus content. The first experiment was therefore a pilot study designed to pinpoint the relevant interaction effects. These would then be used as groundwork for the construction of the major experiment. The following variables were considered relevant :

(a) The sense modalities involved.

(b) The effects of different durations.

(c) Mode of response in making the judgement.

A. THE SENSE MODALITIES:

The question as to whether there is in fact a "time sense" or not (the classical view held by E. Mach) has been so adequately dealt with and discarded that there is no point in pursuing it any further. This does not alter the importance of the fact that each sense modality supplies us with a slightly different experience of temporal succession. Each modality has its unique reception of temporal

experience and some sense organs are more appropriate for the reception of time than others. It has been satisfactorily established by now that the ear is particularly adapted to detecting temporal succession; it has better cortical representation and better association value, and can detect stimuli in a greater spatial area. Moreover, intermodal comparisons have shown that each sense mode displays differences in what one might refer to as their "time units". Behar and Bevan (1961) have shown for example, that auditory stimuli are perceived as 20% longer than visual stimuli.

It is clear, therefore, that the sense modality involved is an important feature of the stimulus conditions and must be considered in an experiment structured to examine the effect of stimulus content on the individual. In order to evaluate the extent to which an individual's estimation is distorted by the nature of the stimulus, we would have to first establish the extent to which inaccuracy is a function of the purely physiological reception of the stimulus : that is, it would be necessary to establish the specific receptor effects before the general impact could be determined. Moreover, by evaluating the role of the receptors in this way, it would be possible to select the sense mode which would most effectively display the effects of different stimulus conditions.

B. DURATION:

It is becoming clear that each group of durations has laws of its own. One finds for instance that the laws of time perception which apply to the short intervals are not applicable to the longer durations.

Several methodological problems are involved in the selection of an appropriate duration for one's purposes. On the one hand it is probably wiser to use a larger duration where the effect of the meaningfulness of a stimulus is being measured (to give the stimulus ample scope to assert itself.) However, one must bear in mind the problems involved in the methods of conveying judgements of time. This

topic is a vast one and there is a formidable body of literature covering it. However, it is a peripheral aspect of this thesis and will therefore be dealt with only summarily.

C. MODE OF RESPONSE:

It is quite clear that there is no way of getting an absolute measure of the time experience of the individual. His judgement cannot be separated from the method of expression. The history of experimentation in this field has shown how different methods of time judgement tend to show different degrees of accuracy and reliability. For the detection of individual differences a test with a wide inter-subject spread of scores and a low intra-subject variability in response to a constant signal is desirable. It has been found in the past that verbal estimates are reliable but that reproductions of time are not. The reliability of time judgement by the method of verbal estimation has been noted by both Clausen (1950) and Siegman (1962). Siegman obtained reliability co-efficients of $\pm$.82 (5 second interval) and $\pm$.84 (20 second interval). They also studied time judgement by the method of reproduction. Siegman, whose subjects reproduced auditory signals by depression of a key, found a reliability co-efficient of $\pm$.59 for a 5 second interval and $\pm$.40 for a 20 second interval. Clausen obtained reproduction reliabilities of approximately the same order. For this reason most studies of (individual differences in) time judgement have been confined to verbal estimation of time.

However, verbal estimations have serious disadvantages. Firstly they tend to be stereotyped and crude. This is shown by the fact that judgements ending in 0 and 5 predominate (Weber 1933). Different subjects change categories with different degrees of ease as the stimulus duration is altered and there tend to be wide differences in the minuteness of the scale adopted by the subject in expressing his judgement. (Klein's (1951) distinction between levellers and sharpeners is relevant in this context). But the strongest objection to the method of verbal estimation is that it does not tell us much about the subject's perception

of time. When a subject makes a verbal estimate he is trying to relate the time signal to clock time, that is, he is translating from an asymbolic to a symbolic process. This alteration in the level of time function means that the differences in verbal estimations may refer to differences in perceived time, to differences in notions of clock time or to differences in the ability to relate perceived time to clock time standards. Non-verbal methods, however, such as the methods of reproduction, do not necessarily rely on differences in conception of time. There is no need to translate from an asymbolic to a symbolic process.

The advantages of the traditional methods of reproduction on the one hand and its off-putting history on the other, motivated the use of a new type of method of reproduction in a study of individual differences conducted by Du Preez of the University of Cape Town. The low reliability generally found associated with the method of reproduction is a serious disadvantage in any study of individual differences, hence one of the aims of Du Preez' study was to find a reliable non-verbal method of exploring individual differences of time judgement. His study explored the possibilities of a method designed by Professor K. Danziger of the University of Cape Town which is based on the known reliability of speed of movements of the limbs. The method is essentially as follows : the subject is asked to move a handle horizontally across a frame in such a way that the duration of his movement equals, in his judgement, the duration of a time signal. He makes the movement after the time signal has ceased. The duration and distance of the subject's movement, made at his own speed, are then recorded and analysed.

Du Preez compared various methods of reproduction. He obtained judgements of time by free linear arm movement, controlled linear arm movement, by key pressing and by gripping the stationary handle. Correlations of these judgements were calculated and it was found that the method of reproduction of time signals by either free or controlled linear movement is more reliable than the method of reproduction by key pressing and is of the same order of reliability as the verbal estimation

of time. (Average reliability co-efficient of + .71). This level of reliability is eminently suitable for detecting individual differences.

Here again our objective was to establish the most appropriate method for our purposes. Du Preez' procedure was to be replicated by our experiment to test whether the superiority of the linear arm movement was confirmed in our context. Moreover, we sought to establish any meaningful interactions which might exist so that they could be exploited in the major experiment.

II SUBJECTS

Thirty male subjects ranging from first year undergraduates to seniors drawn from several different courses were tested.

III APPARATUS

The standard auditory stimuli which had to be reproduced were provided through earphones by an audio-oscillator set at 210 c.s. The light was presented directly in front of the subject : the slides were projected onto the wall facing him. The durations of all these stimuli were controlled by a Hunter Decade Interval Timer. The subject was seated in front of an ordinary table on which was placed a wooden screen 20 inches high and 42 inches long.

(a) A handle moved along a metal rod which passed through its centre to the cord, and this could be moved horizontally by the subject for the whole length of the screen. The distance over which the handle was moved on each trial could be read off on a measuring tape which ran along the experimenter's side of the screen, out of sight of the subject. On this side of the screen was also placed an electric stop-clock which was used to read off the time taken by the subject's movement. The clock was started and stopped by a relay operated by the amplified output of a gramophone pickup, the stylus of which rested on a disc turned by the motion of the cord when the handle was moved.

(b) A key was connected to the electric stop-clock so that time intervals could be reproduced by depression of the key for the estimated duration of the interval. The duration of the movement was recorded by the electric stop-clock.

(c) The third method was a variation of (b). An arrangement was made whereby the subject's depression of the key would supply him with the standard auditory (or visual) stimulus as an accompaniment to his judged duration.

IV PROCEDURE

The subject was seated facing the middle of the screen with the handle at the left. He was instructed to move the handle for a period of time which he judged to be equal to the duration of the auditory (or visual) stimulus. The distance over which he moved was left to his discretion, provided only that the direction of movement (left or right) was not changed until the edge of the frame had been reached. This, the subject could move at the speed he preferred. Thirty seconds elapsed between the end of one trial and the beginning of the next. The subject was required to respond in this way for three durations : 1.4 seconds, 4.2 seconds and 8.4 seconds. These durations were presented and reproduced three times, the mean reproduction time being the score used to calculate accuracy. The stimuli were then replaced by sound effects for the same duration. These were also presented and reproduced three times each. The method of reproduction was now replaced by key-pressing. Stimulus conditions remained the same, i.e. three sets of pure tones replaced by sound effects. The third method of reproduction was a variation of key-pressing. This time the auditory stimulus accompanied the subject's own reproduced duration. The items were randomised to eliminate the possibility of practice effects.

The second experimental session was given within ten days of the first. This time visual stimuli were used, pure light being replaced by T.A.T. cards which were projected onto the wall in front of the subject. For the rest the testing procedure was identical to that of the first session. There were three presentations of the three durations and they were to be reproduced in a similar fashion to the auditory except that the method "key-tone" was replaced by "key-light", i.e. the subject's reproduction of a light was accompanied by the initial light. At the end of the experimental session the subjects were asked to fill in two questionnaires. The first contained the short form of the Maudsley Personality Inventory, a few statements from the F-scale which were considered relevant and miscellaneous items dealing with their a priori attitudes towards time (clock time and time perspective). The other questionnaire was the Taylor Manifest Anxiety scale. (See Appendix A.)

V. TREATMENT OF RESULTS

A. TIME ESTIMATION:

In each case error score was calculated and only the mean error for each duration was used. Thus although nine estimations were elicited for both pure tone and sound effect (for each method), only three were made use of in the final calculation. It was felt that in this way ephemeral intra-subject variability would be eliminated at least to a certain extent and thus leave the characteristic intra-subject variability a little less contaminated by experimental artifacts. The error score was used in the Analysis of Variance and the sign ignored. Thus, inaccuracy score was considered only and not direction of inaccuracy.

After the Analysis of Variance was completed direction of inaccuracy was examined in an attempt to see whether another analysis which took the sign into account was worth conducting. No generalisations could be drawn from the data since subjects did not consistently

over or underestimate. Most subjects who were in fact affected by the meaningful stimuli became more inaccurate, but not in any systematic manner. Hence the idea of a second Analysis of Variance was abandoned.

B. PERSONALITY TESTS:

We divided our subjects into two groups on the basis of their vulnerability to the introduction of meaning in both auditory and visual stimulus conditions. Since individuals were not consistently susceptible to the changes in stimulus conditions, several subjects could not be assigned a place in either group. (Six subjects were problematic). However, the majority responded consistently and thus provided a sample of 12 members to each group. Questionnaires were item-analysed and chi-square tests applied.

VI. RESULTS AND DISCUSSION

A. TIME ESTIMATION:

In Appendix B. Tables I and II may be found the Analyses of Variance, separate ones for Visual and Auditory data. However, a summary of relevant significance levels has been made of these and will be presented below. Each row has been numbered for ease of reference.

TABLE I

ANALYSIS OF VARIANCE

SIGNIFICANCE LEVELS

		Auditory	Visual
1.	A.	99.5%	-
2.	B.	99.5%	99.5%
3.	C.	-	99.5%
4.	D.	99.5%	99.5%
5.	AB.	-	-
6.	AC.	-	-
7.	AD.	99.5%	90%
8.	BC.	-	99.5%
9.	BD.	99.5%	99.5%
10.	CD.	99.5%	95%

Key

A = stimulus conditions
B = duration
C = mode of response
D = subject effects

Mixed model

ABC = fixed effects
D = random effect

(1) The most conspicuous result is contained in the first two cells (Row 1). The difference between the stimulus conditions is highly significant for the auditory and not at all for the visual stimuli. This result is confirmed by Row 7 which summarises individual differences. The results for the auditory cell are significant at a much more acceptable level than those for the visual. The result is susceptible of two explanations :

(a) The importance of considering the sensory mode has already been noted. The above finding supports our hypothesis which predicted some interaction effect, although the exact nature of this could not yet be gauged. The explanation offered here is as follows ; the introduction of meaning into the visual stimulus conditions did not radically disturb accuracy because the subject was able to shut out its distractive power quite easily. He could simply shift his gaze from the slide and stare at the blank wall for the duration of the interval. This did not in any way prevent him from noting the termination of the interval. Our auditory apparatus, however, makes it impossible to ignore the stimulus or shut out its effects. Thus, the actual nature of the receptors implicated can facilitate or hinder dissociation.

(b) The above explanation contributes to an understanding of the findings but is probably not the key explanation. This will more likely be yielded from an examination of the individual's private system of reproduction cues. Unfortunately these were not formally or systematically examined (we compensated for this loss in the next experiment). However, since the subjects were individually tested the experimenter was able to watch the subject's behaviour and it soon became clear that every subject employed a variation of the technique of counting, regardless of the content of the stimulus. They either counter sub-vocally, tapped their feet or a pencil, they even counted the number of revolutions of the tape as it played the sounds. This was done during the course of the duration presented, the number of taps (or whatever reference system was employed) was memorised and then simply reproduced as a guide accompanying the formal method of reproduction (handle, key, etc.)

The above helps to explain the large measure of immunity which was displayed towards the visual stimulus conditions. It was still possible to maintain the response pattern which had been built up during the earlier part of the experiment with very little adjustment ; the subject could inure himself to the potency of the stimulus and continue listening to his own subvocal chanting. *

---

* Studies of rhythm are relevant in this context. In a comprehensive survey on the topic, Weitz and Faiz (140) report wide individual differences, but high intra-individual consistency. Rimoldi has conducted a variety of studies in this field. He has found that the spontaneous speed of subjects in various kinds of performance is a highly stable characteristic. Over a great many tasks and over considerable periods of time, his results demonstrated individual constancy in tempo measurements. Using factor analysis, he was able to isolate

(Continued on bottom of page 29)

(2) The largest duration (8.4 seconds) was responsible for the significant increase in inaccuracy. This is an expected finding even on a purely common sense level, since the larger your duration the more scope you have to "go wrong". On a more scientific level, we have provided more scope for the operation of conceived time. We have resuscitated in somewhat refreshed form the problem of the Indifference Interval and its relative the "specious present". The Indifference Interval of Vierordt is that interval which is judged with the minimum error. Below this interval time signals are overestimated; above this interval time signals are underestimated. The great differences in its determination and its elusiveness in so many contexts have lead to the decreased interest in trying to pin it down.

The view that there is a space of time which may be perceived as a unit is an old one as reference to William James (1890 pp 609-613) shows. James attached great importance to this directly perceived unit of time (the "specious present") which he held to be "the original peragon and prototype of all conceived times" (p.631). Boring has proposed that a much shorter interval of time - the Indifference Interval - should serve as a measure of the specious present. His equation of the specious present and the Indifference Interval is indirectly endorsed in the following statement by Fraisse which relates the Indifference point to the optimal interval for the functioning of the nervous centres:

> "Walking, heartbeats, movements effected at a spontaneous tempo, and perceptions all follow on at intervals of about 0.70 seconds, which we consider to be the optimum interval for the functioning of the nervous centres ...." (p.128)

(Continued from bottom of page 28)

such constant factors as the speed of perception, speed of cognition and speed of reaction time. He believed that this consistency represented fundamental psychological characteristics. The results of a study which Rimoldi conducted with Cabanski is congruent with our own findings. It was found that the rate of tapping in exposure to visually presented patterns is extremely resistant to change: even fatigue had to be considerable to disrupt the tempo.

If we accept the above point of view, we emerge with the hypothesis that the closer the interval approximates to the "specious present" (defined as the Indifference Interval) the less likely the conscious processes are likely to enter the individual's time estimation. In a sense his estimation will more likely be a function of perceived than conceived time.

Piaget's distinction between primary perception and perceptual activity will clarify the point. According to him, primary perception is relatively unaffected by operational thought (such field effects or primary illusions as the Muller-Lyer (are the results of primary perception). Perceptual activity, on the other hand, tends to reduce the magnitude of the field effects. It is characterised by active configurations, memories and other processes which emerge with the operation of intelligence. Though perceptual activity reduces the primary illusions produced by primary perception, it is the source of secondary illusions. (A typical secondary illusion in the experience of time is the Kappa effect).

Within this theoretical framework, perceived time would be a function of primary perceptions; conceived time would reflect the illusions resulting from perceptual activity. The Indifference Interval could be seen as a type of transition point. Going back to our own experiment, it is clear that we are more interested in the manner in which the individual creates the conscious present. An experiment investigating personality differences is more concerned with the illusions generated by the individual's perceptual activity. An appropriate duration would be one which caters for the need to provide enough scope for the free play of perceptual activity, since only in this way can the effects of character structure become manifested. At the same time, reproduction techniques should be borne in mind. Hence our selection of duration would have to strike a balance between "psychophysical elegance and manipulation of mood". Loehlin puts the issue well :

> "One reason for this may well be that the experimental manipulation of variables of attention and attitude is uncertain at best. This situation is aggravated by the fact that many investigations of the perception of time have preferred to work with intervals only a few seconds in length, which offers many advantages in terms of psycho physical elegance, but little scope for the manipulation of mood".

B. PERSONALITY TESTS:

Chi-square tests failed to yield significant differences between the two groups. The only item which approached the .05 level of significance was No.5. "Are your feelings easily hurt ?" This was more often endorsed by the Internalizing group (those who were less affected by stimulus conditions). This was an interesting trend, especially in the light of the second experiment which revealed this item to be the most sensitive. (This will be more fully dealt with in Chapter VI which is concerned with the results of both experiments).

The failure of the questionnaires to reveal significant differences in personality types was somewhat disappointing. However, in view of the fact that this experiment was more specifically concerned with the role of experimental conditions, (cf.(b) of Chapter I) than personality variables, it was not considered a damaging refutation of the hypothesis.

---oooOooo---

CHAPTER III

EXPERIMENT II

I. INTRODUCTION

A. The results of Experiment I will be summarised for convenience:

(1) The superiority of the handle over the other methods of reproduction was confirmed and its reliability as a method for detecting individual differences accepted.

(2) The largest duration was shown to be the most appropriate for an experiment investigating personality differences. It was always the duration associated with the larger error in time judgement.

(3) The role of the sense modality was evident from the fact that the predicted result occurred only for the auditory stimuli. There was no significant difference in the responses to the introduction of meaning in the visual stimulus conditions. This suggests that if our theory has any validity it would be more fruitful to explore its operation in the auditory field. Two explanations were offered for the failure of the meaningful visual stimulus conditions to produce statistically significant results :

(a) The first explanation was sought in the physiological make-up of the modality concerned. The hypothesis offered was that the actual structure of the sense receptors can hinder or aid dissociation. The subject's visual apparatus makes it possible for him to shut out distracting influences : the auditory receptors cannot select the impingement of stimuli in this way. The individual cannot dissociate from the purely sensory impact of the stimuli.

(b) A more likely explanation was suggested by the individual's private strategies in the situation. The individual improvised a rhythmic cue system which acted as an accompanying guide to the formal mode of reproduction. Rhythmic patterns (e.g. tapping or counting) are easier to maintain in the face of compelling visual stimuli even when these are altered radically since they offer no real interference with the individual's intra-organismic activities. (Rimoldi's findings were cited in this connection). Compelling auditory stimuli, however, tamper more easily with rhythmic patterns depending on the individual's susceptibility to external stimuli.

B. The following details were exploited in Experiment II.

(1) The method of linear arm movement was to be the mode of reproduction. In this experiment linear arm movement was to be controlled since the reliability for linear controlled arm movement was higher than that for free arm movement. (cf. Du Preez p. 234)

(2) Two durations were to be used. The smaller duration of the second experiment was the largest duration of the first : 8.4 seconds. The other duration was 17.2 seconds. The choice of intervals was determined by a desire to strike a balance between what period is considered adequate for the effects of personality to show itself and yet not inject a new variable into the experimental conditions : the effects of fatigue generated by prolonged arm movement. It was thought that a longer duration would perhaps yield more fertile personality effects but the corresponding effects of the mode of response would neutralise the advantage gained.

(3) The stimulus conditions were predominantly auditory. We decided to salvage the pure tone from the first experiment but to alter the overall structure of the experiment. There were two reasons for not having it completely auditory. Our expectations had been modified by the first experiment. This time we were interested in the interplay of two personality dimensions,

(a) dependence on (vulnerability to) external stimulation, and

(b) the activity-passivity dimension.

It was clear that Loehlin's activity-passivity factor was an important consideration in investigating the meaning of stimuli. Fraisse has commented on the difference between changes which are only undergone and those which are created. In his discussion of the importance of the unity of the task he says "when the changes we experience cannot be unified, time always seems to be long .... This happens whenever we undergo changes instead of creating them. For a spectator, the interests though real enough, do not give the task unity. The act of

perception has its end in itself and not in an objective to be reached or a task to be carried out".

We have already seen the problems created by a stimulus which is relatively easy to ignore. We decided that not only would stimulus conditions be directed mainly at the auditory modality (which had been shown to be more vulnerable to external change) but the individual was now to become an active participant in the creation of the experience of change. This would guarantee his engagement in the stimulus conditions. Hence one of the non-auditory items was Mental Arithmetic. Slides containing simple problems were to be projected onto the wall in front of the subject who was to complete as many sums as he could within the duration. After he had finished he would be required to estimate duration. He would be told beforehand about the time limit and the time judgement he would be expected to give. The other non-auditory item was to be an empty interval. (Strictly speaking no intervals are ever wholly empty; they are called empty because no known or intentional stimuli fill the intervals). The empty interval was included because we had not articulated for ourselves a clear-cut definition of the components of the two personality types. (Important details were still equivocal, e.g.: were the stimulus-bound personalities characterised by their <u>vulnerability to</u>, or their <u>dependence on</u> external stimuli ?) Moreover it should be a useful item in the investigation of the activity-passivity dimension.

The auditory stimuli were a pure tone, an extract of music, (<u>potent</u> music : Beatles and Rock 'n Roll) and a prose passage. The overall structure constituted (what we thought of as) a hierarchy of meaningfulness with differential ability to engage the individual. We had no clear-cut hypothesis as to whether the arithmetic item in fact made greater demands on the individual than the music item. Our expectation was that this item - because it demanded active participation on the part of the individual - would be a more sensitive instrument of classification. We formulated no definite hypothesis as to whether

the subject would be less able to gauge duration during the music or the empty interval. This was because we could not be sure as to how his stimulus orientation would manifest itself in the time experience. Would his judgement of time be less accurate when he was distracted by stimuli (Beatle music), or when he was unaided by external stimuli and thrown onto his own resources (during the empty interval) ?

In this chapter only the apparatus used in the experiment, the procedure and the results will be described. The discussion of results and the general issues raised will be provided in subsequent chapters.

II SUBJECTS

The subjects tested were male students at the University of Cape Town. They were drawn from a variety of courses and ranged fron first year undergraduates to seniors. Psychology students were excluded so as not to introduce a new variable into the experiment. They were paid R2.00 for a one and a half hour session.

III APPARATUS

The apparatus for producing the auditory time signals and for reproduction of the duration of the signal by linear arm movement were the same as that used in Experiment I. The music was recorded from Beatle and Rock 'n Roll records and only extracts which were particularly compelling were chosen. No extract which contained words was included because it was felt that this might introduce an unnecessary variable into the experiment. These extracts were timed by a stop watch. The prose statements were selected from various sources, e.g. archaeological and geographical texts and descriptive passages. An attempt was made to select forceful striking statements which would also exactly fill the required duration.

These three items were recorded so that the bulk of the experiment could be run off from a recording and unnecessary delays would be reduced to a minimum. The empty interval - bounded by two clicks - was also recorded. Only the arithmetic item was not contained on the recording.

The subject was again seated in front of a table on which was placed the reproduction apparatus. This time only the handle equipment was provided.

IV PROCEDURE

A. TIME ESTIMATION:

The subject was seated facing the middle of the screen with the handle at the left as before. He was instructed as follows :

> "This is an experiment on time estimation. We will be presenting you with various sounds and you will be required to estimate the duration of these. There are four different types of sounds. After each sound you will be expected to reproduce its duration by moving the handle as follows :
>
> Before I begin I will give you an example of each type of sound. The first is a tone (30 seconds). At this point you will be expected to estimate the duration of the tone. The next type is an empty interval separated by two clicks as follows : I want you to concentrate on the passage of time between the clicks and after the second click to reproduce the time which elapsed between the clicks. The third type of sound is a verbal statement which will be read to you, e.g. The fourth type of sound is a piece of music. You will hear each type of sound several times in random order. In the case of each the duration must be reproduced by moving the handle for as long as the sound lasted. Is this clear ?"

Each type was presented six times, three presentations of the two durations (8.4 and 17.2 seconds). (Again the mean error score was used to calculate error). The fifth category, Arithmetic, was presented after the tape was finished. Slides of simple arithmetic problems (to be found in Table III of the Appendix) were projected onto the wall in front of the subject. These were timed by a Hunter Decade Interval Timer. The subject was required to calculate the problems while they were projected and as soon as they were removed, reproduce his estimation of the duration by means of the method of controlled linear arm movement.

B. PERSONALITY TESTS:

The second half of the experiment was now administered.

There were four personality tests :

(1) Measure of Dissociation (Arithmetic)

Subjects were presented with sheets containing arithmetic problems (more complex than the last) which they were required to solve to the sound of harsh background noise. Sound effects were played at high volume for two minutes, at the end of which the subject was to leave what he was doing. There were five extracts chosen on the basis of their power to distract, each lasting two minutes. The rationale for this test was that the Internalizing personality with his greater ability to dissociate would be more able to withstand disturbing stimuli than his opposite and would manifest this by producing a larger output of correct answers.

(2) Questionnaire:

Three questionnaires were administered :

(a) The first two were the same as those administered for the first experiment. (Appendix pages 108-109)

(i) A shortened MPI, plus miscellaneous items garnered from the F-scale, plus several self-descriptive items concerning their perception of and attitude towards time in everyday life situations.

(ii) Taylor Manifest Anxiety.

(b) The third questionnaire was devised to elicit some additional information on the response to the separate items. The questionnaire is contained on page 3 of the Appendix. It will be useful, however, to provide an indication here of what type of information we were after. Essentially we were interested in the subject's awareness of his own strategies in the situation. Does he attempt to devise a private pace-maker ? Was it more difficult to maintain for some items than for others ? Which items did he consider he estimated more accurately ? Could he articulate the reasons for this ? Which items did he enjoy most ? (A 7-point semantic differential scale was used for the rating of each item).

(3) Rorschach:

The second test was based on Kretschmer's finding that Cyclothymes showed a distinct tendency towards colour-reactivity while Schizothymes showed a corollary tendency toward form-reactivity. The Dissociative ability attributed to the Schizothyme and what Kretschmer regarded as its opposite, the Integrative tendency characterising the Cyclothyme suggested the possibility that the two personality types explored in this study would differentiate themselves by their responses to the Rorschach. If our theory was valid then those subjects who obtained high scores (large error scores) in their judgements of the meaningful stimuli should produce a preponderance of colour-controlled responses in their Rorschach protocols. Since we were specifically interested in the colour-form dichotomy, only the five colour cards were administered: numbers ii, iii, VIII, IX, X. The test was administered in the usual manner ("What do you see in the picture? Where do you see it?").

(4) Thematic Apperception Test: (T.A.T.)

Four T.A.T. cards were administered : numbers 3 BM, 6 BM, 12 M, 18 BM. Little is known about the effect or order of presentation of the cards although it is likely that this is not an important factor. The differential effectiveness of pictures in eliciting reactions is an individual matter, so that a fixed order cannot possibly ensure that the same conditions are being produced for each person. Subjects were required to give a verba l account of their responses to the pictures.

V. TREATMENT OF RESULTS

A. TIME ESTIMATION:

(1) The scores for each item were treated in exactly the same way as in the previous experiment, error scores were calculated for

each duration and only the mean error score was used. Thus each subject provided only ten scores for the computation of the group Analysis of Variance.

(2) Since it was not yet known which item was the most sensitive to personality differences we established the median value of the error scores for each type of stimulus and assigned the label "Externally-Integrating" to all subjects who scored above this value. It was hoped that by treating each type of stimulus as a distinct system of classification and analysing personality data separately for each grouping established in this way, the most differentiating stimulus would become apparent and the subjects classifiable.

B. PERSONALITY TESTS:

(1) Measure of Dissociation (Arithmetic)

Arithmetical calculations (performed during supposedly distracting sound effects) were summed for output and accuracy. Only the correct responses were used in the index of the ability to concentrate ("dissociate") in the face of disturbing stimuli.

(2) Questionnaires:

Each questionnaire was item-analysed and Chi square tests were used to establish the significance levels of the frequency distribution of the subjects' endorsements.

(3) Rorschach:

The original choice of the Rorschach test as a diagnostic tool was determined by its ready-made colour-form dichotomy. Eysenck's report that Schizothymes are more form-determined and Cyclothymes more colour-determined had suggested this factor as a method of splitting our two groups. Hence the test was initially scored along conventional lines

but using only the determinants of colour and form. At the time of administration and scoring of the tests, the examiner was unaware of the subject's results in time-estimation experiments or any other of his performance tests. However, after establishing classification systems (the subject's grouping being determined by his score relative to the median) a frequency tally of Rorschach records was constructed. It soon became clear that the Colour-Form dimension was unsatisfactory since although people differed in their production of colour-form responses, the frequency of form responses did not vary much. Protocols from extreme subjects were re-examined for an impression of striking differences and it soon became apparent that another dimension - the relative preponderance of movement-controlled responses (M) - would be more differentiating. We decided to abandon the colour-form dichotomy and substitute colour-movement.

(a) Determining the "C" score:

Individual responses were judged in accordance with criteria laid down by Klopfer and Kelly (1942). The "C" score was determined on the basis of pure colour responses (C) and CF. In the final scoring for colour, all relevant colour responses were taken into account, including those that were part of a larger response (such as "dancing animals wearing red hats") and colour symbolism. The reason for the inclusion of the latter will be elaborated in the discussion in Chapter V.

(b) Determining the "F" score:

The determination of this score presents the least problems, since as Witkin has pointed out "it is a residual whose quantitative value is inversely related to the frequency of all other responses that require greater involvement with a variety of features of the blot". Individual form responses were scored in accordance with generally accepted criteria as given by Klopfer and Kelly (1942). Responses that were primarily form responses but had other scoring determinants subordinate to form (not relevant to our purposes) were also included in estimating the proportion of form responses.

(c) Determining the "M" score:

Individual M responses were also judged in accordance with criteria laid down by Klopfer and Kelly. Some indication of motor activity was necessary for a response to be scored M. Also clearly expressed movements in parts of human figures were scored M. Inanimate and Animal movement responses were scored as movement tendencies, but were not included in the determination of the M score.

Results were computed as follows :

A score was assigned to every colour response and to every movement response. The final number was then used, and the t-test applied.

(4) Thematic Apperception Test (T.A.T.)

Since we were essentially interested in diagnosing only one facet of personality make-up - their characteristic stimulus "tropism" - a complete conventional T.A.T. analysis was unnecessary. While it was appreciated that a comprehensive analysis is of great importance in making as complete an interpretation of the individual protocol as possible, it was felt that the inclusion here would tend to confuse the picture and make statistical computations unnecessarily cumbersome.

The following cards were selected :

3 BM On the floor against a couch is the huddled form of a boy with his head bowed on his right arm. Beside him on the floor is a revolver.

6 BM A short elderly woman stands with her back turned to a tall young man. The latter is looking downwards with a perplexed expression.

12 M A young man is lying on a couch with his eyes closed. Bending over him is the gaunt form of an elderly man his hand stretched out above the face of the reclining figure.

18 BM A man is clutched from behind by three hands. The figures of his antagonists are invisible.

(Murray's description).

While these cards certainly do not cover a wide range of situations we felt that they would be effective in eliciting a satisfactory measure of the responses relevant to our purposes. Our field of interest was Henry's Area 5 : "Emotional Reactivity". This section is concerned with an analysis of the following : "To what general area of stimulation is he most reactive ? - stimulation from the outer world or from his inner world ?" (Henry : Analysis of Fantasy pps 85 -104)

The individual's characteristic orientation to stimulation manifests itself in several dimensions of his personality functioning. The three we considered relevant were the following:

(a) Interpersonal Relations:

To what extent does the subject readily empathise and to what extent does he fail to see personal emotion ?

(b) Inner Life:

Does he accept or reject inner life ? Is his language Intraceptive (expressing personal feelings) or Extraceptive (showing a high awareness of external events and pressures ?).

(c) Direction of Emotional Energy:

Is this energy active or passive ? How does he use his energy in his solution of personal problems and conflicts ?

Accordingly each T.A.T. protocol was scored with reference to these three dimensions.

(a) A score was assigned every time an empatic response was produced. "0" was recorded in its absence.

(b) A score was recorded for acceptance of inner life and "0" for its rejection.

(c) A score was recorded for every active or assertive response to the situations created by their own stories. The passive responses were recorded as zero. In this way every response was recorded.

In developing these scores, we attempted to make directions consistent with each other. Thus a high score on each will indicate the same personality type.

VI RESULTS

A. TIME ESTIMATION:

The complete Analysis of Variance can be found in Table VI of the Appendix. Only significant findings will be dealt with here. A Summary Table will be provided below for ease of reference.

TABLE II

Source of Variation	Significance Level
Stimulus Conditions (A)	99.5 %
Duration (B)	99.5 %
Subject Effects (C)	99.5 %
AB	99.5 %
AC	99.5 %
BC	99.5 %

KEY			
A : Stimulus Conditions	Mean Error	B : Duration	Mean Error
A_1 = Tone	2.24 secs	B_1 = 8.4 seconds	2.08 secs.
A_2 = Passage	2.54 secs.	B_2 = 17.2 seconds	3.42 secs.
A3 = Empty Interval	2.13 secs.		
A4 = Music	2.63 secs.		
A5 = Arithmetic	4.19 secs.		

1. The larger duration (B_2) was responsible for the significant increase in inaccuracy as expected.

2.(a) The most important finding was the fact that the Arithmetic item was responsible for the significant increase in inaccuracy. The other items do not differ significantly from each other (see Table II above). This result was interpreted as a function of stimulus conditions rather than determined by personality differences. (The reasons for this will be elaborated in Chapter IV, the "Discussion of Results".

2.(b) The median value obtained from the error scores of each stimulus condition provided a means of classifying individuals according to their position relative to the median. This permitted an examination of individual behaviour patterns. A scrutiny of this revealed that

four types of response patterns were possible.

(i) Group A: Individuals who fell into this group produced estimations which were always above the median value. Members of this group were labelled Internalizers on the assumption that their relative accuracy was a function of their Internalizing or dissociative tendencies. This group contained six subjects.

(ii) Group B: consisted of those subjects who always fell below the median value. These were also labelled Internalizers. In this case, we assumed that their consistent inaccuracy meant that they were unaffected by the content of the stimulus. This group contained five subjects.

(iii) Group C: consisted of those subjects who were affected by the stimuli which were designated as meaningful: the Arithmetic, Music and Prose statements. Their scores for these were above the median and their scores for the empty interval and the tone were below the value. These subjects were labelled Externalizers since they were markedly affected by the content of the stimulus. This group contained six subjects.

(iv) Group D: consisted of those subjects who were relatively accurate (above the median) for the meaningful items (Arithmetic, Music and Prose) yet inaccurate when it came to the empty interval and the tone. These were considered Externalizers because of the suggestion of their dependence on external stimuli. They were more inaccurate when they were required to supply their own mental content. This group contained seven subjects.

To Sum Up :

(a) Internalizers were defined as those subjects who were either always (relatively) accurate or inaccurate, i.e. their error scores were not essentially determined by the content of the stimulus.

(b) Externalizers were defined in terms of their dependence on stimulus content : they were selected on the basis of their tendency to change their (relative) accuracy in accordance with the nature of the stimulus.

2.(c) We decided to classify subjects not only according to their overall response patterns, but also in terms of their responses to each type of stimulus. Our rationale for this was two-fold : on the one hand we hoped that this would provide a means of identifying the most

differentiating stimulus. Moreover, we felt that by establishing two types of classification systems in this way it would be possible to examine the interrelations between response patterns. To illustrate: would an individual who was assigned the label "Externalizer" in terms of his overall response pattern also be found in this (the Externalizing) group according to his response to say Arithmetic? On each criterion subjects whose error score exceeded the median value were classified as Externally-Integrating and those whose error scores were below it were labelled Internalizers.

B. PERSONALITY STRUCTURE:

(1) Measure of Dissociation (Arithmetic)

No significant correlations were found between the Arithmetic output and the Externalizing-Internalizing groups.

TABLE III

Correlations between Arithmetic Scores and Externalizing-Internalizing Groups as differentiated by Music, Arithmetic and the Verbal Passage.

Music	Arithmetic	Verbal Passage
r=+.031	r=-.012	r=+.041

The value of r was derived from the computational formula for Biserial Coefficient of Correlation.

$$r = \frac{Mp - Mq}{\sigma t} \times \frac{pq}{Y} \qquad \text{(Guilford p.297)}$$

(2) Questionnaires:

A separate comparison of questionnaire responses was done for each type of stimulus (arithmetic, passage, music) using the classification provided by the median values.

Significant differences in the responses of the two groups were found for each type of stimulus. The full questionnaires are to be found in Appendix A. Questionnaires were item analysed. A 2 x 2 fold table was constructed for each item and the probability value of χ^2 calculated.

e.g. It is all very well to talk of ideals but it is practical matters of fact that count in the end.

	RESPONSE	
	True	False
Externalizers	12	3
Internalizers	5	10

$\chi^2 = 6.5$

$p = .01$

Only the items which provided significant differences will be quoted here.

(a) When classification of Internalizers and Externalizers was based on median error scores for the estimation of the duration of the verbal passage the following items were found to discriminate significantly between the two groups:

Items affirmed significantly more often by Externalizers:

(1) "It is all very well to talk of ideals but it is practical matters of fact that count in the end". ($p < .05$)

(2) "There is no doubt that love is an important factor in one's choice of one's marriage partner, but other, more practical factors are of equal importance". ($p < .05$)

(3) "I have a pretty definite idea of what I will be doing next summer". ($p < .01$)

Items affirmed significantly more often by Internalizers:

(1) "I often find it hard to 'get going' on something. ($p < .05$)

(2) "The future is too uncertain for a person to plan very far ahead". ($p < .05$)

(3) "Do you consider yourself a rather nervous person ?" ($p < .05$)

(4) "Are your feelings easily hurt ?" ($p < .01$)

(b) When classification of Internalizers and Externalizers was based on median error scores for the estimation of the duration of arithmetic the following items were found to discriminate significantly between the two groups :

Items affirmed significantly more often by Externalizers:

(1) "It is better to go along with the crowd than be a martyr". ($p < .05$)
(2) "If people would talk less and work more, everybody would be better off". ($p < .05$)
(3) "I have great faith in the future". ($p < .05$)
(4) "I am often in a hurry". ($p < .05$)
(5) "I have many memories of childhood events that seem like they might have taken place only yesterday". ($p < .05$)

Items affirmed significantly more often by Internalizers:

(1) "Are your feelings easily hurt ?" ($p < .05$)
(2) "Do you worry over possible misfortunes?" ($p < .05$)
(3) "Do you lack self confidence ?" ($p < .05$)

(c) When classification of Internalizers and Externalizers was based on median error scores for the estimation of the duration of music the following items were found to discriminate significantly between the two groups :

Items affirmed significantly more often by Externalizers:

(1) "If a person is to get anywhere in life it is sometimes necessary to gamble 'everything or nothing'." ($p < .05$)
(2) "It is better to go along with the crowd than be a martyr". ($p < .05$)
(3) "If people would talk less and work more, everybody would be better off". ($p < .05$)
(4) "I have great faith in the future". ($p < .05$)
(5) "I become impatient if I have to wait five minutes for someone" ($p < .05$)
(6) "Do you prefer action to planning for action ?" ($p < .05$)
(7) "Are you happiest when you are involved in some project that calls for rapid action ?" ($p < .05$)
(8) "Are you inclined to be quick and sure in your actions ?"(p .01
(9) "Would you rate yourself a lively individual ?" ($p < .05$)
(10) "Would you be very unhappy if you were prevented from making numerous social contacts ?" (almost achieved $p < .05$ level of confidence).

Items affirmed significantly more often by Internalizers:

(1) "I have difficulty in concentrating on my work". ($p < .01$)

(2) "I often find it hard to 'get going' on something". ($p < .05$)

(3) "The future is too uncertain for a person to plan very far ahead". ($p < .05$)

(4) "Do you worry too long over humiliating experiences ?" ($p < .01$)

(5) "Are your feelings easily hurt ?" ($p < .05$)

(6) "Do you worry over possible misfortunes ?" ($p < .05$)

Since this classification had yielded such fertile results it was treated from now on as the most sensitive instrument for detecting individual differences. Moreover, once it had proved to be such an enlightening taxonomic tool we decided to compare the individuals differentiated by their responses to Music with the "Externalizers" and "Internalizers" differentiated according to their total response patterns (as described on page 44). We found large overlaps : ten (out of the total of fifteen) subjects whose error scores were above the median value in their response to Music, were also Externalizers in terms of our definition of their general response patterns. Eleven of the Internalizers were common to both classifications.

TABLE IV

Classification by Music

		Internalizers	Externalizers
Overall Classification	Internalizers	(10)	3
	Externalizers	1	(13)

$$\chi^2 = 6.98$$

Phi coefficient is significant at the .01 level

TABLE V

Classification by Arithmetic

		Internalizers	Externalizers
Overall Classification	Internalizers	5	8
	Externalizers	7	4

χ^2 not significant

TABLE VI

Classification by Verbal Passage

		Internalizers	Externalizers
Overall Classification	Internalizers	3	9
	Externalizers	7	4

χ^2 not significant

We treated these results as secondary confirmation of the validity of the Music classification.

(3) Rorschach:

T-tests conducted on the scores of Externalizing-Internalizing groups (differentiated according to responses to Music) on Colour (C) and Movement (M) showed that the Externalizer produces colour responses significantly more often than the Internalizer and the Internalizer produces movement responses significantly more often than the Externalizer.

TABLE VII

Distribution of Colour Responses for Both Groups

Colour Responses

	Mean	Standard Deviation	t	p
Externalizer	4.2	2.12		
Internalizer	1.6	.82	3.25	.01

TABLE VIII

Distribution of Movement Responses for Both Groups

Movement Responses

	Mean	Standard Deviation	t	p
Externalizer	1.27	.45	3.36	.01
Internalizer	2.66	.92		

4. Thematic Apperception Test (T.A.T.)

T-tests revealed two significant differences. The Internalizer's (a) tendency to empathize and his (b) acceptance of inner life, are significantly different from that of the Externalizer who displays the reverse tendencies. Category (C) Direction of Emotional Energy did not reveal a significant difference, although the trend was in the expected direction. (The Internalizers displayed passive emotional reactions).

TABLE IX

Differences between mean scores for both groups on the T.A.T measures.

(a) Empathy

	Mean	Standard Deviation	t	p
Externalizer	1.04	.26		
Internalizer	2.30	.82	2.16	p .05

TABLE X

(b) Inner Life

	Mean	Standard Deviation	t	p
Externalizer	.97	.40		
Internalizer	2.92	.67	4.44	p .01

TABLE XI

(c) Direction of Emotional Energy (a) Active

	Mean	Standard Deviation	t	p
Externalizer	1.30	.65		
Internalizer	.94	.42	1.04	not significant

TABLE XII

Direction of Emotional Energy (b) Passive

	Mean	Standard Deviation	t	p
Externalizer	1.02	.83		Almost significant at the .05 level.
Internalizer	1.97	1.32	2.09	

---oooOooo---

CHAPTER IV

DISCUSSION OF RESULTS

This chapter will deal only with the detailed findings of Experiment II. A more comprehensive discussion of the general issues raised by both experiments will follow in the next chapter.

A. TIME ESTIMATION:

Our broad general hypothesis that stimulus conditions affect apparent duration because of their different impact was convincingly confirmed. The extract of music emerged as the most differentiating item. This was an unexpected finding in terms of our initial rather elastic hypothesis which anticipated a higher degree of engagement during the arithmetic task where the subject is more actively implicated. Our hypothesis was confirmed in one sense since this item was certainly responsible for a much higher percentage of inaccuracy than any other. However, we made a mistake in thinking that it would therefore serve as a nosological detector. Witkin's comments on the relation of perceptual performance to task structure are pertinent. His studies of the field-dependence dimension led him to the formulation of an "ease of separation" factor intrinsic to certain situations. This refers essentially to the extent to which any particular task facilitates the process of separating an embedded item from its field. In our context a concept of "ease of dissociation" could be similarly invoked to account for the systematic group difference in response. The arithmetic item by its very nature is inimical to dissociation. The subject's private cue system could not operate during the course of the duration since he is too absorbed in his activities. The reproduction of duration would have to rely on a retrospective calculation which derived its information from the amount of work accomplished.

Fraisse and Piaget have offered conflicting analyses of the

child's cues in the perception of time. Piaget believes that the child derives his cues from his speed of activity: In Fraisse's view, the number of changes perceived provide the cues for retrospective estimations of duration. Both these reference systems were used in our experimental situation, which involved adults. It is likely that in an experimental situation of this type, the nature of the task determines the cue system used. In the arithmetic item, where the task prevented dissociation so effectively, subjects tended to use the "work accomplished" as a guide to estimation. The music extract, by its very nature, encouraged a different reference system. An item which coerces such a large measure of involvement in a task leaves very little scope for the disclosure of personality make-up and tells one more about the influence of the task structure on performance. In another context, Fraisse accepts the idea that output can provide a reference system : "When the work carried out can be quantified either precisely or approximately, it acts as a basis for measurement of duration". Our experiment substantiated this : almost every subject examined his work output as a guide before beginning his reproduction. *

One of the most interesting features of our findings was the differential ability of the musical interval to engage different personality types. When one compares responses to it with any other item we considered compelling - e.g. the prose passage - its sensitivity becomes impressive. The weakness of the latter item is not specific to our experiment: Swift & McGeogh in 1925 reported an experiment which they conducted in two parts. In the first they used intervals ranging from ½ minute to 5 minutes. Lack of activity was compared to listening to material from an engineering school catalogue, (pretty dull according to the authors) and no significant differences were found : both were

---

* Since we had no clear-cut a priori hypotheses regarding the subjects strategies at the outset of the experiment, systematic examination of the subject's reference system was not possible. However, during the course of conducting the experiment, the writer noted this tendency in all but two of the subjects.

over-estimated. This result can be likened to our own. Lack of activity is parallel to our empty interval and judging by the responses to our archaelogical extracts our prose material was also "pretty dull".* In terms of our Activity-Passivity dimension the prose passage cannot be rated as a compelling item since it obviously failed to engage subjects. If we are not to make the stimulus error, the criterion is the performance and not the given object or standard. We have already noted the fallacy of our a priori assumption that the arithmetic item, because it is an engaging task, will provide a sensitive instrument for tracking down individual differences. Our results merely proved to us the necessity for considering the kind of activity as well as its mere presence.

The special part played by music (and its constituent parts: rhythm and the auditory sense) in the time experience has often been noted in the literature. In 1930 Whitley and Anderson had their subjects estimate the length of music-filled, buzzer-filled and empty intervals of 15 to 45 seconds. All the intervals were under-estimated, the music interval most of all. They also asked subjects to make direct comparisons of pairs of intervals with different fillings, using 5, 10 and 15 second intervals. They found a consistent tendency for the music-filled interval (a Strauss march) to be judged shorter than the other two fillings. ** The study conducted by Knapp & Green (1961) was concerned with the relationship between n Achievement and time estimation. Results showed that high n Achievement is associated with resistance to increasing judgement of a period of time which is presented on four successive occasions in a row. In this experiment subjects were asked to listen four times to a one minute recording (played loudly)

---

* It is probable that the nature of the passage is not the crucial factor : the literature suggests that prose passages as such are not highly absorbing for students. The same study (1925) revealed that listening to an entertaining passage from The Adventures of Huckleberry Finn made no significant difference : copying nonsense syllables was more engaging.

** The tendency to under-estimate music-filled intervals has been well substantiated by other studies reported in the literature.

of Straus's Blue Danube Waltz. It was found that subjects with high n Achievement scores resisted the impulse to increase their estimate of the duration of the fourth as compared to the first playing. Knapp & Green suggest that those subjects with high n Achievement have greater ego-executive control than those with low scores and are therefore more resistant to the "special qualities of music as a distractive influence". Our experiment endorsed the suggestion that music has special distractive qualities intimately bound up with one's capacity to dissociate from experiences in general and time experience in particular. *

The following laws have been proposed by Fraisse to account for the temporal illusions engendered by differently filled intervals.

(i) "The length of a duration depends on the number of changes we perceive in it ..... Any factor which contributes towards an increase in the number of changes observed has the effect of lengthening the apparent duration". (Ibid. p. 222)

(ii) "Durations are overestimated when the subject is required by his instructions to pay attention to the passing of time".

(iii) "the time always seems shorter when we are doing anything at all than when we are doing nothing".

Numbers (ii) and (iii) suggest a consistent pattern of inaccuracy regarding the empty interval. The present study, however, failed to substantiate this since the empty interval was judged relatively accurately in comparison with the other stimulus conditions (cf. Chapter III Table II). It would seem therefore that one cannot propose laws regarding the nature of inaccuracy without first stipulating the experimental conditions under which they obtain. Our experiment suggested that the actual experimental conditions establish a contextual scale of duration : that is, the stimulus conditions themselves set a standard

---

* In view of this and the responses to the arithmetic item we should re-define our terms. From our point of view an "active" item is not simply one which initiates activity : it is one which engages the subject psychologically.

so that one type of stimulus is judged short in relation to the others, and is modified by experience of the others. Thus, because the empty interval was not a compelling item it was judged more accurately in comparison with the other items. Definition of types of inaccuracy must be refined not only by a consideration of personality factors, but also by the category of duration which is being judged. Fraisse himself repeatedly stressed the fact that the laws applicable to one category of duration are misleading when applied to others. * It will be recalled that in our experiment, the larger duration (17.2 seconds) was responsible for the significant increase in inaccuracy (cf. Chapter III Table II). One cannot therefore suggest that the laws proposed by Fraisse are invalid: the difficulty lies in the fact that every "law" becomes an over-simple generalisation as soon as its qualifications are omitted.

B. PERSONALITY STRUCTURE:

(1) Measure of Dissociation : (Arithmetic)

There were no significant correlations between output of correct answers in the arithmetic test (under conditions of distraction) and the groups as differentiated by their judgements of Arithmetic, Prose Passage and Music. (see Chapter III). This suggests that either the demands of the Arithmetic test are an unsatisfactory means of isolating personality differences or the distraction items were not differentially disturbing. In either case, this technique must be regarded as an inadequate measure of individual differences.

---

* Katz (1906) distinguished three types of duration : the short, from 0.25 to 0.55 seconds, the "comfortable" between 0.60 and 0.65 seconds, and the long, above 0.65 seconds. Benussi was even more precise : very short durations extend from 0.09 to 0.23 - 0.25 seconds, short durations from 0.23-0.25 to 0.58-0.63 seconds, indifferent durations from 0.58 - 0.63 to 1.08 - 1.17 seconds, long durations from 1.08 - 1.17 seconds.

Whether these fine distinctions correspond to real divisions or not, the essential point remains : Different laws of perception operate for different categories of duration.

(2) Rorschach:

The remaining personality tests will be discussed in the light of studies which have specific bearing on our results. Of these the most directly pertinent is the work of Witkin and his research team since not only were their objectives comparable with ours but their experimental procedures involved the use of the same research tools, e.g. the Rorschach and the Thematic Apperception Tests. Witkin's interest was unrelated to time perception per se but this does not constitute an objection if one accepts the dictum that an individual's performance in one task involving perceptual judgement is a representative "sample" of his manner of operating in other areas.

Our results showed that the Externalizer produces Colour (C) responses more frequently than Movement (M) responses. The Internalizer displays the reverse tendencies : his protocols are characterised by a preponderance of Movement responses and a relative paucity of colour responses. These trends are in the expected direction, since according to the orthodox theory, the M : sum C ratio represents the individual's Erlebnistyp or experience balance. Individuals who produce a preponderance of colour responses are said to be stimulus determined rather than inner-determined : they use the objectively given as the chief basis of their perceptions. On the other hand, a preponderance of movement responses is said to indicate inner-determined perceptions. The latter type of perceiver has enriched his perception of the blot by projecting movement or depth into blots that are essentially static or two-dimensional Since the personality dimension we were concerned with was defined essentially in terms of experience balance, our finding favours the theory. Our Externalizer is by definition dependent on the objectively given for his perceptual judgements : the Internalizer derives his perceptions essentially from internal cues.

In a sense, Witkin was also concerned with the experience ratio described above. The work of his research team which focussed initially on styles of cognitive functioning, led far beyond cognition to clusters

of complexly interrelated characteristics seen as a developmental process of increasing differentiation and integration. The perceptual dimension - field dependence - was related to the way in which the individual experiences the world. The following findings are pertinent to our study.

(a) The Field-Independent tends towards an analytic perception of the world, i.e. a tendency to experience items as discrete from their background. He has an ability to overcome an embedding context.

(b) The Field-Dependent tends to experience his surroundings in a relatively global fashion, passively conforming to the influence of the prevailing field.

(c) The mode of field approach generalises also to the structuring and articulation of ambiguous material such as the Rorschach.

The tendencies displayed by our two groups suggest the possibility that a similar dimension of personality is being explored. The colour score obtained for both Witkin's Field-Dependent group and our Externalizers revealed their ready acceptance of a prevailing perceptual framework. Moreover, the M scores obtained for Witkin's Field-Dependents and our Externalizers were low, indicating that both sets demonstrated a low degree of inner absorption. Since Witkin's personality dimension is defined in terms of the same criterion as ours - susceptibility to the prevailing field - it is possible that the congruencies of our findings relate to similar indices of personality type. However, the temptation to equate our two dimensions must be modified by several considerations :

(a) the vast difference in our two procedures,

(b) his facile acceptance of results obtained from techniques the validity of which has not been satisfactorily established,

(c) the doubtful light shed on his work by later investigators who challenged the broad analytical-global distinction. Wallach, for example, feels that viewing all phenomena as aspects of one broad dimension has led to a tendency to lower the level of interest in important results which do not support the hypothesis.

LIMITATIONS OF THE RORSCHACH TECHNIQUE:

Innumerable investigations have exposed the problems involved in Rorschach procedures. Contradictory findings have led to a suspicion

of glib equations of Movement with Inner Life, Colour with affective lability and provided some justification for the general distrust of the technique as expressed by Eysenck, for example.

Singer has provided a balanced critical survey of the empirical justification for Rorschach's "Experience Type". In order to assess the value of the Rorschach as a research tool, he proposes that formulae such as the M : sum C ratio be defined operationally, so as to permit specific verification. By breaking up these indices, it might become possible to determine the linkage between specific determinants of an ink-blot response and specific behavioural tendencies. Singer's survey of studies of this nature discloses the equivocal nature of the findings reported and the problems attached to simply accepting the results of an experiment which favours the orthodox claims as elaborated by Rorschach. The inconsistencies and low correlations found among investigators must qualify the conclusions we draw from our own study. In general, our findings are in line with trends which have been fairly consistently noted. However, these should not be treated as "conclusive signs but at best working hypotheses" (Klopfer). Klein offers a penetrating comment on the practice of drawing the wrong conclusions :

> "...like the Stanford-Binet years ago, the Rorschach often turns up as the <u>validating rather than the validated instrument in research designs</u>. Worse than this : By a questionable twist of circular reasoning, such validation of <u>other</u> measures by Rorschach categories are used on occasion to sell the validity of the Rorschach itself ! "

The most trustworthy approach to adopt is the one suggested by Vernon to the effect that "The crucial test of their value for general diagnostic purposes is their <u>incremental validity</u>, i.e. what they add to other diagnostic techniques". It is fortunate that other procedure allowed us to assign this type of role to the Rorschach protocols. The Rorschach was neither the central nor the only diagnostic tool used for differentiating individuals.

(3) Thematic Apperception Test (T.A.T.)

The objections which apply to comparing our work on the Rorschach with that of Witkin's team are equally applicable to our respective T.A. T. results. Only two of the cards he used are the same as ours (3 BM and 6 BM) and his scoring procedure is again very different from ours. However, he has chosen very similar indicators of personality variables and the generalisations which he derived from his techniques are directly pertinent to ours.

(i) Interpersonal Relationships:

The most significant aspect of the person that is brought out in the T.A.T. is the nature of his inter-personal relationships. As already indicated this category of our treatment was sub-divided into two indices of personality types

(a) ability to empathise, versus

(b) absence of this ability (usually substituted by the tendency to give an impersonal impressionistic description of the situations in the stories).

Our results revealed a significant difference between the reaction of the two groups.

The following responses are drawn from protocols of the two different groups:

(Card 6 BM. Murray's description : a short elderly woman stands with her back turned to a tall young man. The latter is looking downward with a perplexed expression.)

(a) Extract from the Internalizers:

"This is an interesting picture. It is difficult to say what has just happened but there seems to be some sort of failure of communication. The woman looks very remote and is probably engrossed in some disturbing thoughts, which she would rather not reveal to the man for fear of upsetting him. The man who is probably her son looks tormented by some news which he is either about to tell her or just has".

The ability to empathise is clearly revealed by his extensive use of intraceptive language in the attribution of an inner life to these characters.

(b) Extract from Internalizers:

> "This is one of those Hollywood movie shots. A dramatic moment is just about to take place. The mother hasn't realised that her son is standing there yet, but will soon and you'll get one of those typical Hollywood situations, if you know what I mean".

Whether or not this story represents a skilful evasion of inner life by a resort to a clichéd experience, it is certainly action- and situation-oriented rather than empathic. (This is a clear instance of the need for qualitative analysis of the underlying dynamics of the manifest response. Our procedure when this occurred was as follows : Where his responses indicated undeniable evasiveness, a reappraisal of the qualitative record was done. This led to a reversal of the score in four instances. However, we felt that the limitations thereby imposed on the measures obtained were not serious since :-

(a) the general orientation (empathy or lack thereof) was never obscured, and

(b) such a re-examination was found necessary only six times in all the protocols.

Moreover, the development of complete qualitative analyses which explored the mechanisms responsible for evasiveness would only be unwieldly in our treatment).

(ii) Inner Life:

Our next category focussed more specifically on the individual's orientation to internal stimulation (obviously this overlaps with the first. Since our categories all explore a specific dimension of personality we could not expect them to be independent of one another). This category was concerned with the extent to which subjects accept or reject internal life. Our connotations for these terms were somewhat different from the conventional ones. It is clear that the fact that an individual shows rejections of inner life is no indication of its non-existence or of a greater leaning on external stimulation. He may be attempting to deny the conflict material which constitutes his inner life. This would then constitute evidence of the existence of an

active inner life. The latter was in fact the real focus of our interest. We were essentially interested in the extent to qhich the subject was familiar with certain kinds of emotional states. "Acceptance" and "rejection" in our context refer, then, to the presence or absence of personal experience of inner life which were the labels we assigned to indications of either. Thus the following response was assigned an "absence" score :

> "Oh! he's one of those Introverted types who spend their time brooding. You know the sort I mean".

The underlined phrase indicates his obvious remoteness from these tendencies.

T-tests conducted on the scores obtained revealed significant differences between Externalizers who obtained relatively high "absence" scores and Internalizers who obtained higher "presence" scores (p .05 cf. Chapter III). This is an expected finding since it is consistent with the stimulus susceptibilities displayed by two groups on the other performance tests. The Externalizers' partiality to external stimulation is an implicit denial of inner life which shows itself in his infrequent attribution of inner states to the pictures. Even pictures with a negative character do not succeed (in a large majority of cases) in eliciting an explanation involving inner states. * Card 3 BM usually elicited some sort of aggressive action response. ("This chap's

---

* Obviously a card like 3 BM which says to the subject"What could make a person sad and what could he be expected to do about it" (Henry page) should evoke some type of empathic response. However, the difference between an "empathic" response which was only an acknowledgement of the manifest stimulus demand (Henry stresses the fact that a negative character calls for more explanation) and one which supplies an index of inner life usually lay in the cliché nature of the former. The subject who simply complied with the stimulus demand would usually offer stock response such as the one quoted previously. ("This is a typical Hollywood shot"). His opposite would become more involved in his attempt to fabricate an explanation: he usually supplied a fuller story. The result was always a fresher less stereotyped account and a more conspicuous attempt to supply the inner aetiology of the presented situation. This point will be elaborated in the next chapter.

been shot and is about to drop down"). In general the Internalizers not only found an inner state to be responsible for the events in the card but even supplied information as to the type of inner states which absorbed them : remorse, guilt and depression themes were the most recurrent.

(iii) Direction of Emotional Energy:

The third category was concerned with what Henry has called "The Direction of Emotional Energy". Our investigation of this necessitated the construction of an Activity-Passivity dimension. Score and procedure for this has already been indicated. Our findings for this dimension were somewhat different from those of Witkin. Whereas his Field Dependent subjects produced stories in which the principal character was crushed by circumstances (a passive response in our terms), the protagonist in our stories was always in control. In the stories composed by Witkin's Field-Dependent subjects, "assertion of one's own needs was at a very low level" (page 259). The reverse applied in our case. Our subjects always expressed a vigorous assertion of their own needs. Witkin interprets his findings in terms of the readiness of Field-Dependence subjects to submit to forces of authority, and their general absence of initiating activity. In terms of their general make-up - their inability to function independently of environmental support - this is a plausible explanation. However, the fact that we found a preponderance of activity responses among our environmentally-dependent subjects could be explained on the basis of another facet of their make-up, one which was also common to both of our studies : their poor control over impulses (as determined by their C score). Their aggressive-assertive responses may well have been a function of their immature control over impulses. Moreover, even assuming the explanation Witkin invokes is valid - the Field-Dependent is unable to assert his own needs - one must bear in mind the difficulties created by a purely quantitative analysis of the T.A.T. It is not unlikely that those people who failed in dealing with their life problems will tend to produce stories

in which the central figure is assertive, i.e. the assertiveness shown by the figure may at times reflect a fantasied self-estimate on the part of the person who created the story.

A further possibility is that the passive responses produced by the majority of our Internalizers is a function of their self-reflective tendencies which force such a rigorous examination of their own behaviour that it is finally inhibited. If one interprets the final behavioural response as the outcome of the aggregate of determining tendencies one might say that his self-consciousness outweighs his tendency to initiate and organise. Witkin himself has pointed out that the capacity of his Field-Independent group for active coping often represented a successful battle against anxieties about their own adequacies. A multi-dimensional analysis of the type suggested by Wallach would be useful in establishing the relative contributions of these features of their personalities - anxiety and organising tendencies - to the final response. It would also go some way towards a more definitive understanding of the cognitive-emotive interplay of these two personalities. After all, even if these personalities do display a more active intellectual handling of performance material, does this necessarily imply its implementation in behaviour ? Our Internalizers who should, according to Witkin's dimension, affirm all the organising activity items in our questionnaire, all preferred "planning for action to action", or "found it hard to 'get going' on something". However, the relationships of the questionnaires to the other personality measures will be discussed in the next section.

The incongruencies of our findings underline three important points:

(a) the drawbacks of a quantitative analysis which constructs its scoring system from a direct analysis of the raw material instead of a knowledge of the profile released by an intensive qualitative analysis.

(b) the likelihood that the members of Witkin's group and our own are not in fact the same types. Despite the surface resemblance between the two dimensions we have isolated, it is very possible that different personality structures are being investigated.

(c) the limitations of uni-dimensional strategies of research. It is better to strive for greater specificity of meaning for theoretical constructs. By breaking down global dimensions and interrelating their indices, we might be able to refine them.

(4) Questionnaires:

Questionnaires combined were comprised of items (60 in all) which concerned not only their perceptions and [illegible] attitudes towards time in everyday life, but included a miscellaneey of declarative and self-descriptive items garnered from sources like the F-scale, the MPI and several other declarative statements written by the present writer. For ease of reference, the items endorsed by both groups will be quoted again (as differentiated by their responses to Music).

The following items were endorsed significantly more often by the Externalizers ($p < .05$)

1. "If a person is to get anywhere in life it is sometimes necessary to gamble everything or nothing".
2. "It is better to go along with the crowd than be a martyr".
3. "If people would talk less and work more everybody would be better off".
4. "I have great faith in the future".
5. "I become impatient if I have to wait five minutes for someone".
6. "Do you prefer action to planning for action ?
7. "Are you happiest when you are involved in some project that calls for rapid action" ?
8. "Are you inclined to be quick and sure in your actions "?
9. "Would you rate yourself a lively individual ?"
10. "Would you be very unhappy if you were prevented from making numerous social contacts "?

The following items were endorsed significantly more often by the Internalizers. ($p < .05$)

1. "I have difficulty in concentrating on my work".
2. "I often find it hard to 'get going' on something".

3. "The future is too uncertain for a person to plan very far ahead".

4. "Do you worry over humiliating experiences ?"

5. "Are your feelings easily hurt" ? ($p < .01$)

6. "Do you worry over possible misfortunes "?

The most immediate observation is the startling resemblance between what we have called the "Externalizing" personality and the orthodox picture of the Extravert described originally by Jung and delineated in more precise detail by Eysenck. In a large number of studies, Eysenck has reported findings concerned with the perceptual and motor correlates of the dimension of extraversion-introversion. The MPI is a forty-eight question inventory which purports to measure the two personality dimensions of N (neuroticism) and E (extraversion-introversion). It has been constructed on the basis of factor analyses (Eysenck 1956) has been found to possess adequate reliability (Jensen, 1958) and is considered to possess construct validity. (Eysenck 1957) A summary of researches on a variety of normal groups as well as several neurotic groups have shown this scale to have considerable differentiating power (Jensen 1958): in its essentials the distinctions Eysenck makes have been borne out.

The fact that our Externalizing-Internalizing groups affirmed items which have generally been found to characterize the Extraversion-Introversion dimension favours our hypothesis since the stimulus susceptibilities of the latter strongly resemble those displayed by our groups. To quote Eysenck "The extravert is supposedly determined in his conduct by external objects and relations : the introvert is supposedly determined in his conduct by internal states rather than objective fact". ("The Structure of Human Personality" p.30.) The tendencies displayed by our groups are distinctly consonant with a subsidiary hypothesis of Eysenck's according to which he identifies hysterics with extraverted neurotics and dysthymics with introverted neurotics. In a sense we have satisfied Eysenck's stricture which requires precise operational

definitions of these types in order to make possible the construction of a test of "subjectivity-objectivity" so that responses can be examined to see whether they fall in the expected direction. However, here again it is important to be wary of false conclusions. We have already questioned Eysenck's practice of using hysterics and dysthymics as criterion groups. Although Extraversion and neuroticism have been found to be orthogonal dimensions in normal samples (- .1), they correlate very highly in extreme populations (- .3 to -.4). According to Eysenck himself, a test should not be used if it does not isolate a dimension. The fact that a large portion of Eysenck's work was conducted on neurotic groups lays his work open to doubt and possibly explains the low correlations and inconsistencies which are found among a substantial body of attempts to substantiate his theory.

---oooOooo---

CHAPTER V

THEORETICAL ISSUES

1. THE IMPORTANCE OF DISSOCIATION IN THE EXPERIENCE OF TIME:

It was Piaget who illustrated the importance of diss ociation in the experience of time. He showed that as soon as the child learns to mistrust his intuitive estimations, he is freed from a misleading perception of duration which is wholly dependent on the content of the experience. Moreover he has begun to manifest the rudiments of what will evolve into a notion or representation of time. The most mature concept of time is a reconstruction of duration as an interval completely emptied of what occurs in it: that is, the concept of a homogenous and uniform flow of time. And the progress towards this can only occur by a continuous doubting of our immediate experiences. Only by constant self-consciousness can we learn that "our movements are constant, and (we must) therefore attach no importance to the perceptual aspect of our observations: at the most we are amused by the apparent resistance or cold irony of these mechanisms which oppose our will". (Fraisse p. 258)

The adaptation to time is a function of the operational level reached by the individual. Several misleading concretizations of time are still to be undergone before the adult reaches his notion of time as an underlying thread of uniform nature which is independent of human actions. The eight year old, for example, although he can already relate durations of two series of changes, still ascribes concrete properties to time. According to Piaget, it is only at the age of logical operations (i.e. adolescence) that the child is capable of passing from the concrete homogeneity of the time of the clock to the abstract homogeneity of a duration which is the thread linking events without being dependent on them.

The formation of a notion of time is an important aspect of our cognitive functioning. Sarbin's (118) recent paper on self-theory is useful in understanding the genetic development of inferences about time.

Closely associated with self-inferences are inferences about time. In the same way as the body-image involves a spatial referent for the inferred self, time, too is one of the primary dimensions by which the notion of the self is constructed. The continuity of memories is necessary for binding the self and for establishing personal identity. In a sense the "I" is a continuity construct for the discontinuous "me". From this point of view the self is seen as the persistence of an identity point, a subjective inference derived from the empirical aggregate of things objectively experienced. A type of subjective scale of duration is laid down. This scale is an aspect of self-organization and possesses an adaptive property. Dooley's (22) comments on the stabilization of the self concept tie up neatly with those of Piaget mentioned earlier. It is in adolescence, Dooley notes, when the child is required to take over the enforcement of controls for himself, that the stabilization of time experience is achieved. According to both these writers, with the stabilization of the self-concept achieved in adolescence is associated the stabilization of time experience. Dooley goes on to suggest that Western man sustains a continuity of the ego by his awareness of time. On the basis of clinical material, she maintains that duration establishes the relationship between the self and objects, and that a loss of the sense of time can be equated with a loss of the object and with the loss of the self. *

The ability to disentangle oneself from and freeze the flow of outside events, to become a spectator to one's own experiences in order to examine their impact, is a basic pragmatic requirement for every

---

* This is congruent with the writings of Ram (108) who suggests that man's relationship to objects was maintained by the psychological construct of time and he evaluated the way it was used in the yogi-trance. By narrowing his range of attention, memory and desire and reducing the intensity and fluctuation of organic sensation a yogi eliminates his experience of time. As he detaches his attention and action tendencies from the external world, his perception of objects and his sense of himself disintegrate. However, this raises another issue - the consequences of the time values of a culture on the modal personality type - a topic which will be treated in the next section.

individual if he is to synthesize his activities : failure to do so would place him at the mercy of every potentially engaging experience. A knowledge of the relationship between his perceived duration and the actual physical passage of time will enable him to organize his daily activities. This is not to suggest that every individual articulates for himself the sophisticated notion of time already described : it refers simply to the fact that every individual evolves some notion of the "cunning" of our activities to stretch or shrink time and to generate illusions about physical homogeneity. We all learn to see round the edges of our perceptual experiences : we develop the ability to suspect our perceptual time estimations which derive from involvement (or its absence) in events. We trust only the instruments which we have devised to record the uniform physical flow of time.

It is in this sense that even the least introspective individual manifests some measure of self-consciousness in regard to his temporal experience. Although the intellectual reconstruction of phenomena is more specific to the highly introspective type of individual, representations of temporal phenomena are typical of all individuals. Introspective behaviour is essentially dissociative in the sense in which we have been using it, since it implies self-environment differentiation. The tendency or desire to reflect on the nature of one's relationship with the environment pre-supposes the ability to dissociate oneself from it. It has already been indicated that an experiment on time estimation is concerned specifically with this ability. Since every individual conducts a different relationship with his environment, the accuracy with which he will gauge time should differentiate his type of personality, or at least place his position on the dissociative dimension.

2. THE DIMENSION OF DISSOCIATION AS AN INDEX OF PERSONALITY TYPE:

Our discussion of the two groups differentiated according to their perceptual judgement was based on the assumption that time judgement is determined by personality structure. However, since the source of

variation was defined in terms of a specific factor - extent of stimulus dependence - it is clear that the two types of performance do not represent distinct personality types : rather they reflect opposite extremes of a specific dimension. Since these scores varied along a major continuum of personality functioning it is easy to extend the implications and give an over-inclusive definition of the subjects thereby differentiated. It was Eysenck who made explicit the source of this type of misrepresentation. Eysenck offers a model of personality in terms of a hierarchical organization of increasing complexity. Each level incorporates more complex patterns of intercorrelations. Thus the concept "type" is distinguished from "trait" in terms of its greater inclusiveness. This type of analysis parallels the levels distinguished by factorial theory. The construct "trait" or dimension of personality is similar to the factor-analytic "primary factor". A constellation of intercorrelated traits would in terms of this analysis, constitute the higher-order construct "type".

Within this framework, it is clear that the classification system we have maintained is an inadequate basis for a modal of personality types. Our tests effectively differentiated among individuals in relation to a specific dimension only : the manner in which this intercorrelates with other characteristics of these individuals was not systematically explored. Generalisations concerning these personalities are therefore subject to this limitation. In spite of this, we found that the personality variable explored by our perceptual techniques did afford a fairly comprehensive "coverage" of personality. Clearly this factor is not "specific" (peculiar to a single test) but "primary". In this connection Witkin's speculation is interesting.

> "We postulate that one of the earliest and most important differences to arise among individuals is in the extent of active or passive relation of self to environment".

(he cites the work of Spitz 1949. p. 478).

Nevertheless, once we regard the individual as a closely integrated system, the extent to which an individual "dissociates" from his

environment cannot be treated as definitive of his personality type. One cannot describe the dynamics of a given individual's psychological functioning unless one takes into account the multi-factor determinants which constitute his distinctive coping mechanisms. It is quite possible that people who are alike in their ability to resist the prevailing context are very dissimilar with regard to other important characteristics.

3. PERCEPTUAL PERSONALITY CORRELATES OF THE DIMENSION OF DISSOCIATION : EVIDENCE OF THE PRESENT STUDY:

In this section an attempt will be made to outline the broad features of the two "ideal" personalities isolated by their perceptual performance. The preceeding discussion should go some way towards indicating the limitations of the speculations which follow.

A. The Internalizer:

This type of person dissociates from the "given. He has more commerce with himself and his inner feeling states than with the environment. In his use of perceptual cues he relies heavily on the cognitive predispositions and determining tendencies which have been laid down during the course of his biography. As a result his ego boundaries are relatively impermeable : he is able to resist the (engulfing) impact of external stimuli. This Field-Independence facilitates the development of an awareness of and some guarantee against the distracting effects inherent in the specific field involved (temporal illusions in the case of time) and renders him capable of what Schachtel has called allocentric perceptions, i.e. objectifications of his experience. In a study of "Independents" versus "Yielders" Barron obtained statistically significant findings indicating that the former actually value accurate observation more than the latter. It would appear, then, that the individual's characteristic response towards stimuli will actually determine the accuracy with which these are perceived. Schachtel's terminolofy will be useful in this context. He proposed two basic modes of communication between the subject and his environment : the subject-centred or autocentric and the objective-centred or allocentric modes of perception. The empirical findings

quoted above suggest an interesting situation : the individual with outer-determined process of orientation to stimuli has been found to produce autocentric (inner determined) perceptions of them. On the other hand, the individual with an inner-determined orientation produces allocentric perceptions. Thus, the Internalizer's actual grasp of the environment is more accurate and embracing than that of the Externalizer who reacts more swiftly. In the ideal case we would get the paradoxical situation of the individual whose resistance to the immediate reception of his environment renders his final assimilation of accumulated impressions more encompassing. He is in fact more open to environmental stimuli. Relevant here is Barron's speculation that "preference for complexity may be associated with a more intense and enduring oral stage in infancy in which the individual has more commerce with himself and his feeling states than with the environment".

Both of these tendencies - i.e. greater accuracy and greater complexity - were displayed by our Internalizers. Not only were they able to sustain their own standard of accuracy in the face of extracts of Beatle music but they also revealed more complex and imaginative responses to the personality tests. The Rorschach protocols displayed a preponderance of Movement responses and T.A.T. stories tended to be less stereotyped. (We devised no formal or systematic scoring system of "stereotopy" for the T.A.T. protocols - however, some examples will serve to illustrate the broad trends). It was Rorschach himself who contended that the ability to employ the movement factor implies greater mental productivity, a creative potential and in general a tendency toward inner living. In the movement response the subject manipulates the structural features of the stimulus feeling. In contrast to the form response for example, he puts more of himself into the task, drawing on deeper feeling resources. He is less stimulus-bound and less dependent on the objectively given. A kinesthetic projection or animation of the blot material by reading movement into it that is not there implies an imaginal process.

> "The imaginal aspect of M-production shown in enlivening the blot with movement suggests a relatively free access to fantasy activities which within the context of a good tie to reality indicates a high level of emotional integration in which the ego is tolerant or archaic or primitive impulses and can freely draw upon these as a source of creative energies". (pp 254-255).

Colour responses were present but their frequency was low in proportion to movement responses and conspicuously rare in relation to the Externalizing groups. It is well known that colour responses do not involve complex processes of articulation, since they proceed from much more direct sense data. They are generally thought to provide information regarding the subject's emotional reactivity. The paucity of colour responses among the Internalizers and the "FC" nature of these in the majority of cases where they did occur may be taken as a sign of their (the Internalizers) control over effect. Moreover, to the extent that creativity can be equated with articulation (objectified fantasy) the fact that colour responses were more frequent among the Externalizers can be used as an indication of their inarticulate mode of orientation to the environment.

We have already dealt with Vernon's criticism of Rorschach workers to the effect that they "pay lip service to holism and yet assume in practice that Movement responses always show inner creativity and so on". The conflicting results of studies in this field caution against an unqualified acceptance of the claims elaborated above. Nevertheless, Vernon himself feels that it would be foolish to reject them in view of their value as exploratory instruments. He endorses Lindzey's (1961) comment that "they are neither infallible nor devoid of any utility".

The trends displayed in response to the Rorschach were confirmed, though to a lesser degree in the T.A.T. protocols. The subjects who estimated time more accurately - our Internalizers - in general supplied fuller stories although these were not necessarily richer. In fact imaginativeness as an index of inner living failed to differentiate between the two groups. (It was attempted as a pilot scoring procedure but proved inadequate and was abandoned). However, although one cannot point to any signs of creativity in the stories there appeared to be less

stereotypy. (They seemed to display less tendencies to trot out the typical Hollywood action scene). This unfortunately could not be systematically examined because our material was inadequate to allow the application of any valid statistical procedures. The more general focus of our attention and the tentative nature of our original expectations prevented a thorough examination of any co-variations of this nature. Nevertheless, reference to a general impression of this trend and qualitative illustrations might prove useful in the structuring of future research strategy in this field.

All these tendencies will best be illustrated by an example from each group.

Internalizers : (Subject 23)

(a) Extracts from Rorschach Protocol :(Responses to Cards ii,iii)

ii. These are two people putting their hands up together. I am not sure what they are doing with their feet but I think they are wearing red boots which they're stamping in the centre. They look as though they've been doing it for years. They're probably Russians.

iii. These are two gentlemen bowing to each other. Alternatively they are two figures bending over a pot. It could be African women stamping something in a pot.

When you turn it upside-down you get two Bantu back to back, busy signalling to somebody.

(b) Extracts from T.A.T. Protocol: Responses to Cards 3 BM & 6 BM)

3 BM This woman has been brooding morbidly for months and now she's having a conflict as to whether to call the whole thing off - life, that is.

6 BM This chap is her son and has just told her something which he has been trying to tell her for a few months now, but couldn't because he had so much internal conflict about it. If you ask me, he'll probably feel guilty about it for a few months now. That's quite a good story, isn't it ? *

Although the actual amount of primary process expressed by the subject is not the product of a fertile imagination it is certainly indicative of inner life. His Rorschach protocol is, from this point of view, a slightly more convincing illustration of Rorschach's identification of creativity and the tendency to inner living.

* The self-consciousness displayed here was treated as confirmation of our analysis.

Externalizers:

(a) Extracts from Rorschach Protocol: (Responses to cards ii, viii and x)

ii. "The red is blood and the black is evil"

viii. "The things on the sides are a lovely colour pink. This is a very cool picture."

x. "The orange things are sickening colours, the green is better. The third green colour is also pretty nauseating. All the other colours are very pretty especially the yellow.

(b) Extracts from T.A.T. Protocol. (Responses to Cards 3 BM, 6BM 12 M, 18 BM)

3 BM "This is a very interesting picture although it is done by a very bad artist. It is like the climax of a very dramatic Hollywood film".

6 BM "This is also part of a Hollywood film. The son is telling his mother of the death of his father, or else it is his grandmother and it is her son who has died. I think it is supposed to be a very moving picture."

12 M "This film was produced by Alfred Hitchcock. The chap lying on the bed is pretending to be asleep but he is going to jump up in a minute and hit his enemy over the head.

18 BM "I don't really know what is happening here. This chap's just about ready to faint".

A third tendency of the Internalizer (aside from the tendency towards greater accuracy and complexity) is what we will conveniently call the uncertainty dimension or the tendency to doubt. * Relevant in this connection is the psycho-analytic speculation to the effect that "regression in the service of the ego is a partial, temporary lowering of the level of psychic functioning to promote adaptation". (Kris). Barron's findings in connection with "Independents and Yielders" provide a substantial measure of empirical support for this view. The Internalizer of Field-Independent's capacity to tolerate uncertainty has been explored by many workers each providing a preferred label.

---

* A doubting tendency is in a sense implicit in our definition : the Internalizer, by definition, questions the direct impact of his experiences and prefers to subject impinging stimuli to an internal locus of evaluation Dissociation from experience is a type of questioning or "doubting" of the pure stimulus value of experience.

(i) Barron found that Independents prefer complexity and some degree of apparent imbalance in phenomena. (Test measure : Barron-Welsh Art scale).

(ii) A factor-analytic study conducted by Pemberton (1952) identified a "flexibility of closure" factor. Common to all her tests was the fact that they depended upon Thurstone's "freedom from gestaltbindung", the gestalt being formed either by the objective stimulus or by the mental set of the subject. From our point of view, it is interesting that the reverse tendency "speed of closure" was found to be closely allied to a synthetic method, the apperception of Gestalten or configurations. Pemberton's results support Thurstone's belief that these closure factors represent parameters which transcend in significance the immediate perceptual content in terms of which they were initially identified.

(iii) Frenkel-Brunswick (1949) found that rigid individuals are characterised by a tendency to "resort to black-white solutions, to arrive at premature closure as to valuative aspects often to the neglect of reality and to seek for unqualified and unambiguous acceptance or rejection of other people". She also refers to their "stereotyped patterns and rigid adherence to norms" and suggests that these styles of life are reflected in their perceptual modes.

(iv) Klein (1954). Reference to Klein's "flexible versus constricted control" has already been made. (cf.(3) of Gardner's summary of cognitive control principles p.) Flexible control refers to the capacity for differentially responding to specific aspects of a field, against the influences of explicitly interferring field forces". Individuals in this group suggested that a broad array of information including feeling tones are allowed to enter into organization of their cognitive field. Constricted control, on the other hand, "is characterised by distractibility in the face of overlapping stimulus configurations, the use of counteractive and suppressive measures in order to elide instructions and an effort to avoid confusion of boundaries and indefiniteness of contours". *

Although our focal perceptual task - time estimation - did not provide the conditions necessary for examining this facet of the individual's make-up, the Questionnaires did. ** For ease of

---

* This definition is useful from our point of view because it provides a penetrating analysis of the rigid thinker's (Field-Dependent) response to complex tasks. When he is required to dissociate, he is distracted by objectively irrelevant intrusions and his perception registers their distractibility. Yet when he is required to register complexity, he glosses over "irrelevant intrusions" since he is unable to contain complexity and tolerate uncertainty.

** If we align ourselves with Klein's approach, we automatically accept his premise that an examination of the items endorsed by the individual should provide some index of the formal features of his perceptions, his Anschauung.

reference, the items endorsed by both groups will be quoted again (as differentiated by their responses to Music).

The following items were affirmed significantly more often by the Externalizers ($p < .05$)

1. "If a person is to get anywhere in life it is sometimes necessary to gamble everything or nothing".
2. "It is better to go along with the crowd than be a martyr".
3. "If people would talk less and work more everybody would be better off".
4. "I have great faith in the future".
5. "I become impatient if I have to wait five minutes for someone".
6. "Do you prefer action to planning for action ?"
7. " Are you happiest when you are involved in some project that calls for rapid action ?"
8. "Are you inclined to be quick and sure in your actions ?"
9. "Would you rate yourself a lively individual ?"
10. "Would you be very unhappy if you were prevented from making numerous social contacts ?"

The following items were affirmed significantly more often by the Internalizers. ($p < .05$)

1. "I have difficulty in concentrating on my work".
2. "I often find it hard to 'get going' on something".
3. "The future is too uncertain for a person to plan very far ahead".
4. "Do you worry over humiliating experiences ?"
5. "Are your feelings easily hurt ?" ($p < .01$)
6. "Do you worry over possible misfortunes ?"

The most immediate observation is the startling resemblance between what we have called the "Externalizing" personality and Eysenck's "Extravert". This has already been dealt with. The only items which provide clues to their belief systems are Nos. 1, 2, 3, & 4 framed in the declarative form. The Externalizer not only has "great faith in the future", he also copes with potential doubts by subscribing to the pat formulae which our society has institutionalized as a panacea for all ills The phrase (item No.2.) "If people would talk less and work more everybody would be better off" is a good example. This indicates more than the action-oriented mode of adjustment. It reveals also -

(a) the tendency to subscribe to the prescribed ready-made solutions to "life's problems". This reiterates their commitment to the external scheme of things so often described.

(b) their failure to question a facile Patience-Strong type of philosophising which allays doubts so reassuringly. *

The Internalizer on the other hand, not only had no faith in the future ("the future is too uncertain for a person to plan very far ahead") but in contrast to his opposite found it hard to 'get going' on something.

B. The Externalizer:

The discussion of the Internalizer's mode of orientation has already embraced that of the Externalizer who operates by definition in the obverse manner. Since the Field-Dependent person conforms passively to the influence of the prevailing field he will tend to experience his surroundings in relatively global fashion. The perceptions which he produces will be autocentric showing little or no objectification. And because his tendency to articulate and differentiate is relatively undeveloped, he will show none of the cognitive components of these, i.e. the tendencies towards analysing and structuring experiences. In Klein's terms, his cognitive judgements are constricted since they are "characterised by distractibility in the face of overlapping stimulus configurations the use of counteractive and suppressive measures in order to elide irrelevant intrusions, and an effort to avoid confusion of boundaries and indefiniteness of contours". The absence of a self-initiated evaluative system leads to greater initial responsiveness towards the environment but a shallower final grasp. They are in a sense "muscle bound". This terms is not used in the orthodox sense but in the more popular laymen's sense which denotes the energetic, sociable but unreflecting type of individual whose overt responses are rapid but rarely followed up by covert cognitive activity - what Crutchfield has called "a completing thought episode". Unfortunately the term cannot be used with any real technical validity since the nature of primary and secondary functioning was not explored. (The efferent aspect of behaviour was only a peripheral focus of attention). The only clues we obtained in this connection are those provided by the Questionnaires.

* Unfortunately it also pinpoints a notorious limitation of the questionnaire : it is quite possible that this type of mentality did not back every individual's endorsement. However, this was impossible to control.

The following items were endorsed significantly more often by Externalizers: ($p < .05$)

5. "I become impatient if I have to wait five minutes for someone".

6. "Do you prefer action to planning for action"?

7. "Are you happiest when you are involved in some project that calls for rapid action"?

8. "Are you inclined to be quick and sure in your actions"?

9. "Would you rate yourself a lively individual"? ($p. < .01$)

These all display the overt immediacy with which they respond to the environment. Since this picture resembled so strikingly the features of Eysenck's Extraversion-Introversion dimension, the implications are worth following up.

According to Eysenck, several tendencies can be predicted from a high loading on either of these dimensions. One of Eysenck's often-quoted typological postulates suggests that the Extraversion-Introversion dimension and the primary-secondary functioning dimension are virtually identical. His central source is the work of Mundy-Castle (1956) who associated primary-secondary functioning with "a central nervous excitability characteristic". In fact, there have been a diversity of attempts to explore the primary-secondary functioning dimension. The work of Hymans and Wiersma (1932), Biesheuvel and Pitt (1949), Mundy-Castle and Rimoldi (1951) will be the main sources quoted here.

The actual details of Eysenck's Typological Postulate create several difficulties, not only in view of the literature on this field, but also because of his own inconsistency. To illustrate : the statement "primary and secondary function denote Extraversion and Introversion respectively" was offered in 1953 : yet in 1957 this position has changed and now Extraversion and secondary functioning are considered identical.

An examination of the literature suggests that the earlier equation is more accurate. The Heymans-Wiersma theory of temperament

will be useful: according to these writers, each conscious event has a primary function of immediate experience, and a secondary function in mental life which is exerted after the event has receded from consciousness. Secondary function gives continuity and stability to conscious mental activity. Individuals who are characterised by a low degree of secondary function are dominated by immediate stimulation and have an extensive but shallow conscious field. Individuals who are characterised by a high degree of secondary function have a deeper and possibly narrower conscious field, and slow felxibility of response, but have richer evocations of past experience.

In the light of this (and the congruent findings of writers like Biesheuvel and Mundy-Castle), it would seem that the Extravert is a primary functioner. Our own findings offer validating evidence as well : they revealed the characteristic traits set out by Heymans and Wiersma. According to them, individuals with predominantly primary functioning are impulsive, jocose, give up easily, are superficial, vain demonstrative, given to public speaking and to telling jokes. On the other hand, the person with predominant secondary functioning is quiet, grave, shut-in, given to intropsective thinking, laughs little, and has depressive tendencies". (p. 39). These two pictures are diametrically opposed to Eysenck's 1957 claim that Primary and Secondary Functioning are characteristic of the Introvert and Extravert respectively.

A crucial cause of confusion lies in the fact that in Eysenck's system there is a clear distinction between (a) expressive activity, and (b) neurone excitability. * In the Heymans-Wiersma theory of temperament, however, external behaviour manifests the same neuronal picture: that is to say, the person who is most excitable in expressive behaviour is the person whose neurones are excitable too. His external picture is a type of mirror-image of the internal activity. The findings of Biesheuvel and Pitt, Mundy-Castle and Rimoldi, suggest that the

---

* Revealing examples of this can be gathered from the MPI : one finds that the Extravert is the person who agrees with statements that he is active, sociable, quick and sure; and yet in terms of his neurone excitability he functions at a much lower level than the Introvert.

distinction Eysenck makes probably corresponds to real differences. What is in question here is the individual's speed of functioning. The view that temperamental differences in speed of function are caused by mental inertia, is fundamental to the Heymans-Wiersma concept of primary-secondary functioning. It would seem, however, that this is too broad an explanation. Psychomotor tests conducted by Biesheuvel and Pitt in 1955 isolated two orthogonal factors identified as (a) unstructured motor speed - this was said to originate at the thalmic level (Mundy-Castle) and (b) flexibility - this refers to high level discriminatory processes and originates at the cortical level. These two general speed factors suggest that mental inertia does not adequately cover the range of factors operating. The fact that they were found to be orthogonal factors is moreover validating evidence of Eysenck's distinction between expressive activity and neurone excitability. Yet even these general speed factors are singular. The literature contains substantial evidence of much more limited speed factors, confined to specific classes of activity. In the field of time estimation, for example, Rimoldi (1951) in a study of fifty-nine tests of tempo, ranging from simple motor skills to mental activities, found that there was no general factor of tempo. He found nine speed factors : (a) large movements of the trunk and limbs; (b) small movements; (c) verbal speed and speed of perception ; (d) motor activity; (e) drawing with the foot; (f) metronome test; (g) reaction time; (h) performance with the hands and (i) space and reasoning. Of these, four second-order factors were extracted : (1) speed of all motor activities; (2) speed of cognition; (3) speed of perception: and (4) reaction time. It is highly possible that Factors (1) and (2) parallel the factors isolated by Biesheuvel and Pitt (unstructured motor speed and flexibility). They provide further proof of the need to distinguish between these areas of our functioning.

An understanding of speed of functioning is important in the field of time estimation because it manifests itself in two crucial tendencies : accuracy and variability. Once one accepts Eysenck's

classification and the questionnaires are in fact definitive of temperamental functioning, one would expect Extraverts who are supposed to use their skeletal-musculative to a greater extent than Introverts * to be more accurate in a task requiring motor co-ordination (the reproduction of temporal intervals). One would also expect them to be less variable in their performance than Introverts. A "purely" efferent investigation of this confirms the prediction. Variability has been found to correlate significantly and negatively with Extraversion. (Du Preez's study yields statistically significant results ($p < .01$). Since variability has been found to correlate positively and significantly with error, we get a meaningful efferent picture. However, this is only the expressive component of the picture. What happens when cognitive controls are brought into play ? Du Preez's study was an indirect investigation of this. Since he used different methods of reproduction he was able to differentiate between subjects who are able to give the same judgement by different methods and those who are not. In the former case one is entitled to draw the inference that these subjects had evolved a solid core or system of time experience which determined the reproduced estimation. In this sense a correlation of the Intra-individual rates of change (as elicited by different methods of reproduction) will reveal some indication of the individual's cognitive functioning. Du Preez puts the issue as follows :

> "It is possible that there are large differences in the degree to which individuals functionally integrate all their time judgements. Some subjects may attempt to judge consistently, others may be more concerned with judging each signal freshly as it comes .... Since Intra-individual changes in time judgements by different methods correlate significantly at 16 seconds, but not at 8 seconds ** we may tentatively conclude that a change of the method of judgement takes place as the signal is lengthened. The unifying factor proposed is an increased reliance on symbolic aid as perception of time turns to conception of length of time". (p.77)

---

* and to a greater extent than their cognitive systems - the phrase "muscle-bound" was used to describe the experience ratio in this context.

** In our experiment where the estimation is necessarily a function of conceived time, even 8.4 seconds revealed the effects of symbolic functioning. One could say, therefore, that this is direct support for Du Preez's "tentative proposal of symbolic intervention". In this sense our experiment is the complement to Du Preez's since we have related conceived time to its efferent outcome. We have filled in the afferent variable of this efferent picture.

Thus we see that as intervals are lengthened cognitive factors become more crucial. All cognitive systems aspire to the maintenance of an optimal level of integration. The nature and success of each individual's integrating ability will be revealed in his power to resist irrelevant artifacts. The efficiency of his cognitive apparatus can be seen in terms of its incisiveness, its capacity to penetrate the surface of experience to the underlying principle involved. It is the ability to detect and register a common denomenator. In the case of the efferent aspects of the time experience, the problem is, as Du Preez puts it "...the extent to which subjects are able to make efferent impulses equivalent, according to some objective criteria by which the resultant behaviours are judged". (p.247). Our own study has stressed repeatedly the extent to which Field-Independence - or a high level of integration - is the prerequisite for recognising the underlying homogeneity of experiences. We saw in regard to the afferent aspects of the individual's time experience that a high level of integration will reduce Variability in time judgements. Du Preez suggests that the same conditions are requisite for reducing Variability where efferent aspects are concerned. "The more the subject's judgements are affected by qualitative differences in the period judged or the method of judging the less the extent to which he corrects his judgement by using rational cues". (The importance of this increases as the interval increases).

A summary of the above will be useful:

(a) The Extravert is both more accurate and less variable than the Introvert in his efferent functioning.

(b) However, as intervals increase, perceived duration incorporates more and more the effects of conceived duration.

(c) Conceived duration with its implication of symbolic functioning, by definition discloses the nature of an Individual's cognitive structures.

(d) The Extravert, since he is more field-dependent, has evolved a less stable and enduring internal integration of his experiences.

(e) The failure to sustain a stable inner cognitive equilibrium will lead to a vulnerability to field artifacts and obscure the underlying homogeneity of the time experience.

(f) This adherence to the field will lead to greater inaccuracy in time judgements.

(g) Therefore, the more the Extravert's cognitive functioning is involved, the greater the inaccuract likely to be registered in his reproduction of time.

Going back to our previous discussion, the multiplicity of interdependent variables is now evident. It is clear that an over-expansive concept of primary-secondary functioning can become misleading. In order to achieve a proper understanding of the factors entering into the concept, it should be broken down. Research strategy would then explore detailed indices of these dimensions and attempt to establish their inter-dependence. In the field of time-estimation, it would be interesting to see at what point, or rather at what controllable convergence of factors, the relative constancy and accuracy of the Externalizer's efferent functioning begins to reveal the inaccuracy predictable from his cognitive functioning. This would also sharpen our understanding of the transition from perceived to conceived time and the role of the size of the time interval involved.

---oooOooo---

the one we isolated are accessible to quantification in the experimental investigation of the estimation of time. Replications of this study would not only help to substantiate (or possibly question) the validity of our findings, but should also determine how this personality factor is dynamically related to others characterising these individuals.

.An interesting aspect of our findings was the way in which our Externalizer, initially rather amorphously conceived, fitted the mould of the well-known Extravert. Because we had not specifically anticipated this finding, our study did not cater for detailed investigation of the Typological postulates Eysenck has proposed. A repetition of this study which controlled for the predictions of Eysenck's hypotheses, would not only re-test our findings, but possibly extend them.

1. LIMITATIONS OF THIS STUDY AND SUGGESTIONS FOR FURTHER RESEARCH:

Details of the basic deficiencie s of this study have been alluded to during the discussion of the procedural techniques so that intimations of the overall limitations are interspersed throughout. It will be useful, therefore, to extract these from the body of the dissertation and delineate them systematically. Experimental procedure and theoretical formulations will be treated separately.

A. EXPERIMENTAL PROCEDURE:

(1) During the course of examining the material elicited by the Personality Tests it became clear that (aside from the Questionnaires) the Rorschach test was by far the most sensitive tool for detecting individual differences. Not only was it able to differentiate groups but the composite entities which emerged were usually in the expected direction. (Since the final scoring procedure was based on a "blind" analysis of the raw data there is no real danger that a priori expectations influenced the scoring system. This has been dealt with in "Treatment of Results"). It is a pity, therefore that (a) only the five colour cards were used, and (b) so few indices were selected for scoring. We have seen that the type of material we were after was to a large extent concerned with the nature of the fantasy life (or

lack thereof) of the individual. The Rorschach was a particularly appropriate research tool because of its policy of subtly sanctioning the disclosure of fantasy life. It has already been noted that this had not determined our selection of the test. At the preliminary stages of the structuring of our research strategy we were influenced by (a) the fact that Colour and Form reactivity supplied classificatory criteria differentiating the groups we had in mind, and (b) the Rorschach had a built-in Colour-Form dichotomy. In a sense, then, the stimulus which prompted our choice was a two-edged sword. On the one hand it provided the clue to the relevant technique, and at the same time it limited our use of it. After all, the claim made is that the final formula produced in the comprehensive analysis of the Rorschach protocol involves the individual's Erlebnistyp or Experience Balance which is a highly appropriate label for what we were investigating. This claim entails the belief that the final summary psychogram, drawn up for the quantity of information, represents the experience balance of the individual. In fact the most obvious feature in any psychogram is the experience balance it represents. If the responses tend to bulk in the first half of the psychogram, it indicates that the subject's perception has been influenced largely by "inner" determinants. If the responses tend to bulk in the right half of the psychogram the subject's perception is considered to have been influenced by outer-determinants. His perception is then said to be stimulus-determined. Our limited use of the potential of the Rorschach meant that the summary psychogram could not validly be drawn up from our quantity of information. Nor could we calculate the (FM and M) : (Fc + C + C^1) ratio, a formula which (it is claimed) allows one to infer a tendency to either Introversion or Extratension. *

---

* We have already discussed the problems associated with these claims. However, the doubts cast on their validity do not condone the failure to exploit the full potential of the test.

(2) Our unexpected findings in connection with the Arithmetic and Music items have often been noted. It will be recalled that we expected the arithmetic item to be more differentiating than any of the others because it (supposedly) engaged the subject more fully. It became clear that this assumption was inaccurate : an item which initiates activity is not necessarily compelling or differentiating - the latter being more relevant for our purposes. Since it is impossible to determine the precise value of a stimulus before it is administered, it is advisable to establish its effects in a pilot study conducted prior to the major experiment. As already indicated, the pilot study we conducted was more specifically concerned with other variables of the time experience. However, now that the hypothesis has been given some support, it would be profitable to explore the precise effects of a wide range of differentiating stimulus conditions.

(3) Our Dissociation Test (Arithmetic performed during supposedly distracting sound effects) was clearly unsatisfactory. It is difficult to ascertain the precise reason for this although it is likely that here again Arithmetic as a stimulus condition does not involve subjects differentially. In view of the empirical findings in this field, it is possible that an advanced version of the colour-form ratio sorting test of the type described by Cattell (p.93) would have been more valuable. (The choice of the Rorschach in this connection was obviously misguided).

(4) Since Witkin's work was concerned with personality factor comparable with our own, it might have been worthwhile administering his embedded figures tests to our subjects. This would not only have examined their ability to resist the context, but would also have tested whether our speculations regarding the possible similarity of our two groups have any validity.

(5) The results of Witkin's tests revealed important differences in perception between men and women. Relevant from our point of view is the finding that "women find it more difficult than men to resist the structure of the prevailing field". (p 479). This finding suggests that a replication of our study using males and females might yield some interesting findings.

(6) The work of Klein and Gardner led them to the postulation of a levelling versus sharpening principle of cognitive control. These are described as follows :

(a) Levelling: the levelling group displayed a pattern referred to as "self-inwardness" which entailed avoidance of any situation requiring active manipulation, exaggerated needs for nurture and succour and passive drifting". (p. 339)

(b) Sharpening: The reverse tendency of "self-outwardness" indicates traits that are manipulative and active ; it refers specifically to people who have a gread need for autonomy.

Of particular interest from our point of view are the conclusions Klein draws from his extraction tests (a variation of Witkin's techniques). He attributes the inefficiency of his levellers to an inability to "penetrate the camouflage". It would be interesting to investigate the performance of our groups on these extraction tests and see whether the Externalizer who was also displaced by field effects would be unable to penetrate the camouflage.

(7) We have already suggested the possibility of exploring the relationship between the Externalizer's cognitive controls and his efferent functioning. The suggestion was based on the following situation :

(i) The Externalizer's cognitive style is manifested in an adherence to the outer field. This leads to greater inaccuracy and variability in time judgements.

(ii) If Extraverts use their skeletal muscular system to a greater extent than Introverts (as their responses to the questionnaires suggest) they might be expected to be more accurate in a task requiring motor co-ordination. Thus their reproduction of duration should reveal the accuracy predictable from their efferent functioning.

B. THEORETICAL FORMULATIONS:

Facile pronouncements have been made throughout our discussions. Dichotomies were set up in such black-white terms that the interplay of factors seem to have been left out of account entirely. It is quite obvious for example that there is no such thing as complete abdication in favour of the external environment. No individual is merely a medium for the ideas and impressions supplied to him wholesale from elsewhere and which he incarnates automatically. There is always an internal selective process going on, even if for no other reason than that the habit patterns or thought precedents established by one's own history will determine the choice of consensual precedents. However, it is almost inevitable that we destroy the individual's centredness by our very methods before we even study him. On the other side, the impression gained of the Internalizer's solipsistic barrier against the environment (the entry of foreign bodies) is also highly misleading. Even highly independent thinking never occurs in complete isolation. It is quite obvious that though independent thought is self-maintaining and self-directing it is not cut off. The process of independent thinking - if it is to retain its high fidelity - requires that there be "feed back" from the physical and social environment. To quote Crutchfield:

> ".....independent thinking is not isolated. In order to maintain a reality orientation the person must be concerned with all sources of validation of his thinking.

The/...

> The social context provides indispensable information and consensual validation from other people : thus the independent thinker cannot remain for long cut off from the social context. Periodically he may leave it to go off on his lonely mental work but he must periodically return to it. This ceaseless oscillation between the private and the public worlds of thought is the hallmark of effective independent thinking ".

An attempt to account for personality differences will invariably create "ideal" dichotomies of personality structure which have no counterpart in reality. The crudeness of these dichotomies is constantly shown up by the infinite hybrids which suggest the rich and complex interactions possible. However, these practices are usually condoned on the basis of the writer's awareness of the purely pragmatic nature of his categories and the qualifications he provides to overcome the resulting oversimplifications. The broadness of one's scope and the desire to reach towards systematic completeness are also invoked to condone coarse theorising. Moreover, as has already been indicated, the fact that our typology was based on a specific dimension is probably responsible for the large gaps in our theoretical model.

2. THE EXPERIMENTAL VALUE OF THE MUSIC ITEM IN THE EXPERIENCE OF TIME : ITS RELATION TO INDIVIDUAL DIFFERENCES.

The frequently noted relation between psychological space and psychological time has not yet been dealt with. We have, however, already distinguished between experienced duration and the notion of time and the importance of maintaining the distinction between these two aspects of time experience. We have also mentioned the difference between perceived duration and conceived duration and the fact that the latter requires symbolic aid. It will be useful to elaborate these distinctions in our attempt to understand the importance of music in the time experience and its relation to individual differences.

In his work "Time and Western Man" Wyndham Lewis suggests that

> "Bergson's doctrine of Time is the creative source of the time philosophy. It is he, more than any other single figure that is responsible for the main intellectual characteristics of the world we live in .... Whitehead makes no bones about his debt to Bergson. 'Bergson' he says 'introduced into philosophy the organic conceptions of physiological science' ". (page 166).

Turning to Bergson's own work "Time and Free Will", (1910) the first important contribution one finds is the distinction between pure duration and time. The former is seen as a qualitative change, the latter as a spatial concept. The psychological implications of this are far reaching. Although our need for manageable conceptions of our experiences manifests itself in many ways, symbolic representation is most readily understood when translated into physical terms. The physical rendering of intellectual constructions is most effectively achieved by visual imagery because of the intrinsically lucid and direct representational nature of visual material. (The psychologist's awareness of this in relation to the time experience is revealed by his construction of a Metaphor Test composed entirely of visual imagery). Fraisse quotes Walton's comment to the effect that "....our states of consciousness must express our relationships in clear terms by a system of impressions and symbols which provide us with sharp distinctions and well defined landmarks .... Those of our states which cannot give rise to distinct representations by themselves will fade behind the symbolism of another series seen in more manageable and definite terms". Bergson's analysis of our notion of time refers to the operation of this "mental habit" in the reconstruction of the time experience. According to Bergson the very notion of homogeneity "surrepticiously introduces space", (Ibid p.104) and further "....time, conceived under the form of an unbounded and homogeneous medium is nothing but the ghost of space haunting the reflective consciousness". This insidious entry of a visual image testifies to the supreme difficulty of conceptualising time - even our concept of space has some recourse to physical reality. As

Fraisse points out : "It is difficult to conceptualise becoming". The notion of time can be likened to the notion of becoming - they both share the same slippery dynamic quality which foils our attempts to capture their reality ina symbolic image. As Bergson points out, even this image of spatialised time does not correspond to any immediate experience.

The experience of duration on the other hand is more direct. A solid body of literature supplies evidence of the intra-organismic cues for our experience of duration. The auditory receptors and the importance of rhythmic cues in temporal experience have been noted and are too well known to be reiterated. Rimoldi's work on individual consistency led him to believe that these represent fundamental psycho-biological characteristics. He went so far as to suggest that modifications in the experience of duration and rhythmic behaviour may be interpreted as an effort to induce constancy in the environment and to fill what is perceived as too empty a duration.

The above theoretical framework should go some way towards illumingting the experimental value of the music-filled interval. Music, by its very nature, works on all these temporal frames of references. Nor is this all : it also provides a type of external projection of the internal temporal experience, and once projected, it is not dissociable. This point can be clarified by comparing the experience of music to our other aesthetic experiences since they too project our experiences. The crucial difference is this : whereas the plastic arts also articulate our experiences and require our participation for their appreciation, they do allow some measure of detachment. One's role as a spectator to the visual arts permits a large measure of critical detachment even during the experience of the art form. However, the special nature of the enactment of a musical form implicates the listener in such a way that it is impossible to escape even the physically experienced effects. Our relationship with duration also makes it impossible for us to

"escape the domination of the experience" (Fraisse p.283). However, experienced duration and music are comparable not only in terms of the relationship we conduct with them : the experiences themselves have similar attributes. Both are irreversible to take their most important common feature. Although our spatialised images of time make time reversible the experience of a specific duration is irrevocable. In the same way a musical experience cannot be re-enacted. The reason for this lies in the ephemeral dynamic quality which they share and the fact that neither has recourse to any palpable reality : physical representations of each (the score of music, the spatialised image of time) simply testify to the impossibility of capturing their essence. Wyndham Lewis has expressed this issue well :

> "Compare any two characteristic masterpieces from the arts respectively of music and of painting - a statue, say the Colleoni, and a piece of music, say a Beethoven quartette. You move round the statue but it is always there in its entirety for you : whereas the piece of music works through you as it were. When you are half way through the piece of music or it is halfway through you, if you did not remember what you had just heard you would be in the position of a clock ticking its minutes, all the other ticks except the present one no longer existing : so it would be with the notes, you have to live the music in some sense in contrast to your response to the statue ..... it is subject and object at once. Its peculiarity is that it has to be felt - it is an emotional object as well as a time object : there is an appreciable visceral and nerve disturbance accompanying the music, none or very little with the object that is an image. The statue, on the other hand, could be described as an intellectual object".

Thomas Mann crystallises this point in his phrase "music articulates time".

> "...time is the medium of narration, as it is the medium of life. Both are inextricably bound up with it as inextricably as our bodies in space. Similarly time is the medium of music : music divides, measures, articulates time, and can shorten it, yet enhance its value, both at once. Thus music and narration are alike in that they can only present themselves as a flowing, as a succession in time, as one thing after another : and both differ from the plastic arts which are complete in the present, and unrelated to time save as all bodies are, whereas narration - like music - even if it should try to be completely present at any given moment, would need time to do it in".
>
> (The Magic Mountain).

The above should go some way towards illuminating both the significance of music in the experience of duration and its peculiar sensivity for detecting individual differences. The experience of music has been likened to that of experienced duration. Music is seen as a type of aesthetic articulation of temporal successions. Following from this, it is suggested that the manner in which music involves the subject is such that his response to a music-filled interval will disclose not only the nature of his general make-up, but more specifically his "power to dissociate" in the sense in which it is required in order to deliver an accurate time judgement. Hence, the experimental value of music in the investigation of the role of character structure is maximal. A replication of this study which systematically explored these interactions - varied music-filled intervals, character structure and judged duration - would clarify the empirical value of music in the investigation of apparent duration.

---oooOooo---

BIBLIOGRAPHY

1. Allport, F.H. Theories of perception and the concept of structure. (New York: Wiley, 1955).

2. Allport, G.W. Personality. (New York: Henry Holt & Co. 1937).

3. Axel, R. T. The estimation of time. Arch. Psych., 1924, 12, p. 1-77.

4. Beck, S.J. Rorschach's Test Vol. 1. Basic Processes. (New York: Grune & Stratton, 1950).

5. Becker, W.C. Perceptual rigidity as measured by aniseikonic lenses. J. Abnorm. Soc. Psychol., 1954, 49, p. 419-422.

6. Behar, I. & Bevan, W. The perceived duration of auditory and visual intervals: cross-modal comparison and interaction. Amer. J. Psychol., 1961, 74, 1, p. 17-26.

7. Bergson, E. Time and free will. (London: George Allen, 1910.)

8. Biesheuvel, S. An observational technique of temperamental and personality assessment. Bull. Nat. Inst. Pers. Res., 1949, 3, p. 30-40.

9. Biesheuvel, S. & Pitt, D.R. The relationship between secondary function and some aspects of speed and tempo of behaviour. Acta Psychol., 1955, XI, p. 373-396.

10. Bindra, D. & Waksberg, H. Methods and terminology in studies of time estimation. Psychol. Bull., 1956, 53, p. 155-159.

11. Boring, E.G. Temporal perception and operationism. Amer. J. Psychol., 1936, 48, p. 519-522.

12. Bruner, J.S. Personality dynamics and the process of perceiving. In Perception: an approach to personality. Blake, R.R. & Ramsey, G.V. (Eds.) New York: Ronald, 1951.

13. Burton, A. A further study of the relation of time estimation to monotony. J. Appl. Psychol., 1943, 27, p. 350-359.

14. Clausen, J., Hansel, C.E.M. & Sylvester, J.D. Interdependence in judgements of space, time and movement. Acta. Psychol., 1955, 11, p. 360-372.

15. Dooley, Lucille The concept of time in defence of ego integrity. Psychiat., 1941, 4, p. 13-23.

16. Du Preez, P.D. Individual differences in the repreduction of temporal intervals. Unpublished doctoral dissertation. University of Cape Town. 1963.

16. Eysenck, H.J. The structure of human personality. London: Methuen, 1953.

17. Eysenck, H.J. A dynamic theory of anxiety and hysteria. J. Ment. Sci., 1955a, 101, p. 28-51.

18. Eysenck, H.J. The questionnaire measurement of neuroticism and extraversion. Rivista di Psicologia, 1956a, 50, p. 113-140.

19. Eysenck, H.J. Hysterics and dysthymics as criterion groups in the study of introversion - extraversion: a reply. J. Abn. Soc. Psychol., 1958, 57, p. 250-252.

20. Eysenck, H.J. The maudsley personality inventory. London: University Press, 1959.

21. Eysenck, H.J. A short questionnaire for the measurement of two dimensions of personality. J. Appl. Psychol., 1958, 42, p. 14-17.

22. Eysenck, H.J. Personality and the estimation of time. Percept. Mot. Skills, 1959, 9, p. 405-406.

23. Eysenck, H.J. & Claridge, G. The position of hysterics and clysthymics in a two-dimensional framework of personality description. J. Abn. Soc. Psychol., 1962, 64, p. 46-55.

24. Filer, R.J. & Meals, D.W. The effect of motivating conditions on the estimation of time. J. Exp. Psychol, 1949, 39, p. 327-331.

25. Flavell, J.H. The developmental psychology of Jean Piaget. Princeton: Van Nostrand, 1963.

26. Fraisse, P. The psychology of time. New York: Harper and Row, 1963.

27. Fraisse, P. Les conduites temporelles et leurs dissociation pathologiques. Enceph., 1952, 41, p. 132-142.

28. Frankenhaeuser, M. The estimation of time. Uppsala, 1959.

29. Fredericson, Emil. Time and aggression. Psychol. Rev., 1951, 58, p. 41-51.

30. Gardner, R.W., Jackson, D.N., & Messick, S.J. Personality organisation in cognitive controls. Psychol. Issues, 1960, 2, No. 4.

31. Gilliland, A.R. Some factors in estimating short time intervals. J. Exp. Psychol. 1940, 27, p. 243-255.

32. Gilliland, A.R. & Humphreys, D.W. Age, sex, method and interval as variables in time estimation. J. Genet. Psychol., 1943, 63, p. 123-130.

33. Gilliland, A.R., Hofeld, J. & Eckstrand, G. Studies in time perception. Psychol. Bull., 1946, 43, p. 162-176.

34. Goldstone, S., Boardman, W.K., & Lhamont, W.T. Intersensory comparisons of temporal judgements. J. Exp. Psychol., 1959, 57, p. 243-248.

35. Gregg, Lee W. Fractionation of temporal intervals. J. Exp. Psychol., 1951, 42, p. 307-312.

36. Guilford, J.P. Christensen, P.R. Frick, J.W. & Merrifield, P.R. Factors of interest in thinking. J. Gen. Psychol., 1961, 65, p. 39-56.

37. Gulliksen, H. The influence of occupation upon the perception of time. J. Exp. Psychol., 1927, 10, p. 52-59.

38. Harton, J.J. An investigation of influence of success and failure on estimation of time. J. Gen. Psychol., 1939, 31, p. 51-62.

39. Harton, J.J. Influence of the degree of unity of organisation on the estimation of time. J. Gen. Psychol., 1939, 21, p. 25-49.

40. Harton, J.J. Relation of time estimates to actual time. J. Gen. Psychol., 1939, 21, p. 219-224.

41. Harton, J.J. Time estimation in relation to goal organisation and difficulty of tasks. J. Gen. Psychol., 1942, 27, p. 63-69.

42. Hindle, H.M. Time estimates as a function of distance travelled and relative clarity of goal. J. Pers., 1951, 19, (4) p. 483-501.

43. Hoagland, H. Pacemakers in relation to aspects of behaviour. New York: Macmillan, 1935.

44. Hoagland, H. The chemistry of time. Sci. Mon. 1943, 56, p. 56-61.

45. Hoagland, H. The physiological control of judgements of duration: evidence for a chemical clock. J. Gen. Psychol., 1933, 9, p. 267-287.

46. Hoagland, H. & Perkins, A.T. Some temperature characteristics in man. J. Gen. Physiol., 1935, 18, 399.

47. Holt, R.R. Implications of contempory personality theories. (In Klopfer et al. Developments in the Rorschach technique. Vol. 1. Ch. 15. p.547-556. New York World Book Co. 1954).

48. Holzman, P.S. & Klein, G.S. Cognitive system-principles of levelling and sharpening: individual differences in assimilation effects in visual time-error. J. Psychol., 1954, 37, p. 105-122.

49. Jaensch, E. Veber d. bezichungen von den lage - und bewegungs - empfindungen. Z.F. Psych., 1906 (quoted by Helson, H. & King, S.M., 1931).

50. Jaensch, E.R. & Kretz, A. Experimentell - struktur - psychologische untersuchungen ueber die auffassung der zeit unter berucksichgung der personaltypen. Zeitschr. f. Psychol., 1932, 126, p. 312-375.

51. James, William. Principles of Psychology. Henry Holt, New York, 1908.

52. Jasper, H. & Shogass, C. Conscious time judgements related to conditioned time intervals and voluntary control of the alpha rhythm. J. Exp. Psychol. 1941, 28, p. 503-508.

53. Jung, C.G. Psychological types. New York: Harcourt, Brace, 1923.

54. Klein, G.S. The personal world through perception. In Blake, R.R., & Ransey, G.V. (Eds.). Perception: an approach to personality. New York: Ronald, 1951, p. 328-355.

55. Klein, G.S. & Krech, D. Cortical conductivity in the brain-injured. J. Pers., 1952, 21, p. 118-148.

56. Klein, G.S. & Krech, D. The problem of personality and its theory. J. Pers., 1951, 20, p. 2-23.

57. Klein, G.S. & Schlessinger, H. Where is the perceiver in perceptual theory? J. Pers., 18, (1) p. 32-47.

58. Klopfer, B., Ainsworth, M.D., Klopfer, W.G. & Holt, R.R. Developments in the Rorschach Technique Vol. 1. Technique and Theory. (New York: World Book Co. 1954).

59. Knapp, R.H., & Green, H.B. Time judgement, aesthetic preference and need for achievement. J. Abn. Soc. Psychol. 1959, 58, p. 140-142.

60. Knapp, R.H. & Green, H.B. The judgement of music - filled intervals and achievement. J. Soc. Psychol., 1961, 54, p. 263-267.

61. Loehlin, J.C. The influence of different activities on the apparent length of time. Psychol. Monographs. 1959, 73, p. 219-224.

62. MacLeod, R.B. & Roff, M.R. An experiment in temporal disorientation. Acta. Psychol., 1936, 1, p. 381-423.

63. Meerloo, A.M. Father time: an analysis of subjective conceptions of time. Psychiat. Quant., 1948, 22, p. 587-608.

64. Meerloo, A.M. Father time (11): a continued analysis of subjective conceptions of time. Psychiat. Quart., 1950, 24, p. 657-671.

65. Mundy-Castle, A.C. The electro-encephalogram in relation to temperament. Acta. Psychol., 1955, 11, p. 397-411.

66. Pemberton, C. The closure factors related to other cognitive processes. Psychometrika, 1952, 17, p. 267-288.

67. Pemberton, C. The closure factors related to temperament. J. Pers., 1952, 21, p. 159-175.

68. Piaget, J. Le developpement de la notion de temps chez l'enfant. Paris: Presses Univ. de France, 1946.

69. Piaget, J. Une experience sur le developpement de la notion de temps. Schweiz. Z. Psychol. Anwend., 1943, 1., p. 179-185.

70. Postman, L. Estimates of time during a series of tasks. Amer. J. Psychol., 1944, 57, p. 421-424.

71. Postman, L. & Miller, G.A. Anchoring of temporal judgements. Amer. J. Psychol., 1945, 58, p. 43-53.

72. Quasebarth, K. Zeitschâtzung und Zeitauffassung optisch und akustisch ausgefüllter intervalle. Arch. Ges. Psychol., 1924, 49, p. 379-432.

73. Rimoldi, H.J.A. Personal tempo. J. Abn. Soc. Psychol., 1951, 46, p. 283-303.

74. Rimoldi, H.J.A. Temporal organisation of behaviour. J. Psychol., 1961, 51, p. 383-391.

75. Roelofs, C. Otto & Zeeman, W.P.C. The subjective duration of time intervals. Acta. Psychol., 1949, 61, p. 126-177, 289-336.

76. Rorschach, H. Psychodiagnostics. Berne, H. Huber 1942.

77. Rosenzsweig, S. & Koht, A.C. The experience of duration as affected by need-tension. J. Exp. Psychol., 1933, 16, p. 745-775.

78. Schachtel, E. Metamorphosis: On the Development of Affect. (New York: Basic Books, Incl, 1959).

79. Schaefer, V.G. & Gilliland, A.R. The relation of time estimation to certain physiological changes. J. Exp. Psychol., 1938, 23, p. 545-552.

80. Scott, W. Clifford M. Some psycho-dynamic aspects of disturbed perception of time. Brit. J. Med. Psychol., 1948, 21, p. 111-120.

81. Siegman, A.W. The relationship between futur e time perspective, time estimation, and impulse control in a group of young offenders and in a control group. J. Consult. Psychol., 1961, 25, p. 470-475.

82. Siegman, A.W. Intercorrelation of some measure of time estimation. Percept. Mot. Skills, 1962, 14, p. 381-382.

83. Singer, J.L. The experience type. Some behavioral correlates and theoretical implications. (In Rickers - Ovsiankina, M.E. (ed) Rorschach Psychology. New York: John Wiley & Sons Inc. 1960).

84. Smith, Marion W. Different cultural concepts of past, present and future: a study of ego extension. Psycho therapy, 1952, 15, p. 395-400.

85. Sterzinger, O. Chemopsychologische Untersuchungen über den Zeitsinn. Zschr. F. Psychol., 1935, 134, p. 100-131.

86. Stott, L.H. Time order errors in the discrimination of short tonal durations. J. Exp. Psychol., 1935, 18, p. 741-766.

87. Sturt, Mary The psychology of time. London: Paul, Trench, Trubner: New York: Harcourt Brace, 1925.

88. Thompson, D.C., Spivack, G., & Levine, M. The experience of time as a determinant of self-control. Arch. Gen. Psychiat., 1960, 3, p. 563.

89. Thurstone, L.L. A factorial study of perception. (Chicago: University of Chicago Press, 1944).

90. Weber, C.O. Estimation of time. Psychol. Bull., 1933, 30, p. 233-252.

91. Werner, H. & Wapner, S. Toward a general theory of perception. Psychol. Rev., 1952, 59, p. 324-328.

92. Witkin, H.A., Lewis, H.B., Hertzmah, M., Machover, K., Messinger, P.B. & Wapner, S. Personality through perception. New York: Harper & Co. 1954.

93. Witkin, H.A., Dyk, R.B., Faterson, H.F., Goodenough, D.R. & Karp, S.A. Psychological Differentiation: Studies of development. (New York: John Wiley & Sons, 1962).

94. Woodrow, H. Behaviour with respect to short temporal stimulus forms. J. Exp. Psychol. 1928. 11.

95. Woodrow, H. The reproduction of temporal intervals. J. Exp. Psychol., 1930, 13, p. 473-499.

96. Woodrow, H. Individual differences in the reproduction of temporal intervals. Am. J. Psychol., 1933, 45, p. 271-281.

97. Woodrow, H. Time perception. In S.S. Stevens (Ed). Handbook of experimental psychology. New York: Wiley, 1951, p. 1224-1235.

APPENDIX A

TABLES OF SCORES

EXPERIMENT I

TABLE

ANALYSIS OF VARIANCE

AUDITORY DATA

SOURCE OF VARIATION	SUME OF SQUARES	DEGREES OF FREEDOM	VARIANCE ESTIMATE	SIGNIFICANCE LEVEL
A	2.9874	1	2.9874	95%
B	67.1102	2	33.5551	99.5%
C	.0079	2	.0039	-
D	28.0229	29	.9663	99.5%
AB	.4208	2	.2104	-
AC	.9594	2	.4797	-
AD	10.1632	29	.3505	95%
BC	.4554	4	.1139	-
BD	25.8567	58	.4458	99.5%
CD	40.2743	58	.6944	99.5%
ABC	1.3642	4	.3411	-
ABD	17.8076	58	.3070	95%
ACD	12.0267	58	.2074	-
BCD	43.1429	116	.3719	99.5%
RESIDUAL	22.9910	116	.1982	
TOTAL	273.5903	539		

EXPERIMENT I

TABLE

ANALYSIS OF VARIANCE

VISUAL DATA

SOURCE OF VARIATION	SUMS OF SQUARES	DEGREES OF FREEDOM	VARIANCE ESTIMATE	SIGNIFICANCE LEVEL
A	.1790	1	.1790	-
B	42.8885	2	21.4443	99.5%
C	9.4403	2	4.7202	99.5%
D	31.6817	29	1.0925	99.5%
AB	.0898	2	.0449	-
AC	.2674	2	.1337	-
AD	5.0428	29	.1739	90%
BC	6.8048	4	1.7012	99.5%
BD	22.5546	58	.3889	99.5%
CD	10.4973	58	.1810	95%
ABC	.3399	4	.0850	-
ABD	6.0509	58	.1043	-
ACD	10.7073	58	.1846	95%
BCD	18.0672	116	.1558	95%
RESIDUAL	13.9938	116	.1206	
TOTAL	178.6050	539		

E X P E R I M E N T II

T A B L E

ANALYSIS OF VARIANCE

PURE AUDITORY STIMULUS

SOURCE OF VARIATION	SUMS OF SQUARES	DEGREES OF FREEDOM	VARIANCE ESTIMATE	SIGNIFICANCE LEVEL
A	167.3354	4	41.8338	99.5%
B	134.4710	1	134.4710	99.5%
C	203.9347	29	7.0322	99.5%
AB	64.9171	4	16.2293	99.5%
AC	371.0288	116	3.1985	99.5%
BC	147.1787	29	5.0751	99.5%
RESIDUAL	217.7035	116	1.8768	
TOTAL	1306.5684	299		

APPENDIX B

QUESTIONNAIRES

QUESTIONNAIRE

Name ..... Sex .....

Year of Study ..... Faculty .....

The following questionnaire is being used for research purposes.

Please indicate to the best of your ability, which of the following statements you consider to be true and which not. Put a ring around the word TRUE if you feel that, on the whole, the statement is true; put a ring around the word FALSE if you feel that, on the whole, the statement is not true.

1. It is all very well to talk of ideals but it is practical matters of fact that count in the end. TRUE FALSE

2. There is no doubt that love is an important factor in one's choice of a marriage partner, but other, more practical factors are of equal importance. TRUE FALSE

3. If a person is to get anywhere in life it is sometimes necessary to gamble "everything or nothing". TRUE FALSE

4. Ambition is the parent of many virtues. TRUE FALSE

5. It is better to go along with the crowd than be a martyr. TRUE FALSE

6. It would irritate me very much to have a watch or clock which was off by several minutes every day or so. TRUE FALSE

7. If people would talk less and work more, everybody would be better off. TRUE FALSE

8. I have a pretty definite idea of what I will be doing next summer. TRUE FALSE

9. I feel uneasy when I am not certain of the time. TRUE FALSE

10. I have difficulty in concentrating on my work. TRUE FALSE

11. I find that I can work hard at something only when I know that it must be ready on a certain date. TRUE FALSE

12. I seem to be pressed for time more than most people. TRUE FALSE

13. I have a poor memory for the past events in my life. TRUE FALSE

14. I often find it hard to 'get going' on something. TRUE FALSE

Please turn over .....

BRIEF PERSONALITY INVENTORY

Name .... Sex .....

Year of Study ..... Faculty .....

Please answer the following questions frankly by putting a ring around either YES or NO for each question. It is important that you should not leave out any questions, so please decide in each case whether on the whole the answer should be YES or NO in your case.

1.	Do you have dizzy turns?	YES	NO
2.	Do you get palpitations or thumping in your heart?	YES	NO
3.	Do you worry too long over humiliating experiences?	YES	NO
4.	Do you consider yourself a rather nervous person?	YES	NO
5.	Are your feelings easily hurt?	YES	NO
6.	Are you subject to attacks of shaking or trembling?	YES	NO
7.	Are you an irritable person?	YES	NO
8.	Do you worry over possible misfortunes?	YES	NO
9.	Do you have nightmares?	YES	NO
10.	Do you suffer from sleeplessness?	YES	NO
11.	Did you ever get short of breath without having done heavy work?	YES	NO
12.	Do you suffer from 'nerves'?	YES	NO
13.	Are you troubled by aches and pains?	YES	NO
14.	Do you get nervous in places such as lifts, trains or tunnels?	YES	NO
15.	Do you lack self-confidence?	YES	NO
16.	Are you troubled with feelings of inferiority?	YES	NO
17.	Do you prefer action to planning for action?	YES	NO
18.	Are you happiest when you involved in some project that calls for rapid action?	YES	NO

Please turn over .....

NAME .....

QUESTIONNAIRE

1. Which duration was the most difficult to estimate?

2. Did the silent interval present any special difficulties?

3. Did you use any particular method for estimating the durations? Was this method used consistently or did you adjust the method to each type of sound or interval? Please elaborate.

4. Was your method of estimation affected by the length of the duration?

5. Indicate whether your usual method for estimating the duration of the pure tone was counting (or tapping or any other similar device) Was this method appropriate for any of the other items?

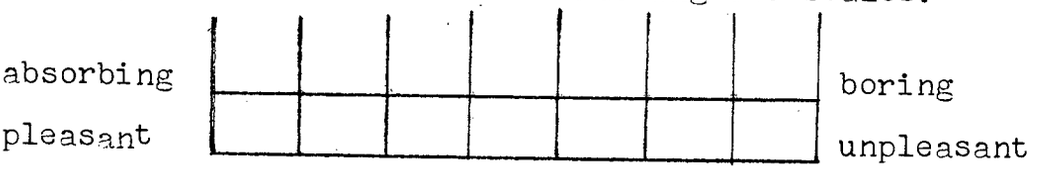
6. Which type of stimulus (music, silent interval, verbal passage, tone, Arithmetic) do you feel you judged most accurately? To what do you attribute your accuracy?

7. Did you find it easier to estimate the duration of the Music or the silent interval? Why is it easier?

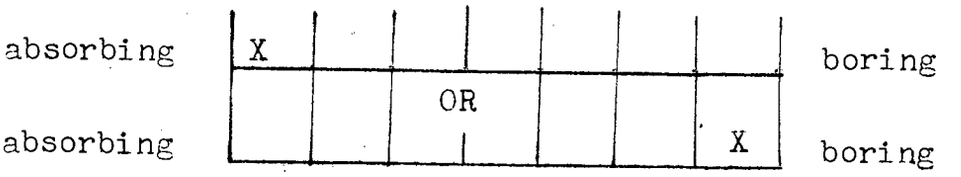
8. Do you consider yourself accurate at estimating the time in daily life?

9. Can you wake up at a predetermined time in the morning (other than your usual time)?

10. Rate each type of stimulus on the following two scales:



If you feel that the stimulus is very closely related to one or the other end of the scale, you should place your check-mark as follows:



/ If ...

/

NAME .....

If you consider the stimulus to be NEUTRAL on the scale, then you should place your check-mark in the middle space:

absorbing |---|---|---|---X---|---|---|---| boring

RATE ALL 5 STIMULI ON BOTH THESE SCALES.

1. MUSIC

absorbing |---|---|---|---|---|---|---| boring

pleasant |---|---|---|---|---|---|---| unpleasant

---

2. SILENT INTERVAL

absorbing |---|---|---|---|---|---|---| boring

pleasant |---|---|---|---|---|---|---| unpleasant

---

3. ARITHMETIC.

absorbing |---|---|---|---|---|---|---| boring

pleasant |---|---|---|---|---|---|---| unpleasant

---

4. VERBAL STATEMENT.

absorbing |---|---|---|---|---|---|---| boring

pleasnt |---|---|---|---|---|---|---| unpleasant

---

5. PURE TONE:

absorbing |---|---|---|---|---|---|---| boring

pleasant |---|---|---|---|---|---|---| unpleasant

APPENDIX C

ARITHMETIC PROBLEMS

NAME .....

ARITHMETIC AGE .....

ADD 12 TO THESE NOS.

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

TAKE 8 FROM EACH OF THESE NOS.

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

TAKE 9 FROM EACHOF THESE.

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

ADD 15 TO EACH OF THESE NOS.

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

ADD 7 TO EACH OF THESE

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

TAKE 14 FROM EACH OF THESE NOS.

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

1.

NAME .....

AGE .....

ARITHMETIC.

1. 360 X 5 =
2. 140 X 3 =
3. 480 X 7 =
4. 400 X 5 =
5. 260 X 4 =
6. 500 X 3 =
7. 390 X 8 =
8. 730 X 6 =
9. 630 X 9 =
10. 570 X 7 =
11. 230 X 6 =
12. 500 X 4 =
13. 640 X 7 =
14. 270 X 3 =
15. 350 X 9 =
16. 580 X 5 =
17. 800 X 9 =
18. 490 X 7 =
19. 180 X 9 =
20. 780 X 4 =

(2)

NAME .....

AGE .....

ARITHMETIC.

1. 976 ÷ 8 =
2. 480 ÷ 4 =
3. 305 ÷ 5 =
4. 306 ÷ 6 =
5. 800 ÷ 4 =
6. 603 ÷ 9 =
7. 819 ÷ 7 =
8. 488 ÷ 4 =
9. 972 ÷ 9 =
10. 895 ÷ 5 =
11. 960 ÷ 3 =
12. 816 ÷ 8 =
13. 749 ÷ 7 =
14. 209 ÷ 5 =
15. 890 ÷ 6 =
16. 407 ÷ 4 =
17. 490 ÷ 9 =
18. 389 ÷ 6 =
19. 391 ÷ 6 =
20. 763 ÷ 8 =

PROSE PASSAGES

1. The meaning of the pyramids can be grasped only in terms of Egyptian religious beliefs. (8.4 seconds.)

2. Andalusia is a country of roses and giant violets. Its people extend a more lavish welcome than in Castile but forget more quickly. Its people have much wit, less humour. (17.2 seconds.)

3. American music is neither as brilliant nor as original as American art. Except in its most famous form : jazz. Jazz stands for the dark side of the American experience. Its wailing strains, its feverishness, its cellar atmosphere are all the heritage of denial. (17.2 seconds.)

4. Posterity, unfortunately, was a very chilly thing to work for, no matter how much a man happened to love hiw own, or even other peoples' children. (8.4 seconds.)

5. The pillars of the Roman temple are almost Oriental in their proportions, heavy and rooted to the earth, like the legs of an elephant stricken with amnesia. (8.4 seconds.)

6. A marvellous atmospheric duet is taking place in the sky, the sun which has become a ball of fire, is now joined by the moon, and in the flood of swiftly shifting harmonics the ruins of Corinth glow and vibrate with supernatural beauty. Only one effect is withheld - a sudden rain of starlight. (17.2 seconds.)