"A STUDY OF TIME BEHAVIOUR IN THE NEUROTIC"

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PREFACE

STATEMENT OF THE PROBLEM AND OUTLINE OF THE METHOD OF APPROACH

This thesis is concerned with time behaviour in the neurotic.

The introduction discusses the significance of the role of "time" in the total repertoire of human behaviour, with special reference to the problems of the neurotic. A survey of the historical background to the study of "psychological time" reveals an emphasis on the investigation of short-time duration, rather than the "time sense."

Included in the use of the "time sense" in this study is:-

a) The awareness and the measurement of "short time," and "long time" intervals.

b) Personal and individual attitudes towards general and specific time concepts, and the emotions associated with these attitudes.

c) Personal time perspective, and attitudes towards the future.

In the past, experiments in this area have treated these different aspects of the time sense separately and differently. Studies have been limited and attempts to

integrate the different facets into a total and comprehensive picture have failed. Lack of a common terminology has created difficulties in synthesising the work in this area.

Clinical studies of the deviant personality, especially those carried out by Existentialist psychiatrists, dealt with the importance of time in the patient's illness (e.g. the depressive who perceives no future and the manic who lives in a continuous present). The distorted assessment of time in the schizophrenic patient has long been recognised. Yet no studies have attempted a comprehensive investigation of both the objective and psychological aspects of time behaviour in the neurotic.

Time sense for the purpose of this study is a blanket term referring to the perception of time, attitudes to time and behaviour specifically related to time. In this study, all these aspects of the time sense were investigated in a group of adult neurotic patients, in an effort to obtain a more adequate picture of time sense in the total complex of neurotic behaviour. The neurotic group was compared with a matched group of normal subjects and a second group of physically ill subjects.

Different methods of measuring the short time duration, as well as individual attitudes and future time perspective, were assessed in this study. The results

derived from all tests administered were subjected to correlation studies. The different groups' results were then compared and the possible implications of the differences and similarities between them considered.

CHAPTER I

INTRODUCTION

"What is time? A mystery, a
figment and all powerful."
Hans Castorp in Thomas Mann's
"The Magic Mountain."

1.1. The Concept of Time

The concept of a specific time sense has its origins in early philosophical studies and discussions, which distinguished betweenabstract and concrete concepts of time. Platonic philosophy maintained that time is the mobile image of eternity (Fraisse, 1963).

The present psychological viewpoint regards time as an abstract concept, providing the individual with a temporal framework with which he can organize his life in a meaningful fashion. Since time is an abstraction from a progression of events, awareness of time constitutes a major frame of reference by meansof which contact is maintained with the outside world (Coheen, 1950). It also provides man with a sense of continuity of both the self and the world. A sense of time has enabled man to maintain a conception of historical and personal continuity without which behaviour would be chaotic and fragmented into short term unintegrated

activity and the world arbitrary and frightening.

As Merloo (1954) states, understanding relationships between time and the human organism reveals that "Time sense" is much more than just the capacity to weigh and fill time. It is one of the basic directing processes of the human organism. The ability to use time profitably is a great asset, as we live in a culture where time itself is a major pressure. Appropriate timing is essential in all walks of life. "There is surely no greater wisdom than well to time the beginnings and onsets of things," said Francis Bacon in his essay "Delay."

Modern technology has provided us with an increase in the numbers of experiences compressed into a given time. McLuhan (1964), in particular, has directed our attention to the speed with which the "new media," such as film and television, assault our senses and join us together in a world village of instant communication. In turn the speed of this "electric communication" has conditioned us to respond with swift presentation of information. He suggests that we no longer need the orderly sequential presentation of events characteristic of the serial information of the printed word. Time is compressed into a multi-sensory vehicle of information delivery and processing. He also says that "today the action and the reaction occur almost at

the same time" (McLuhan, 1964, p. 21). Thus the "effects of technology do not occur at the level of opinions or concepts but alter sense ratios or patterns of perception steadily and without resistance," (McLuhan, 1964, p. 33). McLuhan states that it was the clock, as a machine, which initiated this course by processing time in such a way that it became separated from the rhythms of human experience. Time is therefore, something which is measured by abstract units gradually pervading all sense life, and the uniqueness of private experience is made universal by this abstract notion. The consequence of this is that in to-day's "electric age," we are beginning to "chafe under the uniformity of clock time."

Compression into a given time, in turn requires the elaboration and increase of adjustments to new situations, changing set expectation and the diminution of reliance on established coping mechanisms (habits). Travel, in this jet-propelled age, has succeeded in rendering the once familiar, unfamiliar. In the relatively short time that it takes to travel from one time zone to another, even the well-seasoned traveller can be left with a distinct feeling of unreality. Very quickly he is forced to change the rhythm of his days and nights to new times for eating, sleeping and working. These rhythms are central to his

sense of organized life. This does not imply that the passage of time, in itself, is the cause of the real occurrences of life. The individual's personal experience of time, his behaviour and feelings in time, are, however, fruitful and significant subjects for study.

The individual acquires, through his learning and experience, a sense of time which appears to be closely bound up with his sense of reality. It seems reasonable to expect that the sense of time will be disturbed when this sense of reality is affected and vice versa. Like any other individual, the emotionally disturbed person is confronted with the problems of adjusting his subjective sense of time to the objective facts of time. This adjustment is potentially yet another area of human conflict to be resolved. From observation of the neurotic's general behaviour, it would appear that, for him, this represents a greater problem area than forother relatively well adjusted individuals. Cappon and Banks (1964) state this more forcefully. ". . .the neurotic patients are sick with their hypertrophied or dilated orientation to pastness." The existentialists have expanded the concept by regarding the patient's experience of time as playing a fundamental role in his clinical condition, and they stress the patient's inability to relate to the future as seen in the condition

of schizophrenia (Binswanger, Minkowski, Straus, Rollo May, 1958). Victor Frankl (1967) wrote that not only is time an essential characteristic of human life but it is also a real factor in the meaning of life, giving it an urgency derived from its irreversible quality.

For purposes of scientific investigation, it is necessary to isolate time behaviour from other aspects of human activity. It must always be borne in mind that time behaviour is as subject to environmental stress and influence as are the many other facets of human behaviour.

If it is true that the internal emotional state of the neurotic in regard to time presents greater problems than that of the normal individual, then one would expect to find a pattern of consistency or lack of consistency in relation to time experience, shown by the individual neurotic. One would expect that the pattern would vary from one nuerotic to another in terms of the severity of his illness, and his unique personality. Many different aspects of the time experience should be considered in order to examine this proposition. The precise way in which a time disorder shows itself in the personality will depend on the nature and the degree of the neurotic disorder.

1.2. The Development of the Time Concept

The work of Piaget (1959) (as quoted in Mc V. Hunt, 1961, Flavell, 1963), has adequately demonstrated that the adult concept of time is not intuitive but a cognitive capacity which develops slowly in the maturing individual, as a result of the combination of experience and the development of the cognitive skills. Time, like movement and velocity, are constructs which require slow and gradual ontogenetic construction.

According to Piaget, the development of the sense of time in children can be divided into three main stages corresponding to the three main stages in the intellectual development. During the first sensori-motor-period - Stage I (first 12-18 months of life), there is no real experience of time but only what Piaget calls "practical time" observable in the temporal organization of the infant's movements. Piaget guesses that the child experiences a vague feeling of duration immanent in his own actions. This feeling is probably intermixed with other vague sensations of effort and need. A number of behaviour patterns are observable during the first few weeks. Sucking, looking, listening, vocalizing, grasping and diffuse motor activity are the sensori-motor activities which Piaget has called

schemata. By the end of the sensori-motor period, the child has begun to apprehend time as a generalized experience matrix in which the self and objects can be located in relation to each other. Personal duration becomes related to the duration of external environmental entities.[1]

Piaget states that at about 9-10 months the concept of permanence becomes apparent in the child's behaviour. The child shows his knowledge of the continuous existence of objects when they are out of sight, by searching for them. Subsequently, he proceeds to the egocentric stage of development which is the beginning of the acquisition of symbolic behaviour which leads to the stage of concrete operations. The child is unable to distinguish between inner and outer time which develop concurrently according to Piaget. By egocentrism, Piaget means that the child's view

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[1] Anna Freud (1953) has described this period as being dominated by the alternation between pain and pleasure. The infant is unable to translate what he wants and what he perceives into specific behaviour patterns, consequently his response capacity is deemed very poor. However Robert Fantz (1963) has shown that under special conditions of wakefulness, even the newborn infant can differentiate patterned visual stimuli from plain field stimuli and that preference is shown for the patterned stimuli.

of the world depends on his own activity. It does not imply self-centredness or selfishness but rather the child's lack of awareness of the self as separate from the outside world.

The third stage described by Piaget is called the Stage of Operational Thought. In this stage the distinction between psychological time and objective time can be made. This final stage is reached when the child is able to deduce the order of successions from the inter-relations of succession. The experience of pure duration then becomes possible. Fraisse however asserts that this is possible before this stage (Fraisse, 1963, Ch. 8).

Intelligence is regarded by Piaget as a specific instance of adaptive behaviour directed towards coping with the environment and the organization of thought and action. Adult time concepts derive from the maturing intelligence.

There is no time sense initially. Adaptation begins with random and diffuse mass reflexes in the neonate and progresses through the above-mentioned stages to the formal logical reasoning of adulthood, which occurs at about 15 years of age (Mc V. Hunt, 1961). The adolescent differs from the child in that he is able to think beyond the present.

Piaget (1953) only deals in general terms with the possible effects of deprivation during childhood on

conceptual development. Throughout his extensive observations of mental development in children, Piaget followed the general principle of observing their behaviour without modifying or interfering with the environment. To him too, the adolescent differs from the child in his ability to think beyond the present. He suggests that the degree of impairment of the child's capacity to form concepts such as quantity, weight, volume and time, gives a measure of his degree of cognitive defect (Wolfe Mays, 1963). Other research workers, such as Juanita Chambers (1961) have studied specific aspect of this defect in concept attainment. She concerned herself with the maturation of time concepts in a group of 28 children, who had been placed in at least three different foster homes during their first three years of life, and compared them with a matched group who had lived with their families. Using experimental techniques adapted from Piaget, she found that the deprived children were significantly less mature. The importance of Chambers' findings is the link she established between general maturational capacity which allowed of delayed gratification and the growth of mature time concepts.

1.3. The Neurotic and the Concept of Time

Essential to Freud's concept of the reality principle is the capacity to sacrifice immediate gratification for the

sake of later more realistic adaptation. Fraisse, in 1963, demonstrated the conditioning of time concepts by early experiences. He stresses that the importance of symbolic knowledge of change, plus conditioning to duration, is essential for the development of the adult concept of time.

The neurotic, troubled and disrupted by his difficulties, is likely to be more susceptible to external and internal pressures and the developing time concept is affected as any other developing process.

Time is not psychologically uniform. Rosalind to Orlando, in "As You Like It," aptly elaborates on the varieties of time experience.

> . . .Time travels in diverse paces with diverse persons. . .he trots hard with a young maid between the contract of her marriage and the day it is solemnized: if the interim be but a se'en night, time's pace is so hard that it seems the length of seven years. . . . Time gallops with a thief to the gallows. . . . It stays still withal - with lawyers on vacation; for they sleep between hours and then perceive not how time moves.

Common knowledge confirms Shakespeare's poetic insights: time drags or flies depending upon circumstances; there is work-time, relaxation time, holiday time, day time, night time and objective clock time. We all live with these different times, switch from one to the other without great difficulty. But might not the neurotic find it more difficult to adjust to changes in kinds of time, and in this

way be handicapped by his inability to adapt to the varying time demands of reality, since temporal experience depends on the complex integration of objective external time with subjective experiences of time?

The Problem

This thesis deals with the neurotic and his concept of time. Special attention is paid to the relationship between the neurotic concept of time and the assessment of time in short and long term periods. The subject of the future orientation of the neurotic is discussed.

CHAPTER II

HISTORICAL BACKGROUND

Time, as a phenomenon or as a dimension of experience, has not received the attention it deserves. The study of time has been so fraught with methodological problems that the tendency has been to group time research within the general category of perception.

2.1. Philosophical Background to Psychological Time Concepts

The greater part of time studies has been devoted to short term time. Kant (Brett, 1953 ed.) sought the origin of our concept of time in the activity of the mind which thinks and relates various changes. He maintained a clear distinction between the inner life and the outer life, and he assumed that there is a radical difference between what we know of our own mind and what others know of it. Mental processes had three distinct aspects:-

a) The cognitive aspect which is purely intellectual or rational and separate from "the practical reason."

b) Motivational (conative) aspects.

c) Emotional (affective) aspects.

Intellect is an activity wholly distinct from

sensation. Sensation, without intellect, is never universal and all aspects of mental processes can only be studied by subjective observation. Because of this, he asserted that there could be no science of our inner life (Kant, 1934 ed.). The intellect was regarded as the faculty which makes explicit the content of our sensuous life. Sense and reason are mutually limited as a result. There can not be objects for sense, which are never given in experience, or objects of understanding, which have no relation to the senses.

The outer sense has many differences such as sight, hearing, etc., but the inner sense is limited to the perception of time and is more fundamental than the outer sense. These two come together so that pure intuition of time and space come into experience as purely subjective elements (series). Time and space are the first of the organizing principles of individual conscious existence for Kant. He gives space an existence apart from its content. Kant rejects introspection as being a perversion of true observation, since the object observed was altered by the act of observing (Brett, 1953, p. 655).

Kant's idea that the categories of time and space were immediate properties of an a priori intuition greatly influenced the earliest workers in the field of time. They believed that there is a separate time sense as there is a

visual sense and a taste sense despite the fact that these specific time receptors could not be identified.

Vierordt and Mach (Boring, 1950, pp. 384, 489) pursued this approach in numbers of quantitative studies on time perception. Vierordt's experiments were based on judgments of empty time intervals on the assumption that this would mean that he was dealing with pure time sense. The notion of a general sense of time did not satisfy Mach who subsequently put forward the idea that there was a specific sensation of time. Basic data on the subject was produced by these two workers. The work of Wundt and Mueman and Estel (19th Century) progressed beyond these ideas principally because Wundt regarded time as falling more appropriately into the area of "feeling" rather than "sensation."

At this time, the new experimental psychology enthusiastically applied more sophisticated techniques of measurement to the study of human behaviour. Time study benefited from this advance, in the application of measurement techniques, particularly since certain aspects of time behaviour lend themselves so readily to objective assessments in terms of clock time. One of the earliest experimental procedures, originally employed by Helmholz and later by Wundt in his Leipzig laboratory, was the measurement

of reaction time (Woodworth, 1938, Ch. XIV). This technique had been used as early as 1850 by Helmholtz when studying nerve conduction in the frog. In the clinical sphere, Kraepelin (1883) used the reaction time method together with time estimation, continuous work curves and word association tests, in order to assess the effects of drugs, such as alcohol, morphine and chloral on his patients. By the end of the 19th Century, evidence from these and several other studies helped to establish that a separate "time sense" did not exist and paradoxically, objective study negated the Kantian categorical imperative as it applied to time. Furthermore a distinction was established between time duration as such and the succession of events in time (Danziger, 1963).

The use of the term "time sense" is however, still in evidence in the literature. It loosely encompasses a broad category of time behaviour and feeling about time, both in the objective measurable clock-time sense and the more abstract subjective notions of time.

Some authors, recognising that the behaviours associated with the cognitive or higher mental processes do not involve the operation of reason alone, have made the interesting observation that these behaviours do, however, provide man with a continuity of his experiences. This is

achieved by linking previous experiences with those of the present and with those which are projected into the future. In the same way that one would describe vision and smell as distance receptors, one could perhaps describe the higher mental processes as "time receptors" (Miller, 1964; Klineberg, 1954, pp. 205-208).

Ward favoured the idea that "succession" is the tissue of consciousness and wrote "time as physically experienced duration is primarily an intensive magnitude. The perception of time is, therefore, different from the conception of time; the latter is a uniform scheme, but the former is an intensive experience depending on acts of attention which punctuate the presentation continuum." The above statement was written by Ward in the Encyclopaedia Brittanica in 1886. Ward's observations were a considerable advance on the idea that time is a basic intuition only. He was also responsible for emphasizing that life and growth belong to the mind as they do to the body.

Bergson, in 1910, made the distinction between time lived (real, concrete time) and time thought (abstract time). This follows from the proposition that space is homogeneous and belongs to the external world, whereas duration and succession belong to the intellectual apparatus of the conscious mind. Time as a homogeneous medium, is reducible

to space. Time as pure duration, is wholly qualitative and can be measured only by symbolic representation in space. Bergson recognises two distinct spheres of reality; the physical and the psychical. This theory has evoked a great deal of criticism. Chronological time (time outside) is unreal. Reality can only be found in our inner sense of duration. We have an immediate apprehension of the unceasing and creative flow which constitutes duration. Real time, in Bergson's sense, has nothing to do with space and we must reject any temptation to spatialize our thought about time. In the same way that perception of space is no longer intellectually ordered during sleep, time is also freed from the bonds of consciousness and becomes instinctual in nature. Freud (1920), in introducing the concept of primary process thinking elaborated this concept. He postulated the timelessness of the unconscious processes as revealed in dreams when the bounds of reality are no longer imposed on the unconscious. The ego, by contrast is very much time bound in that through the reality principle the future is always within the scheme of action.

The intellect superimposes an abstract succession in space upon our natural perception of time, and the real nature of time is masked. In an illness such as schizophrenia the cognitive processes are distorted and time

perception is often markedly affected. And Bergson's discussions emphasise the importance of time in relation to psychological states and its relevance in the clinical sphere. Although Bergson regarded time as a creative force in man, he maintained a basic distinction between matter and memory. He regarded time as a creative force because he identifies time with the spiritual force behind evolution. Recent studies which link the identity of things remembered with specific organic molecules, undermine the concept of memory and perhaps, therefore, of time. But as Priestley says, "Bergson dived into time to discover a semi-magical duration" (Priestley, 1964, p. 70).

William Stern (1935) distinguished personal time and spatial time which differs from one individual to another. Personal time referred to the tendency to see things not only in terms of their immediate or deferred consequences but also in terms of differences in plans and attitudes to the future. Spatial time referred to practical external clock time.

2.1. Clinical Observations on Time

Aubrey Lewis, in 1932, stressed the importance of the "time sense" in psychopathologic states. Time sense colours most of the manifold changes of the functional unity which we

divide into perception, affect and the remainder of our actions. Lewis conceptualized a "psychology of time" which permits us to recognize the present; judge duration and the passage of time; and bring it into relation with other contents of consciousness. Like many of his predecessors he, too, divided time into two principle categories: a) objective world or physical time as represented by the clock and the calendar and b) personal experiential time or psychological time not measurable in conventional units.

Clinicians during the 1930's, clearly recognized the role of time experience in the adult personality picture, particularly as seen in the psychotic. Schilder (1936) quotes numbers of observed reactions in schizophrenics and depressives who display a slowing down of the level of mental functioning which is manifested in disturbances in sonscious time perception. Schilder also discussed the psychopathology of time, based on his extensive clinical observations. He felt that a psychology of time would help provide a deeper insight into the constructive energies of the psyche. For him, time is an inherent part of the world both inside and outside the body. Schilder regarded the fundamental perception of time as <u>biological</u>, and interwoven with emotional factors and the actual biological situation of the individual. It may be distorted as any other modality

may be distorted. Schilder was particularly interested in the relationship between "depersonalization" and time experience, and he associated the chaotic time sense of these states with the characteristic loss of the sense of self.

Today, we regard the awareness of time as neither inherent nor instinctive but acquired through learning and experience, ultimately becoming an integral part of the personality.

2.2. Psycho-Analytic Concepts of Time

As noted above, Freud, in his formulation of primary process thinking postulated that the unconscious was timeless and not cognisant of sequential time (Bonaparte, 1940). This concept does not differ markedly from Schilder's idea of the biological nature of time. Freud likened the structure of the conscious and the pre-conscious and their functioning, to a magic writing pad in which the "perception conscious" receives perceptions but retains no permanent trace of them; there is a clean surface to receive every new perception; while the permanent traces of the excitation, which have been received, are reserved in mnemonic systems lying behind the perceptual system. Interruptions in the system, which are of external origin he attributed to a lack

of continuity in the current of innervation. The place of an actual breaking of contact is taken by the nonexcitability of the perceptual system. He suspects (his words) that this discontinuous method of functioning of the Perception-Conscious lies at the bottom of the origin of the concept of time (Freud, 1923, p. 23 and 1920, p. 28). "Our abstract idea of time seems to be wholly derived from the method of working of the Perception Conscious and to correspond to a perception on its own part of that method of working."

Rapaport (1951) feels that this theory of the origin of the concept of time is devious. But Freud states clearly that a sense of time, or a concern with time does not exist in primary process thinking. "Past, present and future are all one in the primary process." Dreams too are independent of time because they compress into a short space of time a greater amount of perceptual matter than could be dealt with by waking mind (Freud, Interpretation of Dreams, p. 64). Furthermore the ideas in dreams and psychoses are fulfillments of unconscious and therefore primary process wishes and in both there is a complete lack of a sense of time.

Bleuler, (in Rapaport, 1951), disagreed with Freud that the unconscious is timeless except in certain autistic states in which time relationships are partially ignored.

Autistic patients disregard time relationships, usually mixing past, present and future, without concern. Otto Fenichel (1934) relates boredom to a basic time experience: It is well known that when we experience many stimulations from the outside world time passes quickly. When the external world provides only monotonous stimuli then "the while is long." He also suggests the possibility that a primary disturbance of the subjective time experience facilitates the emergence of mechanisms involved in psychopathology. If the individual has not been able to come to terms with the needs of reality in this respect, neurotic symptoms will appear, such as exaggerated punctuality and poor tolerance for waiting. These are clinical distortions derived from faulty development of the reality principle.

Psychoanalytic writings seem to leave no doubt that time experience is closely related to the development of the concept of delayed gratification. The working of the reality principle implies an awareness of and appreciation of the future. Delayed gratification for the sake of a later more realistic and satisfying gratification is pitted against the impulsive gratification of immediate pleasures, and hence a long span of time must be retained in phantasy--at the end of which the delayed gratification will be received. It is

this phantasy which provides the sub-strata of a futurity concept and hence of a sense of the continuing self. The timelessness of the unconscious contrasts with the time consciousness of the ego which is governed by the principle of reality, in which events are organised in time sequence. The existence of a primitive level of time experience is suggested by the phantasies arising out of the unconscious (Freud, 1938). Regressed disturbed patients report experiences which are temporarily chaotic and, in early childhood, there is a similar perception of events. "The neurotic is in some way tied to a period in his past life, one in which he was happy" (Freud, 1920, p. 374).

Clifford Scott (1948) examined the observation that there is a relationship between decreasing omnipotence phantasies and the belief in the real time and the self. He suggested that when a patient emphasised the temporal aspects of his experience, the origins could be traced to omnipotent phantasies of childhood. Scott describes the rather fanciful example of a schizophrenic patient who complained that time had either stopped altogether or proceeded in jumps. The patient reported that he would look at the clock and an hour later would see the same time on it. During the interval, he would have phantasies in which he performed activities which would have taken an hour to do. He had grandiose

phantasies about being able to surpass all men, including his father, to whom he was apprenticed at the time he became ill. He also believed that he could make time jump and stop at will. Scott traced these time phantasies to omnipotent phantasies of controlling the father's movements. When the patient was not able to admit to such phantasies, he complained that real time had changed.

In Scott's formulation, the omnipotent phantasies were presented in a projected form and the patient felt impotent in the presence of the distorted time produced by his own projections. "He had unconsciously and omnipotently sped time to the extent that it fitted the continuity of his phantasy."

Observers, who have noted the tendency of schizophrenic patients to overestimate time duration, have explained it in terms of the excessive amount of experiences reported during the overestimated period. Kirson (1951), et al, state that the schizophrenic judges time in terms of his "reactions to fantasy." People taking hallucinogenic drugs have reported a feeling that time is almost endless and also that it is dragging. This is very vividly described by Aldous Huxley (1954, pp. 14, 15) in his account of his experiences while under the influence of mescalin. When asked what he felt about time, all he could say was that

"there seems to be plenty of it." He writes that although there was plenty of it, exactly how much seemed quite irrelevant. Even though he could have looked at his watch, he did not because it belonged to another universe. His actual experience has been "of an indefinite duration or alternatively of a perpetual present made up of one continually changing apocalypse." He seems to be describing the same kind of feeling people often report they have when dreaming, when waiting for something to happen, or when under severe stress.

Most analysts lay stress on future time, particularly in the ability to plan for the future. Adler (1915) wrote ". . .the possession of long range goals distinguishes the human being from the animal, the adult from the child and in many cases, the healthy personality from the sick--striving always has a future reference." Behaviour is determined by one's ideas about the consequences in the future. The future is not the objective future but one's present thoughts about the future. The cause of both "the healthy and diseased mental life" lies in the question "not where but whither?" (Ansbacher, 1956, pp. 90-91). Adler insisted that behaviour could not be studied outside its social context. His formulation of the "life style," implied a general organisation of behaviour elements. And his well known

"inferiority" complex notion with its compensatory striving for superiority, emphasized the goal directed rather than drive-impelled causation of behaviour. He related the child's thoughts about the future and the achievement or non-achievement of his objectives, to feelings of inferiority or superiority, or to the absence of such unpleasant emotions. The individual has a final goal in life around which the unity of his personality becomes organised. The relationship between higher goal setting and increased feelings of inferiority could lead to disordered behaviour, since goals organise time along planned pathways of future action.

2.3. The Existential Concept of Time

The Existentialists share with Adler the idea that the characteristic mode in which an individual structures future events has crucial importance for his present behaviour. During and immediately following World War II, the Existentialists became dissatisfied with the prevailing efforts to gain understanding in psychiatry. They departed from the classical Freudian tradition in an attempt to focus interest on the fundamental role of time in the pathology of the mentally disturbed. They stressed that "one's present and future determine one's past. . .the way in which a person

commits himself to his existence at a given moment determines what he can recall of his past, and so determines the particular gestalt his past will assume" (Rollo, May 1958). Disturbed behaviour is regarded as an outward manifestation of an inner time disturbance, which is a conflict between the security of the present and the uncertainty of the future potential.

The existentialist philosophical formula "Existence precedes being" led these psychiatrists to emphasise the striving for autonomy as a psychological phenomenon. They take the acting person's point of view although insisting on a certain amount of "freedom in man's nature" (Arieti, 1966). The time dimension is essential in understanding human existence: A human being is always in a process of emerging "being in the world." We can only understand him in terms of what he is moving toward or what he is becoming. Straus (quoted in Arieti, 1966) says that Heidegger's great philosophical contribution was to "vindicate time for existence."

Temporality is therefore, one of the attributes of subjective experience. It can be modified by experience and, although it is innate and related to objective time, it is not the same. The future is regarded as the most significant temporal area because normal individuals are oriented to the

future and always actively engaged in designing the future. Minkowsky (1958) describes a depressed schizophrenic patient whom he treated day and night for two months. This patient suffered a disruption in relation to time. Each day was a separate island and consequently he was unable to experience any sense of continuity towards the future. The patient could feel no hope and his symptoms were accompanied by the delusion of violent execution. Minkowsky proposed that the basic disorder was the distorted attitude towards time oriented to the future. Furthermore, Binswanger (1958), in describing the patient, Ellen West, outlines how she not only fought and revolted against her schizophrenic "fate" but also against time in that she refused to accept growing older, ugly, dull and fat. She wanted to stop time. In this patient, Binswanger followed "the emptying of the personality" as it could be observed in the schizophrenic process over a period of seventeen years.

To the phenomenologist, the subjective time of one's inner experience is the "flowing of life," experienced as spontaneous living energy. It is continuous, and exists in its own right and is independent of the sequence of events that is taking place at the same time. Speed is experienced as a judgment of rate of change which can vary under differing conditions, which will promote it or slow it down.

The present is defined as an awareness of one's own behaviour at that specific time. The past is "something we leave behind." The future is something which can be broken down into three categories:-

a) Immediate future, defined as expectation and activity.

b) Mediate future, concerned with hoping and wishing.

c) Remote future, invòlving prayer and ethical action.

Habits of responding towards time develop along either of the above mentioned lines, so that individuals can become generally orientated towards the past or the future giving rise to an idiosyncratic "life style" (Ford & Urban, 1963, p. 459). We thus see the individual who feels that every moment has to be filled with some kind of productive activity; or the individual who is always looking for ways in which to "kill time"; or the individual who is always procrastinating in the hope that time itself will get things accomplished for him.

Ruitenbeek (1962) emphasises the two guiding observations of the existential approach: 1) That man's humanness is a consequence of his living with others--man the social being; 2) that awareness of being leads to awareness of nothingness, either personified in death or

more frequently feelings of isolation, emptiness and loneliness--symbolized by metaphorical rather than actual death.

In existential analysis there are elaborate formulations of the time experience associated with particular clinical syndromes. In depressive conditions, the main experience is of a flowing back in the stream of time; the schizophrenic patient lives in his own personal time rather than world time; the ordinary melancholic patient is still aware of both forms but his personal time appears to be flowing more slowly than world time. In paranoid conditions, the past is very changeable, as evidenced by delusions of memories in which the patient feels that the past has been artificially transformed. May (1958) compares this reported experience with that of George Orwell's hero in 1984 when he becomes aware that "the social frame of memory was continually changed by the state police."

For the normal individual the past, the present and the future are all experienced in different ways but constitute a structured unit. One accepts that the past itself cannot be changed. Psychoanalysis has however, postulated that the past contains forgotten or repressed memories, the unearthing of which can be as startling as any new or unexpected event. Thus, through analysis, the past

may indeed be changed.

Although the Existentialists seem to have developed a new way of thinking about the patient, they still employ Freudian techniques in their treatment. From their very sensitive and detailed observations of disturbed patients, they have provided us with insights into the psychotic process at work in these particular patients. But the question still remains as to whether they have made a positive contribution towards further illuminating the operational relationship between the normal human individual and his experience of time. The importance of time feelings in clinical conditions has been more than adequately stressed and documented by them and is very valuable. But their concept of the idea of death as a central motivating force in long term life planning, would seem to have negative rather than positive value, especially in psychotherapy. Ford and Urban (1963) take issue with existentialists principally because they feel that they represent a point of view rather than a system and therefore, offer theoretical considerations without means of implementation. They also feel that quite often what has happened is that psychiatric intuitions become the reality of the patient rather than that of the psychiatrist, which leads one to question many of the psychiatric explanations

very seriously. There also appears to be a marked paucity of material or discussion on the actual development of time concepts in the individual perhaps as a consequence of the emphasis on dealing with the patient as an individual in his own here and now.

2.4. The Ego Analysts' Concept of Time

Erikson (1956, 1959) too has given serious consideration to time in clinical conditions. As an ego-analyst, rather than as an existentialist, he considers attitudes to time important but considers the attitudes symptomatic of an underlying condition rather than the condition itself. He links the development of mature adult time concepts to the identification process. It is not my intention to go into this in any detail but merely to summarize a few of his main comments in this respect.

Erikson considers a disturbance in the sense of time as a principal symptom of the condition which he has called identity diffusion. The young person finds himself either temporarily or permanently unable to secure satisfactory identity development; he feels that either everything such as career, love, immortality is mortally urgent, or that nothing matters sufficiently to make any realistic effort. Consequently, there is either an overawareness of the

constant loss of time or there is a complete loss of consideration of time. This is often accompanied by a disbelief in the possibility that time can and may bring change and also a concommitant, contradictory, vivid fear that it might. He stresses the adolescent's perception of the future in this condition. Identity diffusion can be very severe but Erikson makes a real plea for the establishment of a new complex of diagnostic criteria to account for young people suffering in this way. His aim is to avoid having them labelled schizophrenic, paranoid or constitutional psychopath as he dreads the therapeutic nihilism which often results when these labels are applied to a patient.

2.5. Biological Concepts of Time

Subjectively, time is something which we all feel that we understand. But when it comes to expressing this understanding in ordinary language, we seem to run into a great deal of difficulty. In order to circumvent this problem, some workers have concentrated on formulating biological concepts of time based on evidence derived from the study of rhythmic physiological processes.

Doehring (1961) notes that most of the work in this area over the last 75 years does not support the notion that

individuals make use of a stable internal clock system when estimating time intervals. It would appear that the performance derives from the exact nature of the operations required to elicit the estimates. Nevertheless, many attempts have been made to explain man's time experience in biological terms.

Neurophysiological studies such as those concerned with the circadian rhythms manifested in cycles of sleep and wakefulness and hunger, suggest the possibility that internal organic rhythms could be serving as clues to the passage of time (McCleod & Ruff, 1936). R. Hernandex-Peon (1964) postulates that sleep cycles represent one of the most fundamental examples of "biological rhythmicity."

Gilliand (1946), et al, theorized that time intervals are mediated by physiological processes and bodily rhythms even in lower animals. Goody (1958) has suggested that animals respond to many internal clocks through which the nervous system transmits and registers information, and he elaborated the metaphor of a complex clock. He emphasized the intrinsic rhythmical activity of the nervous system by citing neurological clock systems at various anatomical levels. The electroencephalogram provides the principal evidence for a highly abstracted cortical clock system. The heart and lungs are obviously also rhythmically acting

organs. He derives support from Einstein and Infeld's (1947) formulation that "any repeated physical phenomenon may be used as a clock provided it can be repeated as often as desired," and its activity can be perceived by an observer. Most of man's vital functions are organized about regular sequential and rhythmical processes.

Goody emphasizes that the passage of time is as essential for perception, as is the knowledge of the extension of space in order to achieve spatial orientation. When the higher order mental processes are disordered due to damage to the cerebral cortex, "loss of timing" is a constant feature. Failure of memory is associated with a defect of recall and arrangement of time past. Failure of concentration leads to an inability to maintain "a fine scale sensori-motor activity" ranged immediately around the present. Foresight, judgment and reasoning are concerned with the future, and failure of these abilities involves failure of "forward memory or prediction." When these powers are impaired, the patient is no longer able to evaluate future events on the basis of information derived from the past. The patient who has a frontal lobe tumour or cerebral atrophy may show many signs of his illness from the most crudely physical incontinence of faeces to a loss of time sense. The damaged integrating clocks in short which

deprive him of physical rhythmicity and control also deprive him of his psychological appreciation of rhythmic and continuing process--his sense of time.

Temporal disorientation has often been observed in patients suffering from organic conditions and is usually considered pathognomonic. It has been observed that, in such conditions, patients are unable to use a clock to remedy their temporal disorientation (Weinstein and Kahn, 1951). It is therefore necessary to separate the ability to tell the time from the orientation to time.

A principal diagnostic feature in Korsakoff's psychosis is the patient's inability to perceive time relations. The patient may give his age as very much less than it really is, while, at the same time, he may state the date of his birth and the present date accurately (Zangwill, 1953). The patient will also persist in maintaining these facts and fail to perceive any incongruity. Similar effects of a temporary nature have been observed after electro-convulsive shock therapy.

Hoagland (1933) hypothesized a "chemical clock" in the brain which is based on chemical reactions related to respiration of specific parts of the brain. In relating tapping speed to temperature, he found that when body temperature was raised, as in illness, tapping speed also

increased. Pieron (1939) had previously come to the conclusion that appreciation of duration might well be dependent on physiological processes, "and if the speed of organic process is modified by variations in temperature for instance, mental time will increase or decrease proportionately," while Davidson (1941) confirmed these observations and has also shown that changes in temperature of the body make the "flow of time" appear changed.

Cheatham and White (1959) found the rate of perception of vibratory stimuli for all three senses to be at the same level of 80 m. sec. per perceived unit. They interpreted this as evidence of a temporal mechanism in the central nervous system that tends to limit the inputs of the major senses.

Further support for the biological explanation of time experience has been drawn from studies of the effects of drugs on physiological processes. Hawkes, et al (1962), noted that subjects under the influence of drugs which speeded up peripheral or central aspects of autonomic activity, showed a speeding up of their subjective time judgments. Significant changes were found especially in the respiration rate. They concluded that the subjects were basing their temporal estimates on internal physiological activity. Lehman and Knight (1961), in their study on the

influence of drugs on simple biological systems, came to much the same conclusion.

Fraisse (1963, p. 34) agrees that man is capable of registering "duration" on a biological level. He sees similarities between human adaptation to periodic change, and conditioning to duration, and believes man is capable of registering duration on a biological level. The various physiological systems and organs act as pacemakers for adaptation to periodic changes. Each system probably has its own regulating mechanism which we are as yet, unable to explain.

The above studies and other similar work do not yield evidence suggesting the presence of a single internal clock system but rather suggest that numbers of different rhythms associated with different bodily systems may, in their summed activity, provide a basis for time estimation. Fraisse (1963) proposes that individuals do not make use of a stable internal clock in estimating times, but rather that time judgment is more probably related to the nature of the behavioural actions involved.

Parallel to the thinking in terms of biological clocks, is the recognition that time concepts are slowly acquired over the maturing years. Dobson (1950) feels that in children, there is initially a very vague awareness of

time, which is amplified by learning units of time from the clock. The significance of intervals is then associated with and interpreted in terms of bodily tensions and rhythms.

Piaget's (Fraisse, 1963, p. 278) explanation of the development of time concepts has been briefly referred to above. But in this connection, it should be emphasized that Piaget believes that the child does have a fundamental intuition of speed and distance from which duration and therefore, time gradually becomes distinguished. Fraisse postulates that the child senses time in the form of the interval which stands between him and the fulfillment of his desires. The child has a fundamental intuition of all three, i.e., speed, duration and distance. This is in accord with the Freudian idea of the role of delay in the development of the reality principle.

It seems unlikely, in view of the above, that anyone would take issue with the hypothesis that time judgment is a learned skill in which some further cerebral neural activity acts as a time base.

2.6. Body Tempo and Time

Further discussion along the lines of a biological concept of time brings one to a consideration of studies related to Body Tempo which may further illuminate this

problem.

Johanson (1922) suggests that possibly the physiological makeup of the individual predisposes him to a set rate of attention to sensory stimuli in the environment. Such an individual rate would be seen, rather broadly, as mainly fast or as mainly slow. As an example, he states that an individual's simple reaction time to a particular stimulus will usually be found to be fairly variable from one trial to another. This may reflect the constant shifting of attention. Yet, if one takes an average of performances, any individual's standing in a group remains consistent within that group.

Observation of individuals shows us clearly that rate of body movement (Body Tempo) varies from person to person. However, individuals are capable of adaptation to change in this respect when circumstances require it. We walk at a regular pace, but should we have to hurry, we can speed up our rate of walking within the limits of our physical capacities. Rimoldi (1951), in a study of tasks involving speed of motor activities, found that although individuals seem to be constant through long periods of time in their tempo, each one seems to adopt a particular temporal pattern for a particular group of activities. He attempted to isolate different speed systems of the body. Among these

were large movements of the limbs. He postulated that speed was probably independent of the actual muscles concerned. Assuming this to be so, he felt that speed could possibly be related to some underlying neurological structures. Factor analysis of the primary speed factors measured revealed four second order factors:

a) Speed of all motor activities.

b) Speed of perception.

c) Speed of cognition.

d) Reaction time.

Cooper (1959), from his investigations of time disortion under hypnosis, lends support to Rimoldi's conclusions. He trained volunteer subjects to experience time distortion under hypnosis. Under hypnosis, he suggested to them that they hallucinate and carry out varied physical activities such as walking, swimming, dancing, or drawing. The subjects stated that these experiences often seemed to take as long as an hour when, in reality, they spent only ten seconds on the mentioned activity. During the hallucinatory activity, the subject's body remained motionless. Cooper felt that these hallucinatory experiences under hypnosis were influenced by some inherent factor plus the activity itself. The inherent factor referred to was the individual's own personal sense of time which he labelled

"special time."

Individual differences in reactions probably related to individual body tempos had been noted many years ago. In 1795, Maskelyne, the astronomer at the head of the Greenwich Observatory, dismissed his young assistant because of his habit of recording all his transits half a second later than he did. However, some ten years later, Bessel, a German astronomer, carried out an investigation in which he found that no two astronomers agreed precisely on the time of a given transit. The range of their differences was usually within the space of one second (Woodworth, 1950, Ch. XIV).

In most work on time estimation, individual differences seem to persist in spite of apparent group trends appearing in many of the results. DuPreez (1964) noted consistent individual differences in his work on time judgment under different conditions. He also found that Need Achievement was positively correlated with the speed with which subjects produced a time interval by means of a linear movement. Fox and Bradbury, et al (1967), in two experiments studied the effects of raised body temperature on time judgments. In the first experiment, the subjects performed tapping tasks for up to 30 seconds at three different body temperatures. In the second experiment, the subjects were required to judge 10 second intervals by the production method. This was measured

at five different body temperatures, all in the same session; and also under exposure to severe cold stress. They found that, despite very large individual variations, group mean time judgments shortened as body temperature increased. Cold stress also produced similar effects but they were smaller. The writers considered that their results and those of previous studies in this area were consistent with the hypothesis that time judgment is a learned skill, superimposed on a time base provided by some function of cerebral neural activity.

Many workers have reported that reaction time is not only sensitive to individual differences but also decreases from birth to adolescence (J.A. Gilbert in 1894; Bellis, 1932; Philip, 1934). Luria (1932) believes that this is a consequence of increasing differentiation of the child's central nervous system. The nature of the response required in the experimental situation also produces a change in time estimation. Hohle (1967), studying the effects of intensity of stimulus and response, compared toe responses with finger responses. He found that using the same stimuli, the toe responses were longer than the finger responses to the same stimuli. He concluded that the slower toe response was probably due to the unfamiliar nature of the response required (e.g., pressing a button with the toe). Commenting

on Dustman and Beck's studies of latency of response changes with age, he wrote: "The observed changes are probably due to combined responses of populations of neural units." Dustman and Beck (1966) measured average electrical changes over repeated presentations of a visual stimulus. They found that latency in response to a low intensity light flash did not differ markedly in subjects from six to sixty. The form of the response changed, however.

These studies on body tempo appear to support the conclusion that further investigation of this area of performance might provide us with some useful information on the relationship between underlying neurophysiological mechanisms and time judgments.

Studying the effects of drugs on time judgments, Frankenhauser (1959) found that when mental alertness was improved by stimulant drugs, the amount of mental time per objective time unit increased and retention improved. Any change in mental alertness probably implies a change in the "rate of flow of mental events" rather than in the intensity of the perception. It is the amount of change or the rate of flow which is a critical factor in judging time. This is in accordance with Fraisse's findings which emphasised that it is the amount and nature of the change that is taking place, in a given period, which is important for the

assessment of time intervals, rather than the time interval itself.

Time cannot really be experienced independently of what is actually taking place. In a study in which so-called model psychoses were induced by LSD-25, normal subjects generally reported that time was speeded up. In the early part of the study, some subjects reported that time seemed to be slowed down. All subjects, however, reported that although they knew the length of time they had actually spent in the laboratory, it seemed much longer or shorter on the basis of their own subjective feeling of time duration (Bercel & Travis, 1958).

Most workers in this area appear to have arrived at the conclusion that there is a trait which can be labelled reaction time. However, it is not an integral part of a general speed trait because it does not correlate with other speed motor acts. It is apparently also present to different degrees in different individuals.

2.7. Sensory Deprivation Experiments and Time

Subjects involved in sensory deprivation studies have often reported that they were amazed at their own preoccupation with time, especially where no time cues were available to them (Ruff & Thaler, 1961). The distress

resulting from this has sometimes been sufficient cause for subjects to terminate the experiment. The general feeling of uncertainty which accompanies a lack of time information in isolation experiments, seems to have a direct bearing on the subject's behaviour. If the subject knows in advance how long the experiments will last, he is more likely to be comfortable and remain cooperative longer, than if he is entirely dependent on the experimenter. Time estimates are remarkably distorted in these experiments. People who have lived in isolation for other reasons report the same kind of experience of time distortion, being unable to assess how long they have been living in isolation.

The McGill group (Heron, 1962) see the results of studies of experimental sensory deprivation as evidence of the general disorganization of brain function. Time distortion is a manifestation of one of the disturbing effects of reduced sensory input. The time distortion which is so apparent in these experiments, seems to highlight both the social and biological factors which are crucial to estimations of time, and stresses the interdependence of the two.

Bruner (1962) illustrates this point further by emphasising how individuals evaluate their experience by reference to models of the external world. He emphasises

that both sensory stimulation and social contact are required for the maintenance of these models. Sensory deprivation disrupts the vital evaluation process by means of which one constantly monitors and corrects the models one has learned to employ in dealing with the environment. Not only is sensory input reduced in isolation, but the subject is also deprived of the information he ordinarily uses in structuring his environment. Time is one of the important aspects of this information. Freedman, Grunebaum and Greenblatt (1962) offer a similar explanation. They suggest that the perceptual changes in isolation and sensory deprivation arise from the disorganization of bodily and spatial schemata customarily used in stabilising, structuring and organising the visual world.

2.8. Time and Society

The demands of our society have made speed very important. There is considerable pressure to get the maximum amount accomplished in the shortest possible time. J.B. Priestley, in his Man and Time, has dwelt at great length on our "barren concept of time". . ."that we belong entirely to a passing time" as being the basic cause of much of society's contemporary ills. "We abstract a concept from our experience of succession and call it Time, turn it into an

immeasurably vast container and then wonder why we cannot make head or tail of it." The dominating sense of the passing of time, he says, is ruining us because all positive value has drained out of the concept of time we have today, "the very people who insist on killing time are the slaves who murder their master every evening." Priestley's exaggerated choice of language serves to highlight why we should be paying more than lip service to the concepts of time under which we operate. "Life contained entirely by passing time, a meaningless portion of years, is not felt to be more precious than ever, it is not felt to be precious at all."

The importance of time itself varies from one culture to another and is particularly related to the level of sophistication of the particular community. Fraisse (1963, Ch. 9) remarks that as the population of a city increases, so does the proportion of its inhabitants who wear watches. Kroeber (1923), on the other hand, points out the relative indifference to time which is shown by the Californian Indians, none of whom knew their chronological ages.

One knows from personal experience of administering intelligence test items to Africans, how difficult it is to convey to the subjects the importance of trying to complete a particular task within the required time limit. It is

exceedingly difficult to try to get the subject to speed up his actions when one can see that he is pursuing the correct path. Greater educational attainments and the sophistication of urban, as opposed to rural living, bring with them an awareness of the real limits time imposes on one's daily actions and future life. The pressure to make the most use of time in the short term and long term sense, is constantly with us.

"Social phenomena are frequently adopted as a frame of reference so that units of time are often fixed by the rhythms of collective life. The need for social collaboration is at the root of social systems of time. Time is qualitatively differentiated according to the beliefs and customs of the group." In this paper, Sorokin (1937) quotes numerous interesting samples of activities used to denote certain time periods. "The frying of a locust" in Madagascar, means in a moment, whereas in "a rice-cooking" means a half an hour. The Khasis name their year according to what takes place at different times, so that there is a month for "weeding the ground" and a month "when cultivators fry the produce of their fields." McLuhan (1964) describes the measurement of time in the Orient by graduation of scents. This method was used until the arrival of European mechanical devices (clocks) brought by the missionaries in

the 17th Century.

Habits of time behaviour are acquired through our personal and social learning and through experiences in our environment. The particular forms of social experience in our culture will affect the nature of these habits. Individual experience, however, is not uniform in relation to time, and one therefore finds a great deal of individual variation within any one group.

It is apparent that the psychology of time has many aspects:

(1) The Perception of Time Itself. This has usually been concerned with the measurement or estimation of short or long durations. The units to be assessed are either hours, minutes or seconds. This implies an assessment of time duration in terms of objective clock units or calendar or world time units. When longer durations are involved, time perception can further be broken down.

(2) The Subject's Awareness of his Experience. This involves "the flow of time" versus the subjective sensation of time passing and the length of a particular duration. A subject can thus report that a time period has passed very quickly but the overall period was much longer. "I thought I had three hours to write the exam but it passed in what

seemed to be 15 minutes." The subject is aware of the difference between his inner feeling of and about time, which is called personal time, and the external objective clock time. In extreme mental disorder, the discrepancy between these two experiences can be so great as to result in complete disorientation and ensuing confusion.

(3) Time Perception Involving a Consideration of Future Time Perspective. Wallace (1956) has defined this as "the timing and ordering of personalized future events." This provides the temporal framework within which the individual organises his experience. Qualities and objects and events are often perceived in relation to the ever present background of time. Sometimes this is remote and, at other times, as the Existentialists have clearly demonstrated, it is the most prominent feature of any situation. Orientation to time and time perspective are very closely linked together since all time judgments, both short and long, depend on events within the individual, as well as on those in the external environment.

Kretch and Crutchfield (1958) stress the importance of time perspective for the understanding of human motivation. For some individuals, it is long and for others, short. Sometimes it is highly structured and clear, and at

other times, unclear and unstructured. Morale is higher when there is a clear understanding of the steps that lie ahead on the way to future goals.

Clinical research on time has been very much concerned with future perspective. Herrick (1956), for instance, has defined adaptation as the "adjustment of the organism to existing conditions. . . .It is a time linked process with a past reference or a future reference." Active search should be made he says "for the mechanisms of this forward reference of adaptive behaviour and human purposive behaviour."

The importance of being able to plan well for the future is particularly apparent in the problems of those who are least able to do this. Sociological analysis suggests that the lower class child has not developed the capacity to delay gratification because for him the future is uncertain (Mussen, 1963). He is frequently frustrated in attempting to satisfy his basic needs, and since he cannot depend on future gratifications, he acts in accordance with the philosophy that a bird in the hand is worth two in the bush. Lesban's (1952) findings that juvenile delinquents also show significantly poor future orientation illustrates the importance for the developing personality of being able to plan for the future.

Ricks, Umbarger and Mack (1964) have shown an

improvement in a population of disturbed adolescent boys following on vocationally oriented psychotherapy. They were given future goals towards which to work. Their improvement was manifest in an increase in future time perspective of their T.A.T. protocols.

Kastenbaum (1961) has suggested that the very manner in which a person meets the problems of his later life is, in part, a function of the future time perspective he possesses while still an adolescent. Allport (1960) also links mature striving to long range goals. For the personality, therefore, the process of "becoming" is largely a matter of organising passing impulses into a pattern of striving and interest. The element of self awareness plays a large role in this process.

The notion of time which we are considering is not a rigid fixed idea. Einstein abandoned the hypothesis of absolute time and decided that there must be a time peculiar to each system of reference. "Time is not absolute but relative to the position of the observer." It is almost impossible to give a sound definition of time when the experience of temporality is so complex and varies from one experience to the next. Einstein explained personal time in this way: "The experiences of an individual appear to us arranged in a series of events, of this series the single

events which we remember appear to be ordered according to the criterion of 'earlier' or 'later.' There exists, therefore, in the individual an I-Time, a subjective time. This, in itself, in not measurable. I can indeed associate numbers with the events, in such a way that a greater number is associated with the later event than the earlier one. This association I can define by means of a clock by comparing the order of events furnished by the clock with the order of a given series of events. We understand by a clock something which provides a series of events which can be counted."

It is the apparent discrepancy between this "I-Time" and world or clock time which is our particular concern in clinical psychology. This I-Time is the time we really live within ourselves. Thomas Mann (p. 135 in The Magic Mountain) says that "the perception of time is so closely bound up with the consciousness of life that one may not be weakened without the other suffering a sensible impairment."

CHAPTER III

METHODS USED TO INVESTIGATE THE ASSESSMENT OF TIME

3.1. Short Time Intervals

Four methods have usually been employed to measure short time intervals (Wallace & Rabin, 1960). A major difficulty in comparing the relative values of these different methods is the lack of clear definition of exactly what is involved in each of them.

1) The first is the Verbal estimation method in which a verbal response is required in terms of specific time units. It usually takes the form of a verbal answer to the question "How long was that?"

2) The production method implies that the subject is instructed to produce a specific interval, e.g., when the subject is told to "press the key for three seconds."

3) The reproduction method. By some specific operation, the subject is instructed to reproduce an interval by carrying out a defined task. For instance, the subject may be required to listen to an auditory stimulus and then reproduce it by a linear movement carried out for the same period of time.

4) The comparative method requires that the subject

judge which is the longer or shorter of two different intervals.

In any of these methods the stimuli can be presented auditorily, visually or kinesthetically. The stimulus intervals may be empty, in which case, if they are auditory, they would be started by a click and then ended by a click; or they may be filled, in which case the stimulus will be continuous. Fraisse (1963, p. 78) believes that there is really no such a thing as an empty or unfilled interval as even so-called empty time is filled with the subject's thoughts. Wallace and Rabin (1960), in their discussion of the lack of significant difference in time estimation under these conditions, state: "Perhaps the lack of significant results is due to the fact that the distinction between filled as against unfilled time is in the mind of the experimenter rather than in the experience of the subject." Fraisse (1937) has shown that the unit perceived depends more on the number of elements than on the total duration of the series.

3.1.1. Verbal Method

Critical data comparisons are often confusing since investigators stress that the results of studies on time depend greatly on the specific methods employed. There does

however, appear to be some general agreement that the verbal method is less accurate than the others. There is also a tendency towards overestimation (Clausen, 1950; Postman, 1944), even though reliability from session to session has been reported as quite good for this method (Clausen, 1950). On the other hand, Hawkes, Bailey and Warm (1960) reported that they could find no significant difference in the use of the verbal, reproduction and production methods or between auditory, visual and electrical effects in the judgment of brief stimulus duration. Falk and Bindra (1954) relate overestimation in the verbal method to anxiety. Danziger and DuPreez (1963) have shown that the verbal method yields a higher level of error than the reproduction method.

3.1.2. The Production Method

This method of measuring time perception is regarded by Whyman and Moos (1967) as a useful clinical index for objective measurement of changes in affective states. They compared patients displaying high anxiety with those demonstrating low anxiety, and found a greater distortion of time perception in the high anxiety group. Their study suggests that the choice of the interval may not be as important as previous workers have thought since the percentage of inaccuracy was as great, for example, for 15

seconds as for 90 seconds.

Dobson (1934) using both the verbal and production methods found a tendency for less accuracy and greater variation with time intervals. He compared four groups of abnormal subjects under filled and unfilled conditions, and found significant differences between them: the disoriented schizophrenics showed the greatest variation on two minute estimates. The more the subject is disorientated in time, the greater the variation he shows in estimating short time intervals. The neurotic group showed greater accuracy and consistency throughout. Neither Clausen (1950) nor Siegman (1962) nor Fraisse (1963) have found significant interrelationships between the two methods. Siegman (1962), in fact, found anxiety to be of more significance than intelligence in accounting for subject's variation in time judgments. In his studies, the subjects participated in a motor impulse inhibition task.

Most of these investigators have applied the production method in a clinical setting. And while the method as such, appears no more reliable than the previous method described, it does seem to yield some valid clinical data. Goldfarb and Goldstone (1963) have reported less variation for the production method as compared with the verbal estimation method. They also draw attention to the

influence of the modality in which the time judgments are assessed. They consistently found (1963 and 1964) that times marked by auditory input were always judged to be longer than those marked by visual input. This is contrary to Tanner and Patton's (1965) finding that visual durations were judged longer than auditory durations. This inconsistency could perhaps be explained in terms of the different techniques applied. Siegman, however, had also found that auditory signals were preferable to visual signals because they are more reliably judged.

There seems to be no doubt that time in the different modalities does vary (Goldstone, 1959; Fraisse, 1963). Goldstone and Goldfarb (1963) found auditory stimuli filled intervals were judged longer than unfilled intervals. The results were not as consistent when visual stimuli were presented.

3.1.3. The Reproduction Method

This method has been used by du Preez (1964). He found that while different methods yield different results, reproduction by linear arm movements was the most reliable. Clausen (1950) had found the method of reproduction to be less reliable but more accurate than production and verbal estimation. Siegman (1962) reports similar findings.

Werner (1963) found that the faster rate of preferred tapping during reproduction of a 70 second interval led to shorter estimation; while slower preferred rates led to longer estimations of duration. Ochberg (1965) argued that, because of the variability of the estimation method, the reproduction method should provide a much more stable base line from which to study time judgments.

The reproduction method by linear movement, which Du Preez (1963) applied to time measurement with such reliable results, uses measures of physical speed as indicators of time assessments. The speed is calculated from the distance moved and the time taken to carry out the movement. Rimoldi (1951) found that the speed of motor activities, estimated in tasks carried out mostly at spontaneous speed, were highly reliable because of their stability. It is a reflection of what he calls an individual's "personal tempo." Allport and Vernon (1933) find measures of speed of expressive movements reliable.

3.1.4. The Comparative Method

This method has been used to measure time intervals, particularly in the investigation of contextual effects upon the estimation of time (Wallace & Rabin, 1960). Many of these studies have successfully demonstrated the effects of

anchoring on the estimations of short intervals (Boardman, 1958; Lhamon, 1958). If the initial stimulus was short, it acted as a short anchor and shortened the subsequent judgments. If it was longer, it lengthened the judgments. Eson and Kafka (1952) stress that the very first time estimate seems to be an important reference point for future ones, as most time measures are calculated on the basis of the means of a number of measures. The many investigators have made us aware of some of the very many variables to be explored and accounted for, in any attempt at the accurate evaluation of time. Michon (1965) explored the effects of stimulus and response uncertainty upon time estimation, and came to the conclusion that the important factor was the amount of information that the subject needs to process rather than certainty or uncertainty.

Fraisse (1963) hypothesises that adults perceive time in terms of a succession of events, and time perception is a consequence of the structure given by these events. Children, however, at the age of five years, estimated time by the quantity of the work actually done (Fraisse & Vautrey, 1952). They obtained comparative judgments of duration for two toy cyclists running distances of various speeds and lengths. Accuracy depended on whether the factors, on which the children based their judgments, corresponded to the actual

duration. In this experiment the children estimated time in terms of the action involved. They judged the time by which of the two cyclists went further or faster or by the amount of effort they put into the task.

The length of the time interval must also be taken into account. With intervals of one second or less, one is not only confronted with trying to establish the subject's conceptual standard for a second, but also with the indifference interval. The indifference zone is a duration for which there is no systematic error. This is usually 0.75 of a second (Fraisse, 1963, p. 129) with a range from 0.6 to 0.8. It has been found that when durations last less than 0.75 of a second, they are generally overestimated. And when they are more than 0.75 of a second, they are underestimated.

The indifference interval serves as a measure of conscious time (Boring, 1933). One has to take the indifference interval into consideration if one is working with the duration of the conscious present, and if one wishes to reduce the influence of memory factors in the estimations. James (1950) believes it to be as much as 12 seconds but Fraisse (1963, p. 89) places it at about two seconds. He found that the rhythm disappeared when the interval between two sounds is about two seconds. The

present, he thinks, is limited to five seconds at the most but is usually two to three seconds (1963, p. 93). ". . .the duration of the perceived present depends on the possibilities for the organization of successive elements into one unit. It is primarily determined by the direction of our attention." It is also well to bear in mind Lehman and Knight's (1960) findings when experimenting with the effects of placebos compared with drugs such as barbiturates and amphetamines. As a general principle, it was found that speed tests were more placebo-prone than accuracy tests or accuracy components of tests. It may, therefore, be proposed that suggestion directly effects speed of performance.

3.2. Longer Time Periods

Orme (1962) noted the paucity of experimental studies of longer durations. Lhamon and Goldstone (1956) amongst others, have adequately demonstrated the tendency of schizophrenics to overestimate time periods when the verbal method is used. Wells and Kelley (1922), in addition to general clinical observations, have shown that manic depressive patients manifest slow reaction time. Dobson in 1956, in one of the few studies on neurotics, found them to be more accurate and consistent in their time estimations. Most of the studies have been concerned with short time

intervals. Orme (1962) found that, by using the longer interval of 20 and 30 minutes, he was able to discriminate between psychopaths and hysterics. Psychopaths and hysterics overestimated in comparison with neurotics and psychotic depressives. Orme suggests that not only is there a need to concentrate on the time estimations of longer periods but the possible variations of these estimates with individual personality variation both of a normal and abnormal kind, must be more carefully considered.

It is often observed that time seems longer when attention is directed towards it and that emotional factors are important in influencing our subjective feelings of time. The longer period of time appears to be more sensitive to this type of influence than shorter periods of time. Cohen and Mezey (1961) have shown that the normal person's awareness of the passage of time varies with his emotional state. Pearl and Berg (1963) have suggested that the prominence of emotional factors and conflicts in schizophrenia, indicates that affective factors are integrally involved in the distortion of time perception in these cases. They propose that the distortion is a direct function of the emotional state or conflict that exists when the patient is tested for time perception. Subjects were tested while emotionally disturbing and neutral pictures

were shown to them. Overperception was evidenced in the presence of these disturbing pictures.

Loehlin (1959) found that normal subjects were profoundly influenced in their overestimation or underestimation of time intervals of approximately two minutes duration by the boredom or interest of the task. The activity or passivity of the subjects during the task was important. People who are generally active, are generally inclined to overestimate passive activities. In addition, individuals for whom the past and the present were relatively less real, overestimated the time occupied by the present activity. Loehlin felt that this was not a direct effect of the activity as such, but that it was related to individual differences in frames of reference of time judgments.

It has often been remarked that in stressful situations time seems long particularly when one is waiting for something to happen. Yet, in experiments which Gulliksen (1927) carried out on subjects who had pain inflicted on them, the trend was towards relatively slight underestimation. Sturt in 1923 had similar results. Loehlin suggests that the reason for these findings is that the subjects probably deliberately inflicted pain on themselves, thus transforming a dull passive experience into an active challenging one.

Files and Meals (1949) reported a greater tendency of their subjects to overestimate as they approached a desirable goal. This tendency is inclined to decrease as the subject becomes more absorbed in the task. This observation supports Frankenhauser's (1959) statement and Fraisse's findings (1963) that time seems long when attention is directed specifically towards its passage and there are no concomitant activities. But Frankenhauser emphasises that in the final analysis emotional factors are the most important in influencing subjective time experience.

It is apparent from these and previous discussions that not only is that which is happening during the time interval relevant to the subject's assessment of it, but also the attitudes the subject brings to the experimental procedure in relation to time itself. Meade (1963) evaluated the effects of motivation and progress on the estimation of longer time intervals from 15 minutes to 60 minutes. He found that the estimates were inversely related to feelings of progress in an assigned task under conditions of high motivation, but unrelated under conditions of poor motivation. It appears that the use of the longer period of time allows of a more accurate assessment of attitudes and feelings towards time than the use of short intervals.

3.3. Future Time Perspective

If the measurement of duration is extended further and continued into the future, we would become even better equipped to understand the role of time in man's life. It is generally recognized that it is important for mental health that man should strive realistically in time; that man should be oriented in a healthy fashion towards a positive future. Many writers have been theoretically and clinically concerned with the effects of the individual's orientation to the future. It is proposed in this section to discuss these methods of measurement of future time perspective.

If, by ego strength, we understand the capacity to plan and make unambiguous and considered decisions based on reality and not on wishful thinking, then, if we are able to measure future time perspective reliably, we may be measuring ego strength. Psychoanalysts accept that imperviousness to reality, time and logic are characteristic of "primary process" thinking, which is thought to be symptomatic of serious disturbance.

Time perspective represents the relationship between the past, the present and the future. Wallace (1956) defined it as "the timing and ordering of personalized future events."

Wallace has demonstrated that, for schizophrenics, future time perspective is considerably foreshortened, and the ordering of future events is more confused than in normals. Schizophrenics extension into the future was 12 years while normals extended to 36 years. Whereas the estimation of short time intervals seems to remain relatively unaffected, the judgment of long time intervals and future time perspective is very much affected by the schizophrenic process, and affected in broader categories of time than those measurable by the ordinary units of the clock. Nevitt Stanford (1965) said that: "One cannot always tell where a person is going, just by noting the direction in which he is headed. One often has to follow him a reasonable way in order to make an hypothesis." It would appear that this is what one is attempting in measuring future time perspective.

Fraisse (1963, p. 176) hypothesises that the future perspectives of an individual depend on his capacity to anticipate what is to come, within the reasonable bounds of reality. In doing this, he has to borrow from his past experience but he is prompted by his present desires, as he attempts to fit his perspectives into the realms of possibility.

Wallace's (1956) formula provides us with a means of measuring future time perspective:

1) The dynamic quality of time perspective is suggested by the temporal flow of time from the present towards the future. Kastenbaum (1961) has called this sense of moving from the present moment into the future-- "Directionality." The schizophrenic who believes that his age has not advanced at all since the onset of his illness is manifestly disturbed in this respect. (Ehrentheil & Jenney, 1960; Dahl, 1958).

Wallace further distinguishes between--

2) Extension which is the length of time span conceptualised by the patient. It refers to how far ahead he thinks.

3) And Coherence which is the degree of organisation of the events filling that time span. Kastenbaum (1961) includes a quality of Density which refers to the number of events with which the future is populated.

4) Anchoring of time refers to the person's individual experience of duration anchored to objective socially constructed time scales.

Israeli (1932) first used a questionnaire and interview method. Later (1936), he introduced the future autobiography as a technique for measuring future time perspective. Projective techniques in the form of the Thematic Apperception Test, or a story completion technique

have been favoured. The range of time covered by the subject's story is scored (Wallace, 1956; Barndt & Johnson, 1955). Knapp used the questionnaire technique, while Kastenbaum (1961) used a structured story completion technique together with an anticipated future events score. All these techniques have yielded interesting results:-

Israeli (1936) has found that drive with respect to future goals, served as a good basis for discriminating between normals and abnormals. Barndt and Johnson (1955), using the story completion technique, showed that delinquent boys produced stories with shorter time spans than controls. They suggest that these findings have significant social implications. If, for instance, the personal environment is such that the future is always uncertain, then the individuals develop less capacity to delay gratification. In such situations, the individual is frequently frustrated in his attempts at satisfying his basic needs, and as a consequence of being unable to depend on future gratifications, he learns to act in accordance with the philosophy that a bird in the hand is worth two in the bush (Mussen, 1963). LeShan (1952) has shown that middle class children have a greater future perspective than lower class children. He suggests that time experience is really a variable in self-control which varies with socio-economic class. Levine and

Spivack (1959, 1960) support LeShan's findings. They have demonstrated that the ability to forego immediate gratification for more distant goals is related to the individual's breadth of conception of time. Relating stealing to temporal orientation, Brock and Guidice (1963) found that 49 subjects who stole money from the experimenter during a brief absence, compared with matched non-stealers, chose fewer temporal concepts and told stories with shorter time duration.

Future time perspective has been related to achievement. In Teahan's (1958) study, the most successful children at school (at the top of the class) were more inclined to think of the future than those at the bottom of the class. It is interesting to note that DuPreez (1964) had also found Need Achievement to be positively correlated with the speed with which subjects reproduced a time interval by means of a linear movement. Using a specially constructed time attitude test rather than future time perspective, Knapp (1962) had also found that time attitude and achievement were related.

Kastenbaum in 1964 using the story completion technique, found no significant difference between young and old people in terms of time perspective. However, when he used the important events score, mentioned above, he found a

significant difference both for the number of future events specified, and the degree of extension into the future. He concluded that extension into the future is low, when the individual's personal life span is made the basic frame of reference. But futurity, as a cognitive tool for organising experience, is retained by the aged. Using the same method, Kastenbaum (1967) has been able to demonstrate that young people's experiences with aged people can bring about systematic changes in personal perspective. The subjects in this experiment were a group of young student nurses in a geriatric hospital. Their range of temporal thought and future extension scores increased with increased identification with older people. (The suggestion that future time perspective can be increased by training experience has, I feel, direct practical implications for psychotherapy which should be pursued.)

Goldrich's (1967) findings that orientation towards the past and the future are interrelated, is in accordance with much of the evidence from the studies mentioned. The findings suggest that past experience determines the way in which one perceives the future. Using Wallace's method, Smart (1967) has demonstrated that alcoholics have a less extensive and less coherent future perspective compared with social drinkers. He maintains that the correlation between

age and extension in alcoholic patients indicates that the deficiency may develop as a response to problem drinking, rather than as a selective factor in its development.

Using the Thematic Appercaption Tests protocols after vocationally oriented psychotherapy, Ricks (1964) found an improvement in future time perspectives in a group of disturbed adolescents. Ricks used Thematic Apperception Test protocols as a direct measure of future time perspective.

CHAPTER IV

THE EXPERIMENT

4.1. Statement of Hypotheses

The hypotheses explored in this study are:

4.1.1. a) Time perception and assessment are relatively consistent for an individual.

b) This consistency will be revealed through the employment of a number of varying techniques of temporal assessment.

4.1.2. Time perception and assessment are closely related to personality structure, and are derived from the total complex of an individual's learning and experience.

4.1.3. Groups of individuals sharing common characteristics share common characteristics in the area of time assessment and perception. Specifically neurotic subjects will differ from normals and also from a group of physically ill patients.

4.1.4. In neurotic subjects, time perception will be more idiosyncratic than in normal individuals; they will reveal more inconsistencies in measurable time experience, future

perspective, and attitude orientation in time. Because of their greater stability, the normal subjects will be more objective and realistic in their assessment of standard clock time.

4.1.5. Although interrelated, differing techniques of time assessment will reveal different levels of accuracy.

The final contention for the future is that as "time sense" is an aspect of behaviour resulting from learning experience and conditioning, it should be possible to alter it by training, specifically aimed at the breaking down of previously acquired inadequate or unadaptive time habits; and the relearning of new, more adaptive time habits.

4.2. The Experiment

Aim: Summary of Hypotheses

The aim of this experiment is a better understanding of the time experience and the role it plays in the behaviour of the adult neurotic. The term "time experience" relates both to the measurement of short and long durations, and future time perspective, which is the way an individual orients himself in time and plans for future goals.

Subjects

The subjects were 80 adults ranging in age from 18-40 years, divided into three groups.

A. The experimental group of 30 neurotic subjects; males 13 and females 17.

B. The control group of 25 normal subjects; 12 males and 13 females, none of whom were physically ill. None of the subjects had any history of psychological illness nor were they suffering from any psychological symptoms at the time of the experiment.

C. The physically ill group of 25 subjects; 12 males and 13 females.

The Selection of the subjects:-

Group A

Permission was obtained from the Psychiatry Department of Groote Schuur Hospital to solicit patients from Psychiatry Outpatients Clinics to act as voluntary subjects in the experiment. However, in a pilot study, this technique was found to be highly unreliable as very few patients were prepared to return voluntarily and were difficult to trace after the first experimental session. In the actual experiment, therefore, the subjects were finally drawn from

the Psychiatric Day Hospital, where they were in daily attendance for therapy.

The apparatus required for the experiment was set up in the day hospital.

Diagnosis: The patients selected for the sample were all diagnosed psycho-neurotic by the psychiatrists and the registrars in the day hospital, and the Outpatient Clinics, from which they were referred. These patients were mainly diagnosed as suffering from psychoneurotic anxiety states with depression. They were all considered to be in need of immediate help both by themselves and the physicians who had seen them. They were not suffering from any major physical illnesses or psychoses at the time of the experiment.

Group B

The second group of subjects was the normal control group. There were 25 subjects also matched against the first 25 neurotic group for age, sex, educational achievement and race. From interviews with the subjects and their employers and their records, it was established that there was no present or past history of psychological illness; and that their physical health was good at the time. Access to most of these subjects was through large business organisations who were prepared to make the subjects

available during their working hours. On the whole, this group was more co-operative and welcomed the diversion from the day's routine work. They all had to be fetched from their place of work and taken to the day hospital where the apparatus had been set up.

Group C

The C group of subjects was a control group of medical outpatients matched for age, sex and race and educational achievement against 25 of the Experimental Group. They were outpatients at Groote Schuur Hospital attending at least once weekly. They were selected as having clearly defined medical illnesses with no known history of any psychological illness. If there was any suspicion of psychological illness, they were rejected from the sample. Most of these patients were drawn from general medical and orthopaedic outpatient clinics with the co-operation of the consultants in charge. All subjects were able to communicate fluently in English and were all of the same racial group. This group (later referred to as the Medical Group or Group C) was the least co-operative of the three groups involved in the experiment. They usually felt that they were being subjected to a test situation which had nothing to do with their actual illness. However, 25 patients were found who attended all

three of the experimental sessions even though some of them had to be fetched from their homes. Experimental sessions, whenever possible, were arranged to coincide with their regular visits to the hospital.

Apparatus

The apparatus used to measure short time durations was similar to that described by Danziger and DuPreez in 1963 and built by P. Humphries. It was constructed in the following way: A white wooden screen, 42 inches long and 20 inches high, stood across three small tables. In front of the screen was a thin, strong cord, which ran the length of the white screen, that is, for a distance of 42 inches. At one end there was an electric stop clock used to measure the time taken by the subject to move the distance along the screen. The clock was started and stopped by a relay operated by the amplified output of a phonograph pickup. The stylus of the pickup rested on a disc which was turned by the motion of the cord when the handle was moved by the subject. At the other end of the screen, there was a handle through which the cord ran to the end of the screen over pulleys. Thus, the cord circles the screen completely. As the subject was required to move the handle along the cord, the experimenter was able to read off the distance the

subject had moved the handle on a metal tape at the back facing the experimenter. The experimenter was also able to read off the time taken by the subject to move the measured distance on the clock timer facing the experimenter. A battery operated buzzer which provided the continuous auditory stimuli necessary for the experiment stood on a separate table. A timer was used to set the length of the auditory stimuli but the frequency and intensity of the sounds remained constant, though the length varied according to the procedure. The clock attached to the cord was automatically started and stopped by the subject's moving of the handle. The auditory stimulus was initiated by the experimenter and operated independently of the linear movement apparatus.

The subject was not able to see behind the wooden screen and was, therefore, not aware of the actual measurements recorded by the experimenter. A stop watch was used to time the other time measures which will be described under procedure. Other materials used in the experiment were the following tests:-

1) The Raven's Progressive Matrices.

2) Cards from the Thematic Apperception Test.

3) An attention and concentration task involving the recording of the number of timesthe word "THE" appeared in

an uninteresting piece of political commentary.

4) A word recall test made up of a word test of 20 words, 10 of which were considered time significant words and 10 of which were neutral stimulus words.

5) A story completion test.

6) An attitude questionnaire.

Procedure

The procedure consisted of one main experiment broken up into a number of component parts which were carried out in three weekly sessions.

First Session

In the first session, general background information was gathered. It covered the subject's personal background, work and achievements. In the data, it has been categorised under the general heading of "Personal Information." A verbal estimate of a 22 minute interval was taken during this initial period. When the subject walked into the room, a hand stop watch was started and when it read 22 minutes, the subject was asked to estimate exactly how long it was since he walked into the room.

Raven's progressive matrices were administered to give some quick indication of intellectual ability. A story

completion task was administered to derive some measure of Future Time Perspective. This was based on the technique originally used by Wallace (1956). The number of future events anticipated was also recorded and rated as another measure of Future Time Perspective.

A concentration and attention task was then given requiring the subject to listen to a passage of prose for 90 seconds and record the number of times the word "the" was used in the passage.

The subject was then required to carry out two tasks directed at the assessment of body tempo. These items were suggested by Rimoldi's work on personal tempo. In the first task (Rimoldi, 1951), he was required to tap with his pencil on a clean sheet of paper for 30 seconds at his own preferred rate of speed. In the second task, he was required to draw circles on a clean sheet of paper at his preferred speed. In both tasks, the subjects were instructed to tap or draw at a rate which was comfortable for them. It was explained to the subject that he was not required to tap or draw as many items as possible.

The subject was then seated in front of the linear movement apparatus and the Verbal method of time estimation was applied. Constant auditory stimuli of two, nine and four seconds respectively, were then given separately.

After each stimulus had ceased, the subject was asked to give a verbal estimate of how long he thought the sound had lasted. All responses were recorded but at no time was the subject given any indication of his accuracy or inaccuracy.

Time estimation by the reproduction method was then measured. The subject sat facing the screen with the handle to his right. He was asked to listen attentively to the auditory stimulus, which was the buzzer. When it stopped, he was asked to move the handle for as long as he felt the sound had lasted. Ten trials were then presented to the subject, five of which were two second auditory stimuli and five of which were four second stimuli. The two second stimulus was selected on the assumption that it would be safely beyond the indifference threshold point for most subjects but within the range of the psychological present. The four second stimulus was selected to have a slightly longer interval for comparative purposes. The auditory stimuli were present in random order for two measures of this nature. The subject's actual score was the mean distance and time taken for each set of five trials of two seconds and four seconds.

The starting side for each subject for each trial alternated between left and right. The subjects were permitted to move the handle back and forth if they so

desired, providing that they did not change direction midway. The subject was not permitted to rest his hand on the handle between trials as the slightest movement of the handle could start the timer going. There was a 60 second rest interval between the end of the subject's reproduction and the onset of the next stimulus.

The same random order of stimuli was presented for each subject. All aspects of the procedure were kept as identical as possible. It should be emphasised that, at all times, the subjects were encouraged to reproduce the length of time which they felt had passed.

The production method of measuring time estimation was then applied. The subject was required to produce a duration for two seconds and then later four seconds. He was requested to move the handle for what he felt was two seconds and then four seconds respectively. These trials were separated by permitting the subject to walk about the room for a few moments and take a "breather."

Whenever the linear movement apparatus was used, the handle was moved to the end of the cord, after the distance and time had been recorded, so that it would be ready for use in the next trial.

(Initially the comparative method was also applied to the measurement of time estimation. After the first few

subjects had been tested however, this part of the apparatus began to give so much trouble that this part of the experiment was abandoned and the results derived from it were excluded.)

Second Session

Generally, the second session followed one week later but for a few subjects in Groups B and C, the interval was almost two weeks. In the second session, the complete procedure of the Body Tempo tasks, Verbal estimations and reproductive and productive estimates was repeated as in the first session. In addition, seven cards from the Thematic Apperception Test were presented. By means of a content analysis of the protocols, scored ratings were derived following a system devised by Lindzey and Goldberg (1954). Six personality variables were scored: Achievement, Aggression, Sex, Abasement, Nurturance and Narcissism.

Third Session

The subject was asked a series of questions directed at finding out how he felt about time; and how he acted and behaved in relation to time in every day life situations. Some of the items on this questionnaire were those which had been found to be significantly related to time behaviour in

the Loehlin (1959) study. Others were taken from the Knapp questionnaire or were suggested by it (Knapp, 1962). Other items were included because it was felt that they might yield useful information about the subject's personal feelings and attitudes. (See Appendix B.)

The experimenter then had a general discussion with the subject concerning time, in the course of which any points which had arisen during any of the sessions, were clarified. (The subjective impressions gleaned from these discussions will be presented and discussed later.)

All responses to the questionnaire were rated by the experimenter on a three point scale during the interview.

The subjects were then given the word recall test. They were required to recall only 10 words from a list of 20 words read to them by the experimenter. From this list of 20 words, they were required to recall by choosing the 10 words they liked the most. The experimenter recorded their choices and the number of words related to time was calculated.

The room in which the experiment was carried out was empty except for the apparatus described and an additional table and two chairs for the use of the experimenter and subject.

CHAPTER V

RESULTS AND DISCUSSION - TIME ESTIMATION

5.1. Description of Subjects' Behaviour

Subjective observations of differences in response to the experimental situation, among the three groups.

5.1.1. The Neurotic Group - A

These patients were all attending the Psychiatric Day Hospital for treatment. They attended daily from Monday to Friday between 9 A.M. and 4 P.M. They were all sufficiently ill to require fairly intensive treatment, but not ill enough to be completely hospitalised. All the patients in this group were able to maintain themselves on the "outside" to a certain extent (some were more capable than others). They were in the hospital as voluntary patients as they were not able to carry out their usual work or leisure time activities.

The daily programme in the hospital (which was completely separated geographically from the Psychiatry Department in the general hospital) was arranged to include daily group therapy sessions; individual therapy at least once a week and occupational therapy;music therapy; drama

therapy; and relaxation therapy.

Patients frequently found themselves participating in many activities which initially were novel to them. They were usually seen by the experimenter in the early stages of their hospital treatment and, therefore, during the more acute stages of their illness. The experimental sessions were usually carried out in the early afternoon during the patient's free time period. On the whole, their cooperation was good and they were sometimes prepared to remain later than 4 P.M. to complete the experiment.

The greater amount of verbal response elicited from the neurotic subjects is one of the outstanding differences between them and the other two groups: Example, the mean times taken to administer the questionnaire of 40 questions was:-

A. Neurotic Group - 77.8 minutes

B. Normal Group - 56.0 minutes

C. Medical Group - 43.4 minutes

It appears that the neurotics, as a group, had learned in the course of psychotherapy that it was necessary to talk about themselves, their feelings and their thoughts in order to improve.

Originally the experimenter had prepared a standard statement which was delivered on the first encounter with

the subjects. However, though they were all quote cooperative and prepared to do what was asked of them, they were quite uninterested in the details of the whole situation and most of the introductory speech was abandoned. The majority of these patients had had psychiatric contact on a more limited basis outside the hospital before attending as day patients. They all accepted the experimenter as part of the hospital setting as they assumed that she was directly involved in their treatment.

5.1.2. The Normal Control Group - B

These subjects were selected mainly through large business organisations. Four members of this group were university students and 2 were semi-professional people in private occupations. As a group, they were easiest to work with in the overall experiment. They were cooperative, helpful and generally more interested in the experiment than the other subjects. They were sufficiently vocal and spontaneous to be able to elicit adequate data without needing to be demanding and persuasive. They were not talkative enough to disrupt the experimental procedure.

As mentioned previously, most of the subjects welcomed the experiment as a diversion from the day's routine. Some of them saw their selection for the sample as a gesture of

confidence in their work. They were flattered by their employer's attention. A few of these subjects were concerned that their employers would be able to use the data against them in some way. They were easily reassured on this point, however.

The four students in this sample were, by choice, not psychology students but volunteers from other university departments. None of the subjects were given any kind of reward for their participation in the experiment and none of them seemed to have expected any.

The normal control group was matched against the same 25 members of the neurotic group as the medical group, for the same variables of age, sex, race and educational achievement.

5.1.3. Medical Group - C

The crux of the difference between the groups in terms of verbal behaviour alone, was that the neurotics had already had some training experience in learning how to communicate their feelings and thoughts in the hospital setting. The medical group had had a hospital experience as physically ill patients. They had been encouraged to limit their verbalisations to the presence or absence of pain in certain areas, with the result that in a hospital setting, they

assumed that one talked about where it hurt or where it did not. Talk about how one felt about time, or one's mother or father, seemed out of place to them. Having clearly defined physical complaints, they could not really see the point of the whole procedure. Unlike the neurotics, they could not imagine the relationship between pain and this kind of talk. They only recognised a relationship between pain and the medicines which the doctor prescribed for them, not the words he used for them. Implicitly and/or explicitly, they made their view of the situation quite apparent.

An Outpatient Clinic is not a place where there is much time for talking and the patients are very much aware of this. The "set" or "expectations," which the different groups had concerning the hospital, was different.

A striking example of the importance of patient attitudes to cooperation in therapy and its outcome is supplied by the following study: In a study of psychiatric patients carried out at John Hopkins, Park et al (1967), observed the reactions of patients who had been given information and instruction not usually given to psychiatric research patients. For instance, they were told that they were being given placebos such as sugar pills. The investigators found that there was no evidence that this kind of information, normally withheld from patients, had

any detrimental effects. These clinic outpatients come into studies with deep feelings of trust and expectations of improvement. As a result, they did not believe that they were really being subjected to research. The patients showed more symptomatic improvement than those who participated in other double blind studies.

Park and his associates felt that there were a number of factors which could account for the positive responses. Patients appreciated the frankness and the request to give voluntary participation; patients with clear ideas about the nature of treatment showed more improvement; even in short term drug evaluation studies, the doctor-patient relationship was more important than the various research procedures.

Many of the medical group patients were prepared to cooperate with the experimenter only to the extent of not refusing her request. They felt obliged to cooperate as they knew that they were patients in a teaching hospital where sometimes the patients had to help students and other doctors but they had no trust in the procedures nor were they familiar with the presence and role of the psychologists.

Medical clinic subjects were approached while they were in the outpatient clinics. The medical consultant directed them to talk to the experimenter. Some of the patients flatly refused to cooperate. The actual experiment

and interviewing was performed at the Day Hospital which was across the street from the main hospital. This medical group, therefore, required more of an introductory explanation than the other subjects. At the end of the three sessions, they were considerably more cooperative and helpful and there was much less of "well let's get all this over with as quickly as possible." Nothing could have been accomplished without the subject's active participation and cooperation. It should be remembered that these patients were often in physical pain and discomfort. They were subjected to more inconvenience in many respects than any of the members of the other two groups. More than 100 patients had been approached before this group of 25 subjects was obtained. Many of the 100 patients were excluded not because of lack of cooperation but for the following reasons: Some had histories of psychological complaints; others had to travel from too far away; and some simply did not return at the appointed time. The final group was matched against 25 subjects in the neurotic group. They were selected on the basis of sex, age, race and educational qualifications. They were, in a sense, a highly selected group, having had to fulfill all these requirements before being included in the sample.

5.1.4. Degree of Illness

In the neurotic and medical group, an attempt was made to keep the level of illness nearly similar. Unfortunately, this was possible only in very broad and subjective terms. By virtue of the daily attendance in the hospital, the neurotic group was severely ill. Their illness was interfering with their daily living to the extent that they were unable to carry out their normal activities. There was, however, no objective yardstock whereby one could compare the severity of their illnesses with that of the medical group. Some members of the medical group had previously been acutely ill and had been hospitalised and they were now receiving medication and treatment. The acute stage of their illness had passed, whereas most of the neurotic patients were still in the acute stage of their illness. It had originally been intended to take ambulatory hospital patients from the wards as subjects. But this was quite impossible to organise and too much to expect from the hospital.

As a group, the neurotic group were in daily contact with one another. The experimenter was concerned that the subjects would discuss the experiment amongst themselves in too much detail. They were requested not to, but itwas difficult to know whether they adhered to the request. In

any event, this probably had little real bearing on the results. In only two instances was any time interval actually stated during the experiment: When applying the production method during which the subject was required to produce a two second and then a four second interval with only a verbal stimulus being presented.

The nature of the tasks required of the subject, were mainly spontaneous assessments made in the experimental room and none of the subjects were given any detailed information about their performances. Information on request was sometimes given in very general terms. On completion of the entire experiment, the patients at the hospital were told, as a group, a little more about the study.

STATISTICAL TREATMENT

OF RESULTS

5.2. Statistical Treatment of Results.

All the data collected was scored and rated as outlined above and subjected to correlation analysis. The data from each of the three groups yielded a separate correlation matrix.

According to Ezekiel and Fox (1964, p. 294) when using a multiple correlation matrix, correlations reflecting true relatedness for N = 30 would only be significant at the .05 level of confidence, when they are .55 or greater. For an N = 25 the .05 level of significance would only be for a correlation coefficient of .65 or greater. The Neurotic group consisted of 30 subjects and the Normal and Medical groups comprised 25 subjects each. Appendix A lists all the truly significant correlation coefficients extracted from the three correlation matrices as well as all other correlation coefficients referred to. Additional statistical procedures were introduced where indicated.

The time measures considered were concerned with the judgment of various intervals using different methods of time estimation.

Verbal Method

Item 27 - Long time interval of 22 minutes.

Items 29-34 - Short time interval estimates of 2,

4 and 9 seconds on initial test and re-test session. The subjects gave verbal estimates of how long they thought a sound lasted.

Reproduction Method

Items 35-42 - Short time interval estimates of 2 and 4 seconds on initial test and retest session. The subjects were required to reproduce a 2 second or 4 second period after listening to a buzzer for these respective durations, by moving the linear movement apparatus. The time taken and the distance moved was recorded for all reproductions.

Production Method

Items 43-50 - Short time interval estimates of 2 and 4 seconds on initial test and retest session. The subjects were instructed to produce what they felt was a 2 second or 4 second period by moving the linear movement apparatus. The time taken and the distance moved was recorded for all productions.

Consistency Measures

Items 55-67 - Direction of test retest differences for all time measures.

Items 122-134 - Extent of test retest differences for all time measures.

Range of Measures

Items 68-75 - Range of estimates for each time interval and each session using the reproduction method of time estimation. Time and distance ranges were calculated separately

Speed

Items 137-144 - Speed for the reproduction and production method estimates on initial test and retest.

Items 153-160 - Speed differences between reproduction measures on different times and production measures on different times.

Items 161-164 - Speed differences between the reproduction and production methods compared.

Accuracy

Items 145-152 - Accuracy on the different methods.

5.3. Reliability.

Reliability of time estimation could be inferred from the relationship between same time estimates using the

same methods but in different test sessions.

Table I was arrived at by correlating initial test estimates with the same time and same method estimates on retest.

TABLE I

TEST-RETEST RELIABILITY OF TIME ESTIMATION MEASURES

METHOD & TIME INT.		GROUPS NEUROTICS	NORMALS	MEDICALS
Verbal				
29&30	2"	.319	.549	.580
31&32	4"	-.062	.740*	.852*
33&34	9"	-.083	.264	.884*
Reproduction - Time				
35&36	2"	.496	.675*	.732*
37&38	4"	.630*	.779*	.911*
Production - Time				
43&44	2"	.165	.568	.889*
45&46	4"	.800*	.725*	.866*

* P = < .05

Inspection of Table I revealed that the Neurotic group on the whole were less reliable in their estimates of short time intervals from session to session than the other two groups. The Neurotics' lesser reliability shows up particularly on the Verbal method of estimating time. It also shows up on the estimation of the shorter time interval of 2 seconds for both the reproduction and production methods

(r = .496 and r = .165).

Table II was arrived at by correlating the distance moved on initial test estimates with the distance moved on retest estimates of the same time intervals using the same methods.

TABLE II

TEST-RETEST RELIABILITY OF DISTANCE MEASURES

METHOD & TIME INT.		GROUPS NEUROTICS	NORMALS	MEDICALS
Reproduction - Distance				
39 & 40	2"	.601*	.914*	.895*
41 & 42	4"	.679*	.975*	.952*
Production - Distance				
47 & 48	2"	.701*	.917*	.993*
49 & 50	4"	.973*	.912*	.991*

* P = < .05

Inspection of Table II revealed that all groups were more reliable on distance measures for both the reproduction and production methods of time estimation as all correlation coefficients are higher on this table than on Table I. However the Neurotics are less reliable than the other two groups. The correlation coefficients are lower for the Neurotics than the other two groups for both the 2 second and 4 second time intervals on the reproduction method (r = .601 and r = .679 P = < .05) but not for the 4 second

interval on the production method (r = .973 P = .01).

Table III was arrived at by correlating range, speed and accuracy measures on initial test with the same measures on retest.

TABLE III

TEST-RETEST RELIABILITY OF MEASURES OF RANGE, SPEED AND ACCURACY

MEASURE		GROUPS NEUROTICS	MEDICALS	NORMALS
Range - Reproduction				
68 & 69	2" Time	.405	.480	.536
70 & 71	4" Time	.374	.446	.429
72 & 73	2" Distance	.207	.941*	.692*
74 & 75	4" Distance	.670*	.688*	.804*
Speed				
137 & 138	2" Reproduction	.802*	.909*	.731*
139 & 140	4" Reproduction	.884*	.955*	.857*
141 & 142	2" Production	.659*	.860*	-.103
143 & 144	4" Production	.808*	.848*	.770*
Accuracy				
145 & 146	2" Reproduction	-.021	.691*	.745*
147 & 148	4" Reproduction	.543	.591	.888*
149 & 150	2" Production	.305	.600*	.823*
151 & 152	4" Production	.789*	.691*	.861*

* P = < .05

Range

Inspection of Table III revealed that range was not a reliable measure of time estimation for either of the three groups. The Neurotics were even less reliable than the

Normals and the Medicals as suggested by the lower correlation coefficients between test and retest measures. The Normal and Medical groups were more reliable on distance measures than on time measures.

Speed

Speed appears to show the most consistent reliability for all three groups on both the Reproduction and Production methods of measuring time estimation.

Accuracy

The Neurotics show greater variation in accuracy on both the Reproduction and Production method than either of the other two groups.

In order to summarise the overall reliability of the three groups the test-retest correlations for time estimates of all short time intervals using the verbal method, range, speed and accuracy were each averaged and listed in Table IV and can be summarised as follows:-

1) The Neurotic group on the whole were less reliable in their estimates of short time intervals from session to session than the other two groups.

This overall lower level of consistency is suggested by the lower correlations of the Neurotics as

TABLE IV

AVERAGE CORRELATIONS OF TEST-RETEST RELIABILITY OF DIFFERENT TIME INTERVALS FOR EACH MEASURE OF TIME JUDGMENT

METHOD & TIME INT.		GROUPS		
		NEUROTICS	NORMALS	MEDICALS
Verbal	2, 4 & 9 secs.	-.155	.518	.772
Reproduction	2 & 4 secs.	.563	.727	.821
Production	2 & 4 secs.	.482	.646	.877
Range		.389	.463	.482
Speed	2 & 4 secs.			
Reproduction	2 & 4 secs.	.843	.932	.794
Production	2 & 4 secs.	.733	.852	.436
Accuracy	2 & 4 secs.			
Reproduction	2 & 4 secs.	.282	.641	.866
Production	2 & 4 secs.	.547	.645	.842
Total Averages		.479	.727	.869

compared with the Normals and the Medicals (e.g. production method average r for the Neurotics = .482, Normals average r = .646 and Medicals average r = .877).

2) There is therefore an instability of time estimation over sessions on the part of the Neurotic group which is evident on all measures except speed.

3) Speed appears to be the most consistently reliable measure of time estimation for all three groups.

4) All groups show generally low reliability on

range of estimates for time, but not to the same extent for distance.

5) The verbal method of measuring time estimation is less reliable as a technique of measuring time estimation when compared with the reproduction and production methods. (Average correlations for the Neurotics were r = -.155 and for the Normals r = .518 which were not significant.)

Overall the Neurotics were less reliable than the other two groups. The Normal group showed the most consistent reliability from session to session in their short time estimates. Thus Neurotics were generally less stable than the Normals and the Medicals on their intersession estimates.

5.4. Longer Time Interval - Item 27.

One longer time interval of 22 minutes was included as a verbal method of estimating time. This was a "filled time interval" in that the subjects were being questioned about their condition and their history during this period. The following table gives the mean estimates for each of the three groups and the percentage of subjects within those groups who overestimated and underestimated the 22 minute period.

None of these groups could be regarded as displaying marked distortion of time estimation, although one must

TABLE V

VERBAL ESTIMATE OF 22 MINUTES

GROUP	MEAN EST. MINUTES	ERROR	NO. SUBJECTS WHO OVERESTIMATED	NO. SUBJECTS WHO UNDERESTIMATED
Neurotics	18.67	-3.33	6 - 20%	24 - 80%
Normals	21.28	-1.72	8 - 32%	17 - 68%
Medicals	23.80	+1.80	14 - 56%	11 - 44%
$X^2 = 5.134$	d.f 2	P = .10		

recognise the greater tendency of the Neurotics to underestimate the longer time interval. The slightly greater tendency of the Medical group to overestimate the interval could be a further indication of the difference in co-operation level of the three groups as already mentioned above. The Medical group were the least co-operative, and the Normals were the most co-operative. The Neurotics were the keenest to talk about themselves while they believed the experimental investigation was going to be of some direct benefit to them.

Summary

1) The Neurotics showed a greater tendency to underestimate the 22 minute interval.

2) The Neurotics were the least accurate as a

group.

3) The Normals were the most accurate.

5.5. Consistency of Methods.

The consistency of any one method of measuring time estimation could be inferred from the relationships between estimates of different time intervals using the same methods in the same session. Average correlations were derived by calculating the averages of all the inter-correlations for the different time intervals for each of the methods in the same session. Speed and accuracy were also included.

TABLE VI

CONSISTENCY OF METHODS
AVERAGE CORRELATIONS OF ESTIMATES OF DIFFERENT TIME INTERVALS FOR EACH METHOD OF TIME JUDGMENT

METHOD & TIME INT.		GROUPS NEUROTICS	NORMALS	MEDICALS
Verbal	2, 4 & 9 secs.	.751*	.651*	.817*
Reproduction	2 & 4 secs.	.655*	.671*	.605
Production	2 & 4 secs.	.459	.720*	.951*
Speed	2 & 4 secs.	.490	.749*	.343
Accuracy	2 & 4 secs.	-.059	.677*	.572

* P =< .05

The Neurotics are clearly less stable in their estimates of different time intervals when using the production method (av. r = .459) than the Normals or the Medicals. The Neurotic's instability also shows up on the speed and accuracy with which they make their estimates. The Neurotic's instability of time judgment is most marked on accuracy (av. r = -.059).

The stability with which the different time intervals were estimated when using the same method is reflected in the next table. The estimates made for the 2 second interval and the 4 second interval were correlated for

TABLE VII

STABILITY OF JUDGMENTS FOR VARIOUS TIME INTERVALS FOR THE REPRODUCTION AND PRODUCTION METHODS OF TIME ESTIMATION

ESTIMATE	SESSION	METHOD	GROUPS		
			NEUROTICS	NORMALS	MEDICALS
2" & 4"	Initial	Reprod.-Time	.664*	.772*	.755
2" & 4"	Retest	Reprod.-Time	.768*	.881*	.939*
2" & 4"	Initial	Reprod.-Dist.	.708*	.960*	.944*
2" & 4"	Retest	Reprod.-Dist.	.922*	.975*	.963*
			Av.r=.766*	Av.r=.897*	Av.r=.900
2" & 4"	Initial	Prod. -Time	.256	.876*	.931*
2" & 4"	Retest	Prod. -Time	.872*	.905*	-.736*
2" & 4"	Initial	Prod. -Dist.	.490	.994*	.998*
2" & 4"	Retest	Prod. -Dist.	.936*	.983*	.992*
			Av.r=.639*	Av.r=.940*	Av.r=.914

* P = < .05

initial test session and retest. This table therefore demonstrates the extent to which the different groups were able to be consistent within the limits of the method being used at the time, in spite of the differences between the intervals. Table VII therefore shows the correlations between different time intervals made in the same sessions using the same methods.

Using the reproduction method of time estimation all groups were stable in the way in which they estimated 2 and 4 second periods. This was evidenced in the significant correlations between 2 and 4 second estimates.

Using the production method the Neurotics' greater variation in stability is again evident in the low relationship between 2 and 4 second estimates on initial test sessions ($r = .256$).

Stability of Accuracy of Estimation for Various Time Intervals.

The following table illustrates the stability of the accuracy with which each group of subjects was able to judge the different time intervals using the same method on the same day. The estimates made for the different intervals were correlated.

TABLE VIII

STABILITY OF ACCURACY OF ESTIMATION
FOR VARIOUS INTERVALS

TIME INTERVALS	SESSION	METHOD	GROUPS NEUROTICS	NORMALS	MEDICALS
2 & 4 secs.	Initial	Repr.	-.042	.790*	.755*
2 & 4 secs.	Retest	Repr.	.673*	.854*	.929*
			Av.r=.316	Av.r=.822	Av.r=.842
2 & 4 secs.	Initial	Prod.	.427	.874*	.929*
2 & 4 secs.	Retest	Prod.	.929*	.773*	.859*
			Av.r=.678	Av.r=.824	Av.r=.894

* P = < .05

What emerges again is the greater variation in accuracy of the Neurotic group both on the reproduction method (r = -.042 for 2 seconds) and on the production method (r = .427 for 2 seconds).

Comparison Between Different Estimates Using Different Methods.

The following table extracts the correlations between the 2 and 4 second estimates on the three different methods which were used to measure time estimation.

What emerged again was the lesser stability of the Neurotic group which showed up on the production method (r = .256). The other two groups demonstrated greater stability on the production method than on the verbal and

TABLE IX

CORRELATIONS BETWEEN 2 SECOND AND 4 SECOND ESTIMATES FOR DIFFERENT METHODS

METHOD	GROUPS		
	NEUROTIC	NORMAL	MEDICAL
Verbal	.604*	.646*	.820*
Reproduction	.664*	.772*	.755*
Production	.256	.876*	.931*

* P = < .05

reproduction methods, while the Neurotics demonstrated the least stability

Different estimates on the reproduction method were significantly correlated for all three groups. This again demonstrates the reliability of the reproduction method as a technique of measuring time estimation.

In all groups, other than the Neurotics, subjects appear to be able to maintain a reliable standard of time judgment. This was reflected in significant relationships between estimates of different times using the same method.

5.6. Stability as a Function of Other Variables.

In order to pursue this apparent instability of the Neurotics further, the extent of the test retest differences could be compared with other variables. It could be expected

that the Neurotics' instability would be more clearly apparent on speed and distance variables than actual time variables. This would be assumed because in the experimental situation it was more likely that the distance moved could be varied to a greater extent than the time. The time response could not be varied to the same extent as the distance because it could be more clearly defined by a verbal marker.

The findings this far suggested that the Neurotics were more unreliable and unstable when using the production method of time estimation than the reproduction method. It had also been observed that speed as such had been a reliable measure for all three groups. Speed differences were therefore correlated with test-retest differences in time and distance estimates using the production method. Test-retest differences reflect the extent of the difference between any initial measure and its counterpart on retest. These measures were intercorrelated.

Item 157 was the difference in speed for the 2 second and 4 second interval for the production method. Items 126-129 were the test-retest differences in 2 and 4 second time estimates and 2 and 4 second distance estimates for the production method.

The Neurotics and Medical groups show a consistently negative relationship between test retest differences on

TABLE X

RELATIONSHIP BETWEEN TEST-RETEST DIFFERENCES IN SPEED AND TEST-RETEST DIFFERENCES IN TIME AND DISTANCE ESTIMATES, USING THE METHOD OF PRODUCTION

		NEUROTICS		
	126	127	128	129
157	-.561*	-.152	-.241	-.280
		NORMALS		
	126	127	128	129
157	.087	.057	.676*	.318
		MEDICALS		
	126	127	128	129
157	-.766*	-.763*	-.699*	-.737*

* P =< .05

production 2 and 4 seconds time and distance (126-129) and the differences in speed on production 2 and 4 seconds.

1) It appeared that the bigger the speed difference was, the smaller the time estimate difference.

2) If the length of the interval varied, those people who then changed their speed probably confused themselves and became less consistent, i.e. they varied their speed with the different time intervals and therefore became less reliable in their estimates.

3) The Neurotics seemed to suffer from this difficulty and therefore appeared very much less reliable and less consistent than the Normals.

Accuracy and Stability

Relating accuracy to time estimate differences on the production method further emphasised the Neurotics' instability in comparison with the other two groups. Table XI shows the correlations between test-retest estimate differences and accuracy for these same estimates on the production method.

TABLE XI

RELATIONSHIP BETWEEN ACCURACY OF TIME ESTIMATION AND TEST-RETEST DIFFERENCES IN TIME ESTIMATES, USING THE METHOD OF PRODUCTION

	NEUROTICS		
	149	151	
126	.349	.054	Av. r = .378
127	.292	.817*	
	NORMALS		
	149	151	
126	.952*	.881*	Av. r = .913
127	.960*	.858*	
	MEDICALS		
	149	151	
126	.916*	.830*	Av. r = .886
127	.917*	.882*	

* P =< .01

Table XI shows that for the Normals and the Medicals there was a highly significant relationship between accuracy and test-retest difference on the production method. However

the Neurotics do not demonstrate this same relationship between accuracy and stability as the correlations are low and insignificant ($r = .349$, $r = .054$ and $r = .292$). The average correlation of $r = .378$ for the Neurotic group is very much lower than that of $r = .913$ for the Normals and $r = .886$ for the Medicals.

This section has tried to identify the cause of the Neurotic subjects' greater instability of time estimation. It was apparent that having been less reliable from session to session and from one interval to another the Neurotic was also less reliable in the degree of accuracy with which he made his different estimates. This did not mean that the Neurotic group was necessarily less accurate than the other groups but that the reliability of their level of accuracy was less than that of the other groups.

Differences in Speed of Movement and Stability.

The following table shows the relationship between test-retest differences in speed of movement while making time estimates and the extent of test-retest difference for those same time estimates when using the production method.

Items 126-127 are the estimate differences.

Items 149-151 are the speed differences on the production method.

TABLE XIIa

RELATIONSHIP BETWEEN TEST-RETEST DIFFERENCES IN SPEED OF MOVEMENT AND TEST-RETEST DIFFERENCES IN TIME ESTIMATION USING THE PRODUCTION METHOD

	GROUPS		
PRODUCTION	NEUROTICS	NORMALS	MEDICALS
Test-Retest Diff. & Speed			
126 & 149	.349	.952*	.916*
126 & 151	.054	.881*	.830*
127 & 149	.292	.960*	.917*
127 & 151	.817*	.858*	.882*

* P =< .01

The Normals and the Medicals show consistent significant relationships between differences in test-retest estimates and differences in speed of movement. The Neurotics are again very much less consistent than the other two groups as reflected in low and non-significant correlation coefficients between stability and speed (e.g. r = .349 and r = .054). Thus for the Normals and Medicals speed and stability are positively significantly linked together but there is little evidence of this relationship existing in the Neurotic group.

The following table reflects the relationships between test-retest differences in time estimates on the production method. These differences (items 126 and 127) were then correlated with the speed differences between same

time intervals for the reproduction and production methods (items 163 and 164).

TABLE XIIb

RELATIONSHIP BETWEEN TEST-RETEST DIFFERENCES BETWEEN METHODS IN SPEED OF MOVEMENT AND TEST-RETEST DIFFERENCES OF TIME ESTIMATION USING THE METHOD OF PRODUCTION

	NEUROTICS	
Estimate Differences	163	164
126	-.067	-.150
127	.200	-.088
	NORMALS	
	163	164
126	.500	.411
127	.508	.441
	MEDICALS	
	163	164
126	-.615	-.388
127	-.656	-.430

No significant correlations

Changes in Speed

Changes in speed between the different methods were compared in items 161-164 and these can be related to the extent of test-retest differences from session to session. For the Neurotics it would seem that the differences across times were crucial in determining the differences between estimates. For the Normals and the Medicals the differences

between the nature of the methods are perhaps more crucial. This means that the Normals and the Medicals respond more to method differences than to time differences. The matrices, Table XIIb on page 117, correlating extent of test-retest differences (items 122-127) with speed differences between methods (items 161-164) will illustrate this.

The Neurotics show very few correlations between estimate differences using the Reproduction and Production methods of time estimation. Whereas the Normals show many positive significant correlations between differences from session to session and differences between the speeds used on different methods. The Normal Group's greater consistency and therefore stability even comes out in the manner in which they vary. In this area the Medicals seem to be as poor as the Neurotics. The less the group varied across tests the more reliable are the test-retest measures across the methods. Normals varied less across tests and were consequently more reliable across the different methods.

The speed differences even where they do exist manifest differently in the three groups. The Neurotics and Medicals show many negative relationships between test and differences and speed differences which implies that if the one was more the other was less--a further proof of their general instability in the area of time estimation. Changes

in speed are then clearly a function of stability.

Changes in Speed and the Extent to Which They Are Related to Each Other.

Differences between methods here reflect differences in orientation of the three groups of subjects.

1) The Normals adhered closely to instructions and were able to maintain a more stable standard of assessment than either of the other two groups. Even when they deviated they did so consistently.

2) On the whole the Medical group were consistent too but had similar difficulties to the Neurotics on speed measures.

3) The Neurotics were inclined to vary their speed with the different times and thus confused themselves so that their estimates were considerably less reliable. They seemed to be relying on internal impressions or cues rather than external ones. A possible explanation for the differences in orientation might be found in some general observations of the apparent motivations of the different groups. As mentioned above, the Medical group were on the whole, more uncooperative and the Normals the most cooperative. This may well have meant that the Normal Group made a much greater effort to please. Perhaps they were more consciously aware of trying to succeed according to some criterion which they

felt that the examiner might have in mind. This could then have enabled them to respond with comfortable but consistent spontaneity. The Medical group, being somewhat more hostile and not particularly motivated to please the experimenter, might well have carried out their tasks in a consistently more hurried manner, which then affected their speed.

The Normals and the Medicals show a strong relationship between accuracy on the production 2 and 4 second estimates and the extent of the difference between initial test and retest estimates for both time and distance on the production method (Normals $r = .952$, Medicals $r = .916$, Neurotics $r = .359$). This further stresses the relationship between stability and accuracy. This tendency therefore seems undermined in the Neurotic group. It produced a trend towards instability which the Neurotics display across most of the time measures in this study when compared with the other two groups. The Neurotics display a much more consistent tendency to change their speed with the different times rather than the methods.

5.7. Speed as a Function of Body Tempo.

The following table gives the mean speed per second of movement for each of the three groups for both the

reproduction and production methods of time estimation.

TABLE XIII

TEST-RETEST INCREASE IN SPEED OF MOVEMENT FOR THE PRODUCTION AND REPRODUCTION OF SHORT TIME INTERVALS

METHOD	INTERVAL	SESSION	GROUPS-SPEED INCHES PER SEC. NEUROTICS	NORMALS	MEDICALS
Reproduction	2"	Initial	12.89	10.85	12.95
	2"	Retest	14.90	12.79	14.97
	4"	Initial	11.48	9.83	12.58
	4"	Retest	13.68	11.61	15.32
Production	2"	Initial	13.46	10.71	10.14
	2"	Retest	13.45	10.55	12.07
	4"	Initial	11.85	9.84	11.18
	4"	Retest	13.16	9.95	10.08

Table XIII shows that mean speed increased on retest for most of the reproduction and production trials but more so on the reproduction method estimates than the production estimates. Speed on the production method showed less change in the Normal and Neurotic groups than on the reproduction method (2 seconds speed reproduction Neurotics increased from 12.89 to 14.90 inches per second and Normals from 10.85 to 12.79 inches per second. 2 seconds speed on production showed little change--Neurotics 13.46 to 13.45 inches per second and Normals 10.71 to 10.55 inches per second).

The following table gives the mean distance moved

during the estimation trials for each of the groups using the Reproduction and Production methods.

TABLE XIV

TEST-RETEST INCREASE IN DISTANCE MOVED DURING THE PRODUCTION AND REPRODUCTION OF SHORT TIME INTERVALS

METHOD	INTERVAL	SESSION	GROUPS MEAN DISTANCE MOVED IN INCHES NEUROTICS	NORMALS	MEDICALS
Reproduction	2"	Initial	27.09	23.01	27.10
	2"	Retest	31.42	25.36	28.04
	4"	Initial	46.91	40.49	50.71
	4"	Retest	52.95	43.86	52.13
Production	2"	Initial	29.79	17.31	26.49
	2"	Retest	26.41	20.11	21.04
	4"	Initial	59.85	33.09	42.70
	4"	Retest	57.79	30.66	28.92

On the Reproduction tasks all groups increased the mean distance moved on retest. On the production trials the Neurotics were inclined to decrease the mean number of inches moved, e.g. on initial test mean distance moved during the 2 second estimation was 29.79 inches and on retest it was 26.41 inches.

There was a general tendency towards increased speed on retest but less consistently so for the Neurotics than the Normals. On the whole this appeared to be a consequence of the subjects moving the apparatus further as the increase in the distances suggests.

Body Tempo

Two tasks intended to measure spontaneous rate of body movement were included in the battery of tests administered. The subjects tapped with a pencil for one and drew circles for the second. The number of dots and the number of circles drawn during a 30 second period were recorded. The subjects had been instructed to carry out these tasks at a speed which they found comfortable. It was stressed that they were not speed tests. The following table shows how the numbers recorded for both tapping and circle drawing increased on retest. (XVa).

TABLE XVa

TEST-RETEST INCREASES IN TEMPO ON TWO TESTS

TEST	TIME	SESSION	GROUPS-MEAN NUMBER RECORDED		
			NEUROTICS	NORMALS	MEDICALS
Tapping	30"	Initial	91.37	82.20	99.60
Tapping	30"	Retest	95.37	91.40	112.60
Circle drawing	30"	Initial	26.60	19.68	21.56
Circle drawing	30"	Retest	30.13	24.40	30.48

Table XVb shows the correlations between number recorded on initial test and number recorded on retest.

1) The same trends appeared for all three groups--a tendency to faster productions on retest than on initial test.

TABLE XVb

RELATIONSHIP BETWEEN TEST AND RETEST PERFORMANCE ON TWO TEMPO TESTS, SHOWING THE POSITIVE SIGNIFICANT CORRELATION COEFFICIENTS BETWEEN TEST AND RETEST PERFORMANCE

TEST	GROUPS - NO PER 30 SECONDS		
	NEUROTICS	NORMALS	MEDICALS
Tapping	.578*	.793*	.884*
Circle drawing	.655*	.794*	.854*
	Av.r=.617	Av.r=.794	Av.r=.869

* P = < .05

This fits in with a tendency observed in measures of time estimation where the distance moved on retest was greater than on the initial test, as the time remained the same on retest. As for initial test, if the number recorded increased, then the speed with which they drew or tapped must have increased.

2) On the production method only, the Normal group maintained this tendency of increased speed through body tempo and also measures of time estimation involving body movement. On the production method, although the time taken decreased, so did the distance moved for the Neurotic and Medical groups. This means that they were maintaining a more consistent speed of movement in this context than the Normals. One could postulate that in these circumstances, the Normal group permitted the familiarity of the situation on retest to

improve their performance in terms of speed and the other two groups did not. Perhaps again, the Normals were responding more closely to the external reality of the tasks while the Neurotics and Medicals were more consistently responding to their internal cues as related to the external stimulus. The Normal group could have been displaying a greater tendency towards appropriate flexibility in the context of the experimental situation and the Neurotic and Medical groups more rigidity in their responses.

3) Not taking into account whether the differences were more or less but simply the amount by which they varied, circle drawing involving much more gross body movement varied less for all three groups. Both tapping and circle drawing differences appear greater for the Normal and Medical groups than the Neurotics.

4) Normal group body tempo circle drawings correlated particularly with speed on the production method ($r = .504$ for 2 seconds and $r = .589$ for 2 seconds on retest) and the other production measures tested. Spontaneous speed of body tempo as measured by circle drawing correlated with the spontaneous speed at which the subjects produced what they felt to be short 2 and 4 second time period. Spontaneous body movement is probably involved in body tempo measures and linear movement apparatus productions. Tapping rate also

correlated with the range of time estimations for 4 seconds on the reproduction method ($r = .643$, $P = < .05$). Rate of drawing circles also correlated with test-retest differences on the reproduction and production method time estimates. Circles and test difference reproduction 2 seconds time, $r = .507$. Both groups have more positive correlations between circle drawing and speed for the production method than the reproduction method even though they were not significant. It seems that a tendency towards spontaneous rate of movement influenced these productions creating a relationship between body tempo measures and speed, particularly on the production method.

Assuming speed of movement during the linear movement productions and reproductions also to be a function of body speed, then the positive correlations between verbal estimates and speed support the notion of an underlying rhythmicity as a built-in guideline to time estimations in adulthood probably originally dependent on speed of body movement or internal processes. For the Normal group, test retest differences on the verbal method also correlated with test, retest differences on other methods of time estimation, e.g., particularly the production method. Verbal 2 second test difference and extent test retest difference for production 2 seconds time ($r = .598$ and 4 seconds $r = .670$,

P = < .05). The extent of the test difference on the verbal estimate for 4 and 9 seconds also correlated with the body tempo measures (r = .730, P = < .05 verbal 4 seconds and body tempo circle drawing extent test retest differences), r = .682, P = < .05 between verbal 9 seconds test retest difference and circle drawing test retest difference.

5.8. Test-Retest Decreases in Time Estimates for Brief Periods.

To illustrate the point that although tempo tasks and speed appeared to increase on retest actual time estimates decreased on retest, the following Table XVI was drawn up. The table reflects the mean time estimates for the 2 second interval on the reproduction and production methods on initial test and retest session. The table also shows the mean distances in inches moved during those same estimates.

TABLE XVI

TEST-RETEST DECREASES IN TIME ESTIMATES FOR BRIEF INTERVALS

METHOD	INTERVAL	SESSION	GROUPS NEUROTICS	NORMALS	MEDICALS
Reproduction	2" Time	Initial	2.27sec.	2.13sec.	2.18sec.
Reproduction	2" Time	Retest	2.04sec.	1.90sec.	1.90sec.
Reproduction	2" Dist.	Initial	27.09in.	23.01in.	27.10in.
Reproduction	2" Dist.	Retest	31.42in.	25.35in.	28.04in.
Production	2" Time	Initial	3.14sec.	1.90sec.	2.12sec.
Production	2" Time	Retest	2.18sec.	1.82sec.	1.73sec.
Production	2" Dist.	Initial	29.79in.	17.31in.	26.49in.
Production	2" Dist.	Retest	26.41in.	20.11in.	21.04in.

All time estimates decreased on retest for all three groups when only the briefest time interval was considered.

5.9. Accuracy of the Different Methods.

5.9.1. Relative Accuracy.

The following table lists the mean time estimates made by each of the groups for 2 and 4 seconds on the verbal, reproduction and production methods. It indicates the relative accuracy of each of the three methods as measures of time estimation. This can be gauged from the extent to which the mean estimates approximate to the actual stimuli.

TABLE XVII

RELATIVE ACCURACY OF THREE METHODS OF TIME ESTIMATION IN SECONDS

	REPRODUCTION METHOD			PRODUCTION METHOD			VERBAL METHOD		
STI	NEURS.	NORMS	MEDS.	NEURS.	NORMS	MEDS.	NEURS.	NORMS	MEDS.
2"	2.27	2.13	2.18	3.14	1.90	2.12	4.96	3.08	4.28
4"	4.22	4.04	4.04	4.49	3.70	2.97	10.25	9.92	10.88
6"	6.49	6.17	6.32	7.63	5.60	5.02	15.24	13.00	15.16

1) The table shows quite clearly that the Reproduction method of measuring time estimation is the most accurate. Estimates made by all groups of subjects approximate

most closely to the actual stimulus.

2) The production method was the next most accurate method.

3) The verbal method was the least accurate.

5.9.2. Over and Underestimation.

1) Few individual subjects were able to make completely accurate time estimations. However two neurotic subjects were able to give two accurate responses on the production method because they had both been trained to measure seconds accurately under specific circumstances.

Accurate time habits can be a direct consequence of the training one acquires as part of job requirements. This is borne out by the fact that the two instances of complete accuracy for the short time intervals, using the linear movement apparatus were produced by: -- one subject who was a medical doctor trained and experienced at measuring heart rate by pulse and counting seconds. The second subject, who was a deep sea-diver told me that he had trained himself to be able to measure seconds accurately as it was essential that he be able to calculate time accurately while under water without relying on a watch. He had been doing this for a number of years and stated that he had not previously had such an accurate an idea of short time intervals.

2) Physical involvement in the form of linear movement undoubtedly makes for greater accuracy of time estimation. Both the reproduction and production estimates approximated more closely to the actual stimulus than the verbal estimates.

3) There was no significant difference between over- and underestimation using the reproduction method, e.g. for 2 seconds 50% of the Neurotics gave an underestimated response, 44% of the Normals and 48% of the Medicals did. On the production method there was a greater tendency to give underestimated responses, e.g. for 2 seconds 60% of the Neurotics underestimated, 84% of the Normals and 72% of the Medicals. Using the verbal method the trend was towards over-estimation where 73.3% of the Neurotics over-estimated the 2 second interval, 68% of the Normals and 76% of the Medicals did.

4) All verbal estimates were at least double the length of the stimuli. The verbal method in the context of this experiment appeared to promote greater inaccuracy in the direction of overestimation.

5) The use of the reproduction method of time estimation demonstrated that accuracy was more readily approached by this method, than the verbal method of measuring time estimation in neurotic and normal subjects.

This confirmed the findings of duPreez and Danziger (1963) for a normal student population.

6) Judging from overall mean estimates the Normals approach greater accuracy as a group than the other two groups. However the differences between the groups were not significant in this respect. The Normals' approach to accuracy was probably greater because on all three methods they were more consistent and more stable in their manner of estimating short time intervals.

7) Comparing these methods it was apparent that over- and underestimation trends vary considerably for the same subjects according to the techniques which were used to measure time estimation.

SUMMARY OF FINDINGS

1. Reliability Across Sessions.

1) There was a reliable relationship between estimates on initial test and retest sessions for all three groups.

2) However the Neurotics were clearly lower in the strength of their reliability measures than the other two groups.

3) The Neurotics were consistently less reliable in time estimates from session to session and this was

reflected in their accuracy measures for which the intertest correlations were very low (r = .021).

4) The longer 4 second interval was generally estimated with more reliability by all three groups.

5) The reproduction and production methods of measuring time estimation were more reliable methods to use than the verbal method of time estimation for all groups.

2. Consistency Within Sessions.

1) The Normals and the Medicals displayed an overall consistency in their estimates of different time intervals for the same methods in the same session. However the lesser stability of the Neurotics showed up again in the lower correlations particularly on the production method for both time and distance.

Thus the Neurotics' instability showed up in two general areas:

(1) Their reduced stability over sessions showed up markedly in the verbal and reproduction methods.

(2) Their lesser stability over different times in the same session showed up in the production method.

The lesser stability of the Neurotics on the

production method across times also appeared when the extent of the test-retest differences were compared. The cluster of negative correlations which appeared when correlating speed differences with estimate differences ($r = -.067$ and $r = -.150$) suggested that this was a clear illustration of their instability.

It could be expected that instability would appear more on distance and speed than on time variables because the subjects could vary their movement but not the stimulus to the same extent. Comparing the speed differences on the reproduction method (item 153) and the speed differences on the production method (item 157) it was found that these differences correlated with estimate differences (items 126-129). These relationships seemed to indicate that the bigger the speed differences for the Neurotics the smaller the time estimate differences were. This could have meant that the subjects who changed their speed with the different time intervals tended to confuse themselves and therefore became less consistent and reliable.

2) The Normals maintained a greater consistency even of differences between speeds on the different methods and times than the Neurotics. When they varied they varied consistently.

3) For the Neurotics the differences across times

may have been more crucial than the differences across methods. The Normals and the Medicals however seemed to respond more to differences across methods. It was possible that this difference arose in that the Neurotics responded more to the time and their own internal impression of what was required rather than to the letter of the instructions. In adhering more closely to the instructions the Normals and Medicals were perhaps more able to do so being freer from internal pressures which permitted them to respond more spontaneously and more accurately to the directions. Perhaps illness necessitates a greater vigilance on the part of the individual so that he is more consciously aware of his physical actions even in this limited fashion.

4) The reproduction and production method tasks were carried out at the subjects' preferred rate of movement. The production method was slightly freer in that the subject moved the handle of the linear movement apparatus for as long as he felt 2 or 4 seconds actually lasted on the verbal instruction of the experimenter. In the reproduction method the subject listened to an auditory stimulus (buzzer) which was continuous for either 2 seconds or 4 seconds and then moved the apparatus for as long as he thought it lasted. The subjects' speed of movement could have been consistent for both methods.

As stated before the whole orientation of the three groups varied considerably judging from observation of their behavior during the experiment. Basically it seems that the Normals were perhaps trying to please the experimenter by working towards some assumed standard or criterion of achievement which enabled them to be more reliable and consistent or even more realistic in their evaluation of their own performances. The Medicals were mainly concerned with getting an uninteresting task over with as soon as possible, and the Neurotics were more interested in whether the experimenter could be of some clinical benefit to them.

5) The production method of measuring time estimation was apparently more susceptible to the effects of the Neurotics' instability of time judgment in that greater variation of consistency was displayed when using this method. It is therefore contended that this method provides a more clinically sensitive technique of measuring time estimation than the other methods employed.

CHAPTER VI

RESULTS AND DISCUSSION TIME RELATED ATTITUDES, FEELINGS AND ASPECTS OF PERSONALITY

Chapter V dealt specifically with the relationships between the time variables which were assessed in this study. It was observed that Neurotics were considerably less reliable and less consistent in the manner in which they estimated short-time intervals than the Normals or the Medicals. This lesser reliability and consistency was interpreted as a manifestation of their instability in the area of time estimation. It was also noted that the production method test-retest differences and accuracy particularly demonstrated this instability in the form of low insignificant and often negative correlations between difference measures and accuracy measures.

In this chapter an attempt will be made to clarify what variables, other than time related ones, could have had some influence on the Neurotic's instability in the area of short-time estimation. Time variables were therefore correlated with variables of personal and social information, attitudes and feelings and aspects of personality as reflected in T.A.T. stories.

6.1. Stability and Accuracy.

Stability and accuracy appeared to be linked together as mentioned in the previous discussion. Stability was implicit in the test-retest differences which for the Normal group were positively and significantly inter-correlated with each other and with accuracy. This was not observed in the Neurotic group. These variables were therefore correlated with personal, social variables and feelings and attitudes and personality aspects as reflected in T.A.T. stories.

Inspection of the correlation matrices revealed few significant correlations between the above variables in either of the groups. However the few which did appear could be discussed.

Neurotic Group.

The number in the family and T.A.T. narcissism were significantly correlated with test-retest difference and accuracy on the production method (variables 4 & 127 $r = .637$, 4 & 152 $r = .559$, $P = < .05$).

The following table gives the breakdown of the numbers in the family and the position of each subject in that family.

The Neurotic group came from larger families than the Normal group (Neurotics $M = 3.63$, Normals $M = 2.76$). The

TABLE XVIII

NUMBER IN FAMILY

GROUPS	ACTUAL NUMBERS LARGER FAMILIES 11 9 8 7 6 5 4	SMALLER FAMILIES 3 2 1	MEAN NO.
Neurotics	1 4 2 7 = 14	10 4 2 = 16	3.63
Normals	1 1 1 = 3	9 9 4 = 22	2.76
Medicals	1 1 1 1 2 = 6	12 5 2 = 19	3.40

POSITION IN FAMILY

GROUPS	YOUNGER POSITION 9 8 6 5 4 3	OLDER POSITION 2 1	M
Neurotics	1 2 3 8 = 14	4 12 = 16	2.40
Normals	1 2 0 = 3	8 14 = 22	1.84
Medicals	1 1 1 4 = 7	6 12 = 18	2.15

Neurotics were also more often the younger members of their families. Position in family was also positively correlated with test-retest difference and accuracy on the production method ($r = .522$ and $r = .528$ significance just below 5% confidence level).

It appears that the subject's order of birth may have had some relevance to the manner in which he estimated short-time intervals. It may have contributed towards his being less reliable on the production method. Position in family may have influenced the attitude which one develops towards time. The Neurotic may well have suffered because of

increased distance from his parents and this may have contributed towards his instability.

T.A.T. Narcissism was also positively correlated with test-retest difference on the production method ($r = .527$). In the Normal group, who were more often the older members of their families, this was not so. A certain amount of Narcissism is necessary for good mental health and perhaps the higher one is in the family hierarchy the greater the opportunities to develop "healthy Narcissism." The oldest child is, as Freud said, "always the Crown Prince." This possibility was perhaps hinted at in the Normal group where there was a positive but not significant correlation between number in family and T.A.T. Narcissism score ($r = .437$).

Whyman and Moos (1967) found that the production method of measuring time estimation was a useful clinical index for the objective measurement of changes in affective state. In this experiment the production method did appear to be more sensitive to differences between the three groups. These differences could be described in terms of differences in clinical affective state and one could therefore support the suggestion that if this were accurate then this method might in a more refined way be used as a useful index of changes in affective state.

Normal Group.

The feeling that one would have been better off if clocks never had been invented was negatively significantly correlated with test-retest difference on the production method ($r = -.928$, $P = .01$) and also with accuracy ($r = -.770$, $P = .05$). Agreement with this statement conveys a negative attitude towards time because clocks are the mechanical symbols of time in our culture and we cannot function without them. The Normal group did not agree with this statement on the whole. This was perhaps indicative of their more positive basic orientation towards time as compared with the Neurotics. Because the Normals were more positive and more balanced in their orientation towards time they were perhaps more able to be more reliable and more consistently accurate within the limits of the experimental situation.

6.2. Time and School and Work Achievement.

Correlations reflecting a relationship between school and work achievements and attitudes were extracted from the correlation matrices. The few relationships which emerged are discussed here but the following table gives a breakdown of school standard achieved by all the subjects and the age distributions of the subjects.

TABLE XIX

SCHOOL STANDARD ACHIEVED

GROUPS	STANDARD 10		9		8		7	
Neurotics	21	70%	4	13.3%	3	10%	2	6.7%
Medicals	18	72%	2	8.0%	4	16%	1	4.0%
Normals	18	72%	2	8.0%	4	16%	1	4.0%

AGE DISTRIBUTIONS FOR ALL THREE GROUPS

AGE	NEUROTICS	MEDICALS	NORMALS
19-21	12)	7)	7)
22-27	8) 20 = 66.7%	8) 15 = 60%	5) 15 = 60%
28-33	3)	5)	5)
34-42	7) 10 = 33.3%	5) 10 = 40%	5) 10 = 40%

The majority of subjects in all three groups fall into the younger age groupings rather than the older age groupings.

There was no significant difference between the groups for school standard achieved. In the Neurotic group this item correlated with future time perspective coherence and extension score at a level just below the 5% level of confidence. (r = .504) This suggested that future time perspective could be related to the amount of formal education an individual has had. If this were so then it could be regarded as an example of a cognitive style or set operating directly towards the establishment of mature

healthy modes of thought and planning for the future. School standard achieved for the Neurotics was also negatively correlated with attitudes towards school ($r = -.541$, $P = < .05$). The negative quality was due to the rating system used and implied that the further they went in school the more favorable their attitude to school.

The amount of schooling which one is able to benefit from can often depend upon the availability of the financial means necessary to support educational endeavours. Presumably, the more education one has the better one's attitude towards school. Education increases the existential awareness of the passage of time and therefore the more one attempts to use it valuably. Perhaps this is why verbal estimates of 4 and 9 seconds (31-33) were correlated with the Neurotics' school achievement. It seems that the higher they went in school the less they were inclined to overestimate the actual times ($r = .728$, $.700$ and $.634$, $P = < .05$). This could be regarded as a further reflection of the cognitive element which does seem to enter into time estimations. It could be postulated that this cognitive element is also interfered with by the neurotic process and that it manifests itself as an increased sensitivity to the estimation of short-time intervals. These estimates then have become increasingly sensitive to variables in the Neurotic's life experience (such

as amount of schooling). The same sensitivity was not manifest in the Normal and the Medical groups.

School standard achieved was also correlated with accuracy on the 22 minutes interval but it was not a significant correlation ($r = .467$). However, verbal accuracy on the longer time interval is part of the cognitive style necessary for a successful mastery of time in our social environment. Because of the rating system used, school standard was negatively correlated with an accurate idea of time ($r = -.491$) implying that the further one has gone in one's schooling, the more accurate an idea of time one was likely to have. In this way estimation in the longer sense could appear to be an outgrowth of the development and training of higher order mental processes necessary for scholastic achievement.

For all three groups, future time perspective scores were positively though not significantly correlated with school standard achieved. The ability to plan towards the future seems dependent on the amount of education one receives for the Neurotics even more so than for the other two groups. The suggestion that future time perspective is an indication of ability to plan for the future is supported by the data. The further implication is that this ability is a direct consequence of learning and experience.

Occupation.

Because of the manner in which the groups were matched, the majority fell mainly into the same occupational grouping--semi-professional category according to Hollingshead's (1958) rating system. In the Normal group, occupation was a positive factor in being able to anticipate what they would be doing next summer ($r = .512$) and in attitude toward school ($r = .540$). In the Neurotic group occupation was correlated with future time perspective (item 26, $r = .548$). The highest professional occupation rating was designated the first in the Hollingshead system. This relationship therefore implies that the Neurotics' present occupational status influenced his perception of the future. Considering that many of the Neurotic subjects had suffered severe work difficulties because of their illness it was not surprising that the two variables were related. With unfavourable attitudes towards work and schooling the Neurotics seem already handicapped in their perception of the future.

TABLE XX

SUBJECT'S OCCUPATION--HOLLINGSHEAD INDEX

	RATING					
GROUPS	6	5	4	3	3	1
Neurotics	2	6	6	8	6	2
Normals	0	5	8	10	2	0
Medicals	1	4	2	14	4	0

6.3. Diagnosis or Severity of Illness.

Neurotics.

The subjects had been rated for relative degree of intensity of symptoms within the group itself (Item 9). It is interesting that the rating appeared to be related only to their own descriptions of overt behaviour tendencies in relation to time, such as keeping appointments and wristwatch accurately adjusted. The ratings did not relate to any of the direct measures of estimation of time duration. This draws attention to the possibility that it is in the area of feelings and attitudes towards time that there is likely to be the greatest sensitivity to neurotic processes at work and therefore the area in which we are likely to find greater difficulties for the neurotic.

Medicals.

Severity of illness, for the Medical group was positively but not significantly correlated with feeling that the days go slowly and the weeks and months fly ($r = .383$). This is commonly observed by sick people. Days drag for sick people because so little of an eventful nature takes place during the day but in retrospect, the weeks and the months have flown by because of the difficulty distinguishing one

day or one week from another. Diagnosis in this instance was positively correlated with being early for an appointment ($r = .468$) but for the Neurotic it was negatively correlated ($r = -.507$). Although these correlations were not significant, this may be symptomatic of the Neurotic's difficulty in using time realistically and appropriately. The Medicals appear to retain this capacity and are perhaps more able to view keeping timed appointments as a respectful gesture towards other people. The Neurotic is more pervaded by his own illness and less confident perhaps, that something is actively being done about it. It is generally more difficult to assess improvement in neurotic states than in more clearly defined medical states. Psychological "pain" is also more difficult to control than "physical pain" so that the neurotic's illness enters into most of his activities more so than that of the physically ill person. The medically ill person suffers from his illness. The neurotic is his illness.

6.4. Living Conditions.

6.4.1. Present Living Conditions--Item 12.

This merely indicated whether the subjects were presently living alone or in a family home.

TABLE XXl

	HOME		ALONE	
NEUROTICS	20	66.7%	10	33.3%
NORMALS	22	88.0%	3	12.0%
MEDICALS	22	88.0%	3	12.0%

6.4.2. Past Living Conditions i.e. Whether Brought Up in Home or Institution

Brought Up at Home--Item 12.

The following table shows the relationship between being brought up at home and time measures and methods.

TABLE XXll

NEUROTICS

	F.T.P.		22.	VERBAL			REPROD		PROD		EST. DIFFERENCES REPROD		EST. DIFFERENCES PROD		ACCURACY REPROD		ACCURACY PROD	
	25	26	27	29	31	33	35	37	43	45	122	123	126	127	145	147	149	151
12	-.152	-.246	.173	-.131	-.101	-.006	-.171	-.107	.502	-.110	.107	-.020	-.104	-.032	.669	-.119	.012	.005

NORMALS

12	.200	.003	-.185	.359	.143	.097	-.032	.018	-.079	-.131	.047	.100	-.069	-.083	-.021	.018	-.079	-.137

MEDICALS

12	.265	.171	.180	-.231	-.180	.113	.235	.394	.633	.627	.316	.654	.577	.620	.235	.394	.633	.627

For the Neurotic group, being brought up at home, correlated with the 2 second time estimate on the production method and accuracy on the reproduction method ($r = .502$ and $r = .669$, $P = < .05$). For the Medical group it correlated with the 2 and 4 second time estimates using the production method ($r = .633$ and $r = .627$, $P = < .05$) and also with accuracy on the production method ($r = .633$ and $r = .627$, $p = < .05$).

Having been brought up at home rather than in any kind of institutional or foster care was negatively correlated with feeling anxious and distressed when uncertain of the time. Subjects with a stable home background did not feel abandoned or alone when they could not accurately locate themselves in time. It was also negatively correlated with the long interval of 22 minutes accuracy ($r = -.423$ but not significant) and T.A.T. Narcissism. One might have hypothesized that for those who had been brought up at home there is a greater reliance upon internal resources and perhaps less dependence on external reassurances

such as clocks for a sense of stability.

Being brought up at home was positively correlated with a T.A.T. achievement ($r = .584$, $P = < .05$) and accuracy for 2 second on both production and reproduction methods ($r = .502$ and $r = .669$, $P = < .05$) was also positively but not significantly correlated with wearing a watch. Thus, the motivation to do well becomes associated with accuracy on these measures in connection with being brought up at home. There is a curious possible contradiction in these data. The secure "home reared" person is less dependent on external sources of time for his sense of security in "time-space," yet he is more likely to be wearing a watch. Possibly the stability of the time-space world of the well adjusted allows the wearing of a watch without it acting as a constant reproachful reminder of the rapid passing of time or a source of pressure to get organised, which it may be for the chronically disorganised neurotic. For the well-adjusted it is simply a helpful instrument, not a phantasy laden almost persecutory object.

For both Neurotics and Medicals, being brought up at home, was correlated with accuracy on the reproduction method ($r = .669$, $P = < .05$--Neurotics; $r = .394$ not significant--Medicals). For the Medical group, it was also correlated with production method estimates of accuracy (e.g., $r = .627$ and $r = .633$, $P = < .05$) and with other direct measures of time estimation. Principally, production estimates in time and distance moved, e.g., 2 seconds time, $r = .633$; distance, $r = .691$; 4 second time, $r = .627$; and distance, $r = .695$, $P = < .05$. In all three groups the majority of subjects were brought up at home. One of the Normals grew up in a foster home only and two of the Neurotics and two of the Medical group.

6.5. Attitudes Towards School Work and Time--Items 12, 14, 15, 18, 10.

6.5.1. School

As stated earlier the subjects had been matched for school achievement. However it was observed that the further the subjects had gone in school the more favourable their attitude towards school seemed to have been. The subjects had been requested to report to the examiner what their attitude towards school had been while they were at school.

TABLE XXIII

ATTITUDE TOWARDS SCHOOL

GROUPS	FAVOURABLE		UNFAVOURABLE	
Neurotics	14	46.7%	16	53.3%
Normals	20	80.0%	5	20.0%
Medicals	17	68.0%	8	32.0%

$X^2 = 6.84$ d.f.2 P = .05

6.5.2. Work Attitude.

TABLE XXIV

WORKING STATUS

	NEUROTIC	NORMAL	MEDICAL
Sick Leave	33.3%	0	24%
Resigned	6.7%	0	0
Dismissed	40.0%	0	0
Part Time Employment	10.0%	4%	40%
Annual Leave	3.3%	0	0
Housewives	6.7%	12%	0
Full Time Employment	0	84%	36%

PRESENT ATTITUDE TOWARDS WORKING

GROUPS	FAVOURABLE	UNFAVOURABLE
Neurotics	7 (23.3%)	23 (76.7%)
Medicals	19 (76.0%)	6 (24.0%)
Normals	17 (68.0%)	8 (32.0%)

$X^2 = 8.409$ d.f. = 2 P = .02

The Medicals and the Normals fell within a similar group but the Neurotics were clearly not in the same group; thus, contributing greatly towards the rejection of the null hypothesis in this instance.

One can immediately see that the high rate of employment for the Normal group was a direct reflection of the method of selection of the members of the sample. However, the 40% dismissal rate for the Neurotics was a direct reflection of their unfavourable attitude towards working, itself symptomatic of their illness.

Only 32% of the Normal group voiced an unfavourable attitude toward their work experiences on the whole, whereas 76% of the Neurotic group do. Pressure of time was correlated with age for the Normal group (in present day society, this is probably to be expected, especially when it becomes apparent that 84% of the Normal group were in full time employment).

TABLE XXV

WORK CONSISTENCY RECORDS

GROUPS	GOOD		FAIR		POOR	
Neurotics	11	36.7%	10	33.3%	9	30%
Medicals	19	76.0%	3	12.0%	3	12%
Normals	21	84.0%	4	16.0%	0	0%

There was a closer affinity between the Normals and the Medicals than between either of these two groups and the Neurotics. The nature of psychological illness had already been shown to effect work attitudes. These findings suggest it is of sufficiently long standing to have had a detrimental effect on the work history of the Neurotic subjects in comparison with the Normals and the Medicals. Grouping the fair and poor categories together, 63.3% of the Neurotic subjects had such work records, while 24% of the Medical group and 16% of the Normal group had poor work records. There was a greater tendency on the part of the Medical group towards a poor to fair work record than for the Normal group but it was still very much less so than for the Neurotic group. As far as one could ascertain, there was no suggestion of structured psychological illness in the physically ill group. (One cannot deny the possibility that sometimes psychological health can be maintained at the price of a transitory physical illness serving a decompensatory purpose.)

Seventy-six percent of the Neurotic group voiced an unfavourable attitude to their work experiences on the whole. This was not surprising in view of the fact that their illness was probably interfering with their attitudes towards work, although not necessarily with their previous efficiency at work, as can be seen from the brief description of the

subjects in Appendix B. But age did correlate negatively with attitude towards work ($r = -.714$, $P = < .05$) indicating perhaps an accumulation of failure over the years. On the whole, their work consistency records are also poorer than that of the other two groups.

The majority of the Neurotic group (76%) had an unfavourable attitude towards their work. The majority of the Neurotic group also had symptoms suggestive of depression and anxiety.

The Normals had by far the best work records, 84%--good; Medicals, 76%--good; Neurotics only 36.7%. These records were positively correlated with the body tempo measure of tapping speed ($r = .567$, $P = < .05$) and the other body tempo measure of circle drawing difference between initial test and retest ($r = .577$, $P = < .05$). Consistency in work, verbal time estimation and body tempo are linked together. As mentioned above, illness in the Medical group has interfered with work consistency in this group but not to the same extent as in the Neurotic group.

6.5.3. Attitude Towards Time.

TABLE XXVI

ATTITUDES TOWARDS TIME AND SPEED OF TIME PASSING

GROUPS	FAVOURABLE		UNFAVOURABLE	
Neurotics	9	30%	21	70%
Normals	24	96%	1	4%
Medicals	22	88%	3	12%

$X^2 = 10.598$ d.f.2 P = .01

SPEED OF TIME PASSING

GROUPS	FAST		SLOW		DON'T CARE	
Neurotics	15	50%	8	26.7%	7	23.3%
Normals	17	68%	8	32.0%		
Medicals	16	64%	8	32.0%	1	4.0%

From the above, it can be seen that both the Normal and the Medical group had predominantly favourable attitudes towards time which were not shared by the Neurotic group. The tendency was for most subjects to see time as passing by too quickly but less so in the Neurotic group where 23.3% felt they were not concerned with the passing of time. Not being able to use time profitably for the neurotic, means not being able to keep up with it. In this way, he is then either over concerned or attempts to ignore it completely (23.3%). Clinical contact with the members of this group confirmed

this impression.

6.5.4. Intellectual Rating--Item 20.

The Ravens Progressive Matrices (South African Air Force Form) was administered to all subjects individually. The following table shows the distribution of the raw scores for the subjects in the three groups and also the mean scores for the groups.

TABLE XXVII

DISTRIBUTION OF RAVENS PROGRESSIVE MATRICES
RAW SCORES - MAXIMUM 38

SCORE	NEUROTICS		MEDICALS		NORMALS	
5-9	2	6.7%	0		0	
10-14	4	13.3%	0		1	4%
15-19	9	30.0%	7	28%	1	4%
20-24	4	13.3%	8	32%	13	52%
25-29	8	26.7%	6	24%	8	32%
30+	3	10.0%	4	16%	2	8%
	N = 30		N = 25		N = 25	

MEAN SCORES

NEUROTICS		NORMALS		MEDICALS	
SCORE	S.D.	SCORE	S.D.	SCORE	S.D.
20.20	6.81	24.16	3.90	23.48	4.86

Normals and Neurotics t = 2.58 P = .05

A significant difference was noted between Neurotics

and Normals on the Ravens Matrices raw scores ($t = 2.58$, $P = .05$). Anxiety is known to reduce intellectual performance (Wechsler, 1958) and the Neurotic subjects were far more agitated about doing this task than any of the other subjects. There was no difference in level of educational achievement between the groups, and there were two exceptionally well qualified subjects in the Neurotic group. Nevertheless their Ravens scores were lower than that of the Normal group and therefore, the significant difference between them was observed as stated above. One can only postulate that their illness could have influenced these neurotic subjects' on the Ravens Matrices, detrimentally.

It could also be noted that the Neurotics were more often the younger members of their families. The possibility that the younger members of the family are less exposed to intellectual stimulation in the family environment than older children and therefore perform more poorly on the Ravens, could be considered in this connection. Russel Davis (1957, p. 136) suggested that birth order might have some influence on intellectual development. It seems that only children and children first and last in order of birth occupy a favourable position. He feels that the most probable explanation for this is that they gain from a close relationship with their mothers.

Twelve of the Neurotic group of 30 were the first children. The majority were not first or last children. They might well have suffered as a consequence of increased distance from their mothers, more so than the other two groups. The Normal group had 14 out of 25 first children. But normal families on the whole were smaller, 22 coming from families of three and below.

6.6. Future Time Perspective.

As already described in Chapter IV future time perspective was measured in two different ways. The one method required the subjects to complete a number of stories which were started by the examiner. The second method required the subject to actively project himself into the future and list 10 major events which he felt might happen to him in his life time. After doing this he was required to arrange them in what he regarded as a possible logical sequence of events. It is in the second area that the Neurotics had the most marked difficulties.

Future Time Perspective Scores.

TABLE XXVIII

FUTURE TIME PERSPECTIVE MEAN SCORES

		NEUROTICS		NORMALS		MEDICALS	
		M. SCORE	S.D.	M. SCORE	S.D.	M. SCORE	S.D.
Item 22		4.57	1.76	4.80	1.76	5.16	1.84
23	I	10.73	3.69	14.56	2.77	14.72	1.62
24	I	15.30	4.16	19.40	3.62	19.96	2.51
25	II	6.17	2.97	8.68	1.38	8.56	1.64
26	II	13.83	7.54	28.92	5.82	26.08	6.88

t TESTS FOR SIGNIFICANT DIFFERENCE BETWEEN MEANS

		NEUROTICS AND NORMALS
	t	
Item 24	3.86	P = .01
25	3.89	P = .01
26	8.17	P = .01

The Neurotic group's difficulties around projecting themselves into the future were clearly highlighted by the sharp difference between their mean scores and that of the Normal group (t = 3.86 and t = 3.89 and t = 8.17). The last two items (25 and 26) above were concerned with the major events which the subjects thought might happen to them in the future. All subjects were asked to try and predict 10 major events which they thought might occur to them in their life time. The Neurotic subjects, as a group, all had surprising

difficulty coping with this task, and very many were unable to reach 10 (Item 25). In fact, all subjects had greater difficulties with this than with the story completion task, but the Normal group subjects and the Medical group subjects were more successful at overcoming it.

The Neurotics are able to perform slightly better in the more structured, and directed story completion tasks. However, in the task to test for the density and coherence of events with which the future appears to be populated, they were left entirely to their own resources and could not cope with this type of task. Therefore there is a highly significant difference between the Normals and Neurotics on this test ($t = 8.17$).

These results also indicate just how useful and valid this future events test (taken from Kastenbaum, 1961) is for discriminating between Normals and Neurotics in this context.

The Neurotic's inability to extend his thinking about himself may also be considered a reflection of his unhealthy commitment to the past. Many Neurotic subjects expressed the desire to live their childhood over again and remake their lives. This may well have also implied the wish for the passive protected existence of a phastasised "golden childhood."

The observation that the Neurotics also performed better in the initial more structured and time limited story completion tasks could perhaps also carry a further assumption. Were therapists for these patients more cognisant of the necessity for providing more clearly defined structure within the limits of which the neurotic could learn to function efficiently, they would be better able to see the gradual realisation of more ambitious goals for treatment.

6.7. Personality Variables and Self-Description in Relation to Time Attitude and Feelings.

6.7.1. Thematic Apperception Test Stories Items 76-81.

T.A.T. stories were rated on a 6 point scale for each of the following expressions of emotion:-

Achievement, Aggression, Sex, Abasement, Nurturance and Narcissism.

T.A.T. score differences discriminate quite well between Neurotics and Normals. The Lindzey & Goldberg (1953) scoring system used serves to objectify the data derived from the T.A.T. stories in what appears to be a consistent and reliable fashion.

TABLE XXIX

T.A.T. STORIES, ITEMS 76-81

ITEM	T.A.T. EMOTIONS	NEUROTICS Mean Score	NEUROTICS S.D.	MEDICALS Mean Score	MEDICALS S.D.	NORMALS Mean Score	NORMALS S.D.
76	Achievement	9.50	3.02	9.64	1.98	10.16	2.15
77	Aggression	16.43	4.92	11.68	2.23	11.48	2.57
78	Sex	10.63	4.41	9.08	1.63	10.44	2.10
79	Abasement	14.57	3.70	10.52	1.85	12.68	4.22
80	Nurturance	9.67	1.90	11.88	2.07	16.96	4.47
81	Narcissism	12.13	2.60	11.48	2.18	14.96	3.43

TESTS TO TEST FOR SIGNIFICANCE BETWEEN MEANS OF T.A.T. SCORES

T.A.T. EMOTIONS	NORMS & NEUS.	MEDS. & NEUS.	NORMS & MEDS.
Achievement	2.31*	1.37	0.89
Aggression	4.90*	4.83*	0.29
Sex	0.06	1.52	2.55*
Abasement	2.04	5.52*	2.34*
Nurturance	8.58*	4.90*	5.16*
Narcissism	3.28*	1.34	4.28*

* 2.052 P = < .05

The Neurotic group had the highest mean score on aggression and the lowest mean score on achievement. The Medical group had their highest score on nurturance, and aggression next but it is very much lower than the Neurotic score. The Medical score's lowest score was on sex. The Normal group's highest score was on nurturance and their lowest on achievement, although their achievement score is

the highest of all the three groups.

The order of scores for the three groups was as follows, ranging from the highest to the lowest:

NEUROTICS	MEDICALS	NORMALS
Aggression	Nurturance	Nurturance
Abasement	Aggression	Narcissism
Narcissism	Narcissism	Abasement
Sex	Abasement	Aggression
Nurturance	Achievement	Sex
Achievement	Sex	Achievement

The fact that achievement scores feature so low in all the groups was probably a consequence of the nature of the stimulus content of the T.A.T. cards which are generally depressive in affective tone. Very few achievement ratings above 1 were earned on any of the cards except No. 1 (the boy and the violin) for all three groups.

Medical and Normal groups head the list with nurturance and the Neurotics with aggression. There was much evidence in the T.A.T. protocols that the neurotic patient was in a state of egocentric concern with his problems; and the normal individual was more concerned with fostering the care of others as well as himself. It is possible that the guilt attached to the aggression which appears so near the surface for the neurotics was responsible for the high abasement score.

As this was a neurotic group, it was not surprising to find that the highest mean score was on aggression. At

the peak of an illness marked by depression and anxiety, it was also not strange to find that achievement was the lowest. Realistic ambition is difficult under the circumstances of this type of illness and its lack can, in itself, be symptomatic.

6.7.2. T.A.T. Scores and Time Variables.

Neurotics.

Achievement was positively correlated with Nurturance score ($r = .570$, $P = < .05$). It also seems related to using time profitably and it was correlated with accuracy on 2 seconds using the reproduction method ($r = .839$, $P = < .01$). This was a highly significant correlation. Achievement was also significantly correlated with accuracy on the 22 minute long time interval ($r = .557$).

In order to attain ambitions in life it is necessary to be able to plan realistically and use time profitably. In the Neurotic group both achievement and accuracy scores were lower than for the Normals. It is possible that lower achievement orientation in the Neurotics could have an influence on the accuracy and consistency with which they estimate both short and longer time intervals.

Aggression which was higher for the Neurotics than the other two groups was significantly correlated ($r = .587$,

P = < .05) with the feeling that when one wakes up it's as though one has only just gone to sleep. Neurotics do have sleep difficulties which in themselves can emphasise their awareness of their own feelings and the acuteness with which they feel them.

Achievement and nurturance were positively correlated at a significant level (r = .570, P = .05). Nurturance was also related to accuracy on the 22 minute interval and reproduction 2 seconds (r = .629 and r = .547, P = .05; r = .629 and r = .547, P = .05).

Both achievement and accuracy were lower in the Neurotic group than in the Normal group. In addition the Neurotics were very high on aggression scores. In these findings might well lie the reason for the Neurotics' poorer performance in the area of time estimation in this study. His reduced accuracy which appears to be related to low achievement orientation might also have been aggravated by his apparently intensified aggression feelings. The more aggression an individual feels, the more one might expect him to behave in a physically aggressive fashion in a setting where it is appropriate to do so. This situation did demand this. The subject was required to grip the handle and move it along in a forward thrusting movement. Many subjects did appear to be attacking the apparatus during this procedure

and two subjects succeeded in breaking the cord (neurotics).

6.7.3. Self Description.

The subjects were read a list of statements to each one of which they had to indicate whether the statements described how they felt. They could agree, disagree or not commit themselves to an answer, in each instance.

The statements were all regarded as revealing or implying attitudes or feelings which could be associated with time in the general sense.

6.7.3.1. Memory for Time Items 86, 91, 97 and 101.

Statements revealing attitudes and feelings about time.

TABLE XXIX

MEMORY FOR TIME, ITEMS 86, 91, 97, 101

		MEDICALS		NEUROTICS		NORMALS	
ITEM	X^2	AGREE	DISAGREE	AGREE	DISAGREE	AGREE	DISAGREE
86	2.329°	13-52%	12-48%	23-76.7%	7-23.3%	14-56%	11-44%
91	8.788*	1- 4%	24-96%	12-40.0%	18-60.0%	4-16%	21-84%
97	0.476	16-64%	9-36%	24-80.0%	6-20.0%	18-72%	7-28%
101	1.952	16-64%	9-36%	16-53.3%	14-46.7%	9-36%	16-64%
		46%	54%	75%	45%	45%	55%

* P = .02 ° P = .30

There was little difference between the groups in

terms of overall agreement and disagreement. However, there is a marked difference on Item 91--i.e., having many memories of childhood events which seemed as though they might have taken place only yesterday. The majority of the Neurotic group stated that generally they had poor memories for past events. This was more marked than in the Normal or Medical groups as evidenced by the greater number of the Neurotic group who had difficulty remembering the days or the dates of important events. X^2 = 8.788 d.f.2 P = .02 distinguishes well betweeen these subjects. Agreement with the statement that one has a poor memory for past events in one's life was maintained by 40% of the Neurotic subjects as against 4% of the Medicals and 16% of the Normals. Statement 86--difficulty remembering the day or date is the next most discriminating item. X^2 = 2.329, P = .20. 76.7% of the Neurotics agreed that they had this difficulty as against 56% of the Normals and 52% of the Medicals.

6.7.3.2. The Neurotics.

The majority of subjects agreed that they often had difficulty knowing the day of the week or the date (23 out of 30). Most subjects felt that they did have poor memories for past events on the whole (18 out of 30). They said that they had many memories of childhood events which seemed as

though they might have happened only yesterday (24 out of 30). It would seem that the Neurotic subjects are either closely attached to and perhaps bound up in the world of their childhood or else, they have been well trained as psychiatric patients to recall past events.

In the test session when asked what the day and date were, 50% of the subjects were correct. Although 73% agreed that they usually had difficulty remembering the day or the date. In this small instance, the Neurotic's account of his behaviour does not agree with objective assessment. A greater number of them do remember the day and the date than they themselves believe they do.

Having memories of childhood events that seem as though they had only happened yesterday correlated with accuracy on the reproduction method for 4 seconds ($r = .652$, $P = < .05$). A general trend towards accuracy seems to be suggested here where the accuracy of the subject's estimates is related to his subjectively accurate recall of childhood events. This does not mean that the subjects recall of the past is necessarily accurate but many childhood events stand out vividly in his memory. This item also correlated significantly with having a hard time getting started on things ($r = .554$, $P = < .05$).

It should be remembered that these are subjective

reflections of feelings and impressions which the subject had about himself. Certainly the manner in which an individual views himself in his environment is as significant for him as the reality of it and a direct reflection of his particular life style.

6.7.3.3. The Medical Group.

In the Medical group having a poor memory for past events was significantly correlated with the extent of the verbal test-retest differences for 4 and 9 seconds ($r = -.870$ and $r = -.751$ significant at 1% level of confidence). This suggested that these subjects might have been appraising themselves quite realistically in this context. Poor memory was negatively correlated with accuracy of reproduction. The reproduction technique in itself involved being able to recall the approximate duration or length of the auditory stimulus and memory is a prerequisite. Possibly the subjects had generalised this statement, (poor memory for past events) to cover recent as well as distant aspects of recall.

In the Medical group having a poor memory for past events was consistently negatively and significantly correlated with the verbal estimates of the short 2, 4 and 9 second intervals. The verbal method also required the subjects to listen to an auditory stimulus and then state how long

they thought it was. Memory was also a prerequisite in this technique.

6.7.4. Feelings About Childhood.

The only item in this category which revealed differences in feelings about childhood between the groups was Item 87.

TABLE XXX

Item	AGREE	DISAGREE	DON'T KNOW
	N E U R O T I C S		
87	17 - 56.3%	11 - 37%	2 - 6.7%
	N O R M A L S		
	21 - 84.0%	3 - 12%	1 - 4.0%
	M E D I C A L S		
	17 - 68.0%	8 - 32%	--

$X^2 = 5.389$ d.f.2 P = .10

6.7.4.1. Neurotics.

The item which discriminated between the groups in this category was 87, i.e., having had a happy childhood.

A greater percentage of the Neurotic subjects did not feel that they had had a happy childhood than in the other groups. 84% of the Normal subjects felt that they had had a happy childhood but only 68% of the Medical group did and 56.3% of the Neurotic group. For the Neurotics, having a

happy childhood meant an unreal childhood ($r = .597$, $P = .05$). If a happy childhood is one in which the neurotic can only look back on as unreal, perhaps it is only unreal in contrast with the difficulties in their present life.

In the Neurotic group the mother being dominant was significantly correlated with the 4 second estimate on the reproduction method ($r = .598$, $P = < .05$). 60% of the Neurotic subjects felt that their fathers were very dominant personalities whereas only 30% felt that their mothers were dominant. Of the number who thought that their mothers were highly dominant personalities, themajority had voluntarily left home before it was necessary to do so. This suggests that the forcefulness or dominance of the parents is a factor in the moulding of a general "weltanschaung" of which time perception is an important constituent. No doubt having a dominant mother could also affect the sense of domination over time. 44% of the Medical group said that they had very dominating mothers; 40% of the Normal group and 30% of the Neurotics. Domination of the father in the Neurotic group correlated with feeling guilty when late ($r = .429$--not significant). The latter finding serves to remind us of the often underemphasised role and importance of the father in the development of neurotic illness. If psychoanalytic thinkers propose that the development of the superego is

largely derived from the father's role in the child's development, then this relationship is most appropriate. 60% of the Neurotic group describe their fathers as being dominant; 48% of the Medicals and 36% of the Normal group. It is of clinical interest that where the father's dominance is felt most strongly, it should also be associated with feeling guilty about being late (only slightly late) for appointments. Additional corroboration would be required to support this but the clinical picture presented by many of the Neurotic subjects is supportive evidence, as is the finding that on the T.A.T., the second highest score for the Neurotics was on abasement; and self-abasement arises from low self-esteem, very often accompanied by much guilt about aggressive feelings.

6.7.4.2. The Neurotic's Feelings About Childhood.

TABLE XXXI

FEELINGS ABOUT CHILDHOOD

	% AGREEMENT			% DISAGREEMENT			% DON'T KNOW		
ITEM	NEURS	NORMS	MEDS	NEURS	NORMS	MEDS	NEURS	NORMS	MEDS
87	56.3%	84%	68%	37.0%	12%	32%	6.7%	4%	--
88	23.3%	20%	16%	76.7%	80%	80%	--	--	4%
103	20.0%	24%	12%	76.7%	76%	88%	3.3%	--	--
104	60.0%	36%	48%	36.7%	60%	52%	3.3%	4%	--
105	30.0%	40%	44%	70.0%	60%	56%	--	--	--

The majority of subjects did not want to relive their childhood. (When they did feel that they wanted to, it was so that they could have a "second chance"). They also did not feel that their mothers were particularly dominant but 60% felt that their fathers were unpleasantly dominant personalities. Only 30% said the same of their mothers. The majority of subjects, 76.7%, felt that their childhood days were very real. One has the picture of the neurotic as having a negative attitude towards his childhood although he likes to regard it as a happy period. He is either denying his problems or alternatively, the defenses which were successfully applied in those days, are no longer applicable in adulthood. Having had a happy childhood correlated with a feeling that childhood days were unreal ($r = .597$, $P = < .05$).

It seems that the longer time interval estimates were more likely to be related to variables in the realm of personality and affect than the short time estimate. It is necessary to recognise that we may be dealing with different types of processes. This does not mean that they are unrelated. But Broadbent (1958) for instance, hypothesised that there is a distinction between short term memory and long term memory. Short term memory, he described as being a function of neurological intactness, long term memory as a function of selective storage, availability of experience,

affect and personality integration. Perhaps time estimation of short and long term periods could be approached in the same way.

53% of the Neurotics described themselves as having many memories of events which seemed as though they might have taken place only yesterday. Perhaps many of the Neurotics subjects who did this, did not want to relive their childhood. However, those who were inclined to be obsessional could not really resist the temptation to do it all over again to make it right (46.7%) it seems.

Childhood days perceived as unreal correlated negatively with test-retest differences on verbal estimation for 2 and 4 seconds respectively ($r = -.696$, $r = -.514$, $P = < .05$). Perhaps if the subjects had a feeling of unreality about their own childhood, this feeling would also apply to other areas. If this were so and one had a tendency towards feelings of unreality, it would be difficult to retain and maintain an accurate idea of time. This perhaps, applies more to short time intervals than longer time intervals. The response to the statement of having had a happy childhood distinguishes the Neurotic from the Normal and Medical groups. X^2 5.389 implies a rejection of the null hypotheses. A far greater percentage of Neurotic subjects reported not having had a happy childhood.

6.7.5. Speed and Pressure of Time.

TABLE XXXII

SPEED AND PRESSURE OF TIME

ITEM	X^2	NEUROTICS AGREE	NEUROTICS DISAGREE	NORMALS AGREE	NORMALS DISAGREE	MEDICALS AGREE	MEDICALS DISAGREE
93	.005	23-76.7%	7-23.3%	19-76%	6-24%	19-76%	6-24%
94	.804	12-40.0%	18-60.0%	12-48%	13-52%	14-66%	11-44%
90	.777	14-46.7%	16-53.5%	8-32%	17-68%	11-44%	14-66%
98	1.427	18-60.0%	11-36.7%(1)3.3%	10-40%	15-60%	13-52%	12-48%
99	.292	20-66.7%	10-33.3%	16-64%	9-36%	19-76%	6-24%
111	.333	23-76.7%	7-23/3%	16-64%	9-36%	17-68%	8-32%
116	3.050	26-86.7%	4-13.3%	13-52%	12-48%	14-66%	11-44%
117	.423	8-26.7%	22-73.3%	9-36%	16-64%	8-32%	17-68%
115	1.426	17-56.7%	13-43.3%	9-36%	16-64%	14-66%	11-44%
119	1.262	24-86.7%	6-13.3%	17-68%	8-32%	24-96%	1- 4%
85	4.332	10-33.3%	20-66.7%	2- 8%	22-88%(1)4%	3-12%	22-88%
106	5.332*	10-33.3%	20-66.7%	1- 4%	24-96%	5-20%	20-88%
102	.403	14-46.7%	15-50.0%	10	15	13-52%	12-48%
		219-56.0%	169-43.0%(2)1.0%	142-43.7%	182-56%(1).3%	174-54%	151-46%

X^2 = 5.332 d.f.2 P = .10

Item 106 - The feeling that one would be better off if clocks had never been invented probably reflects a denial of reality. Clocks are the mechanical symbols of many aspects of time in our culture and to believe that we would today organise our lives without them is a denial of reality. Only 4% (1 subject) in the Normal group, felt this. However 33.3% of the Neurotic subjects (10 out of 30) did, and 20% of the Medical group felt this quite strongly.

6.7.5.1

With $X^2 = 5.332$ (d.f.2, P = .10), responses to this item were not drawn from the same population and it discriminates between the groups. The Medical group falls between the Neurotic and Normal groups. They were relatively consistent in their attitude towards this aspect of time, since those who wished they lived in a world without time also tend to feel that they would have been a lot better off if clocks had never been invented (r = .431). Presumably, in order to be good at saving time, one has to be very much aware of time and organise one's activities well within the limits of the time one has at one's disposal. Perhaps, this reflects the Normal group's greater capacity to use even the very short time intervals more profitably.

The belief that we would have been better off if clocks had never been invented was significantly correlated with a range of time measures for the Normal group (Items 106 and 124, 125, 128, 139-140, 151-152, 155, 157, 163-164, 44-50). It was noteworthy that these relationships include only distance and speed measures on the reproduction method but time and distance and speed measures and speed differences on the production method.

This supports the previous contention that for the Neurotics the differences between estimates was more dependent

on the distance rather than the actual timing, i.e., the Neurotics anchor their estimates in terms of the distance rather than time. Distance enters into speed more crucially for them than time. Many of the Neurotics voiced their feeling about clocks very strongly and it well reflects their antagonistic feeling towards time. This manifested itself as a pedantic over-concern with time or extreme lack of concern about time and an inability to balance their feelings about time.

Table XXXIII shows with which other variables the belief that we would have been better off if clocks had never been invented, was correlated for all three groups.

At no time does one assume that normal people are free from the necessity of adopting psychological defenses as part of their life style. Therefore the group of Normal subjects should not be regarded as any more free of psychological defences than any other group. However, in contrast to the Neurotic group, they use their defences adaptively.

It would appear that both physical and psychological illness in itself has an affect on one's attitudes towards time. The world of the physically ill, especially the bedridden, shrinks to an area immediately surrounding the bedside. The affect of this is isolation from many of the time pressures of our society while they are confined to bed. The

This table shows with other variables the belief that we would have been better off if clocks had never been invented, was correlated for all three groups.

TABLE XXIII

NORMALS

	44	45	46	47	48	49	50	85	98	110	124	125	128	139	140	151	152	153	155	157	163	164
106	-.746	-.555	-.777	-.839	-.971	-.824	-.951	-.071	-.167	-.468	-.940	-.953	-.928	-.669	-.677	-.555	-.770	-.736	-.802	-.720	-.719	-.692

NEUROTICS

106	.043	.085	.092	-.310	-.037	.039	.066	.700	.397	.189	-.376	-.290	-.123	-.236	-.126	.198	-.036	.004	-.100	.117	-.234	-.200

MEDICALS

106	.099	.109	-.323	-.219	-.221	-.221	-.208	.431	.080	.089	.081	-.091	.100	-.156	-.019	.106	.021	.433	-.034	.175	-.107	-.042

recovery process for the patient is often made difficult by having to give up the personally related and unpressured time expectations of the sick bed, for the impersonal rush of the work-a-day world. The medical subjects were seen during this latter stressful period. This may be the reason for the extent of their agreement with many of the attitudes of the Neurotic group in this section. Neurotics show 56% agreement with these statements; the Medicals, 54% and the Normals, 43.7%.

A considerable number in all three groups stated that while the days go slowly, the weeks and months fly. This was probably a reflection of the lack of varied experience in their daily lives. Most of the Normal group had routine jobs and this high consensus of agreement was probably a reflection of this. The difference was that the Normal group were not complaining about that and although welcoming diversion, did not seem to suffer for lack of it.

6.7.5.2. <u>The Neurotics</u>.

The majority of subjects agreed that they wasted time a lot (86.7%). This was also correlated with feeling guilty when a little late ($r = .578$, $P = < .05$). Feeling pressed for time was correlated with feeling guilty for sleeping late ($r = .521$), as well as with speed and accuracy

variables for the reproduction method. In this general category, reproduction method measures seem to be particularly sensitive. 46.7% of the subjects felt that they were more pressed for time than most people. Pressure of time also correlated with having a dominant mother ($r = .544$, $P = < .05$).

The guilt about time, as mentioned above, tends to be related to the father while the pressure of time is related to the mother. One could speculate that the mother, in teaching the child how to deal with life, is enabling him to learn how to organise, and the father how and what to feel guilty about. The mother also helps the child to learn to cope with the demands of the father.

The wish to live in a world without time was correlated with the wish that clocks were never invented ($r = .700$, $P = < .05$) and the feeling that time drags and a few minutes often seems like hours. 33.3% of the subjects felt this while 76.7% felt that the days drag but that the weeks and months fly. This clarifies the difficulty that the neurotics have in maintaining a balanced perspective on time: It is long and dragging but in retrospect, they do not know where it has fled. This feeling is not a pleasant one and arouses anxiety. They seem to be consistent in their feeling that they are not using their time profitably.

The Neurotic's attitude to school (which was mostly

unfavourable) correlated significantly and negatively with being impatient to wait ($r = -.557$, $P = < .05$). This implies that those who had a favourable attitude towards schooling were not likely to become very impatient if they were required to wait a short while suggesting a higher frustration tolerance.

The relationship between the father being dominant and the feeling of being more pressed for time than most people ($r = .544$, $P = < .05$) again stresses the significant role of the father in the realm of attitudes towards time.

6.7.6. Organization of Time.

TABLE XXXIV

ORGANISATION OF TIME

ITEM	X^2	NORMALS AGREE	NORMALS DISAGREE		NEUROTICS AGREE	NEUROTICS DISAGREE	MEDICALS AGREE	MEDICALS DISAGREE
82	7.343	6-24%	19-76%		9-30.0%	21-70.0%	11-44%	14-56%
83		20-80%	5-20%		22-73.3%	8-26.7%	23-92%	2- 8%
107	4.855	22-88%	2- 8%	(1)4%	19-63.3%	11-36.7%	19-76%	6-24%
110	5.413	21-84%	4-16%		11-36.7%	19-63.3%	18-72%	7-28%
113	5.718	10-40%	14-56%	(1)4%	20-66.7%	10-33.3%	6-24%	19-76%
114	.523	12-48%	13-52%		11-36.7%	19-63.3%	10-40%	15-60%
118		0	25-100%		5-16.7%	25-83.3%	7-28%	18-72%
120	4.395	11-44%	14-56%		20-66.7%	10-33.3%	18-72%	7-28%
121	.180	19-76%	6-24%		20-66.7%	10-33.3%	13-52%	12-48%
108	6.750	6-24%	18-72%	(1)4%	22-73.3%	8-26.7%	10-40%	15-60%
92	2.737	14-56%	10-40%	(1)4%	22-73.3%	8-26.7%	8-32%	17-68%
84	1.140	6-24%	19-76%		7-23.3%	23-76.7%		
		147-49%	149-49.7%	(1)3%	188-52.2%	172-47.8%	150-50%	150-50%

Item	X^2	d.f.2	P
82	7.343		.05
110	5.413		.10
113	5.718		.10
108	6.750		.05

6.7.6.1.

There was no significant difference between groups in organisation of time as reflected in the summed scores above. However, there were significant differences in some of the individual items.

Getting up at the same time daily, whether necessary or not applied more to the Medicals (44%) than to the other two groups (X^2 = 7.343 d.f.^{2} P = .05), and least to the Neurotic group, 24%.

It seems that all groups have difficulties with organising time. 73.3% of the Neurotics; 56% of the Normals and 40% of the Medicals find it very hard to get started on doing things. In the Normal group this was negatively correlated with having a dominant mother (r = .645, P = < .05) but in the Medical group it was positively correlated with having a dominant mother (r = .428 not significant). Perhaps, having a dominant mother who forces one to do the things one has to do, is helping reinforce behaviour which is directed towards getting things done. The positive affect holds provided the mother was not dominating in the sense of doing things for her children but rather in directing them towards doing things for themselves.

6.7.6.2. Neurotics.

The majority of subjects stated that they become bored very easily and they found it very hard to get started on things (73.3%). This suggests that they have a tendency towards using projection. The environment has to provide interest and the impetus to get started on things, it could not come from internal resources. Most of the subjects said that once something or someone had given them the push to get started, they would very often manage the rest of a task on their own.

36.7% of the subjects become annoyed if their watches stop and this was correlated with being anxious when uncertain of the time ($r = .653$, $P = < .05$). This may be a reflection of their general anxiety which becomes attached to minor events in the environment and upsets the feeling of stable structure.

30% of the Neurotics did get up at the same time daily whether it was necessary or not (Item 82). This was found to correlate with accuracy on the reproduction method 2 seconds estimate ($r = .954$, $P = < .01$) and accuracy on the 22 minute verbal estimate ($r = .617$, $P = < .05$). Getting up at the same time daily whether it was necessary or not implies a certain careful control of how one organises one's time and is therefore not surprisingly related significantly to accuracy measures. Getting up at the same time daily does

imply a certain type of accuracy in one's way of life, perhaps verging on obsessionality.

6.7.7. Future. TABLE XXXV

Only 13.3% of the Neurotics had a definite idea of what they were doing the following summer as compared with 48% of the Normals and 36% of the Medicals. In this context, not being able to plan for the future is almost symptomatic of the neurotic illness.

68% of the Normal group had great faith in the future, as compared with 23.4% of the Neurotic group and 72% of the Medical group (X^2 - 7.816, P = .01). This fits in with the Neurotics poor future time perspective.

73.3% of the Neurotics felt that the future was too uncertain to enable one to plan ahead (Item 95) which further reflects their poor future orientation. The Normal group and the Medical group act more and daydream less about the future.

Summary

Items which discriminated the Neurotics from the other two groups in terms of their agreement or disagreement with the statements of attitude.

TABLE XXXV

FUTURE ITEMS

ITEM	X^2	NORMALS		MEDICALS		NEUROTICS	
		AGREE	DISAGREE	AGREE	DISAGREE	AGREE	DISAGREE
109	12.389	12-48%	13-52%	9-36%	16-64%	4-13.3%	25-83.4%(1)3.3%
112	7.816	17-68%	8-32%	18-72%	7-28%	7-23.4%	22-73.3%(1)3.3%
100	2.847	10-40%	15-60%	11-44%	14-56%	21-70.0%	9-30.0%
89	1.490	7-28%	18-72%	8-32%	17-68%	14-46.7%	16-53.3%
95	5.248	14-56%	11-44%	8-32%	17-68%	22-73.3%	8-26.7%
96	1.495	12-48%	13-52%	15-60%	10-40%	22-73.3%	8-26.7%
		72-48%	78-52%	69-46%	81-54%	70-39.0%	69-46.0%(2)2.0%

Item	X^2	d.f.2	P
109	12.389		.01
112	7.816		.02
95	5.248		.10

A. Memory for Time.

Item 91, i.e., poor memory for past events. 40% of the Neurotics agreed with this and only 4% of the Medicals and 16% of the Normals. This was only a statement and no objective measure of memory was included in the battery of tests administered (X^2 = 8.788 d.f.2 P = .02).

B. Feelings About Childhood.

Item 87, i.e., a happy childhood. 84% of the Normal group and 65% of the Medicals felt that they had had a happy childhood but only 56% of the Neurotics felt this (X^2 = 5.389 d.f.2 P = .10). Those who did feel that they had had a happy childhood described it as unreal.

C. Pressure of Time.

Item 106, i.e., we would have been better off if clocks had never been invented, was the most discriminating item in this group (X^2 = 5.332 d.f.2 P = .10). A belief in this reflects a denial of reality. Also Item 85 which states the wish to live in a world without time reflected this same kind of denial of reality (X^2 = 4.332, P = .20) and also discriminated between the groups. The belief that one could live in a world today without clocks and without time reflects a desire to perhaps eliminate one of the basic mechanisms by

means of which our daily lives can be organised and is therefore suggestive of a denial of reality. Item 106 was significantly correlated with test-retest differences and speed measures and actual estimates particularly on the production method.

D. Organisation of Time.

Items which discriminate between the groups were:

Item 82, i.e., getting up at the same time daily ($X^2 = 7.343$, $P = .05$); Item 108, i.e., being easily bored. 73% of the Neurotics described themselves in this way and 24% of the Normals ($X^2 = 6.750$, $P = .05$).

Item 110, i.e., good at saving time. 84% of the Normals felt this and only 36% of the Neurotics ($X^2 = 5.413$ d.f.2 $P = .10$).

Item 113, i.e., difficult getting things done without deadlines. 66% of the Neurotics felt they had this difficulty but only 40% of the Normals ($X^2 = 5.718$, $P = .10$).

F. Future.

Item 109, i.e., having a definite idea of what one will be doing next summer. 48% of the Normals felt they could agree with this but only 13.3% of the Neurotics could extend themselves into the future in this way. Not being

able to plan for the future was symptomatic of the neurotic illness in this study.

Item 112, i.e., faith in the future was voiced by 68% of the Normals and 23.4% of the Neurotics. This further highlights the Neurotic's poor future orientation (X^2 = 7.816 d.f.2 P = .02).

Item 95, i.e., future is too uncertain to plan far ahead reflects this same kind of orientation. 56% of the Normals agreed to this but 73.3% of the Neurotics did (X^2 = 5.248 d.f.2 P = .10).

6.8. Summary of Significant Differences Between the Three Groups as Reflected in the t Tests.

6.8.1. Neurotics and Normals.

NEUROTICS AND NORMALS

ITEM		t	d.f. 53
20	Ravens Scores	2.58	P = .05
24	Time Perspective Extension & Coherence	3.86	P = .01
25	Density Fut. Time Perspective	3.89	P = .01
26	Density Extension & Coherence	8.17	P = .01
76	T.A.T. Achievement	2.31	P = .05
77	T.A.T. Aggression	4.90	P = .01
79	T.A.T. Abasement	2.04	P = .05
80	T.A.T. Nurturance	8.58	P = .01
81	T.A.T. Narcissism	3.28	P = .01
129	Extent test-retest difference for B4" distance	2.09	P = .05

The Neurotic group's difficulties around projecting themselves into the future was clearly highlighted by the

sharp difference between their mean scores and that of the Normal group ($t = 3.86$ and $t = 3.89$ and $t = 8.17$). The last two items (25 and 26) above were, as mentioned previously, to do with the major events which the subjects thought might happen to them in the future. All subjects were asked to try and predict 10 major events which they thought might occur to them in their lifetime. The Neurotic subjects, as a group, all had surprising difficulty coping with this task and very many were unable to reach 10. In fact, all subjects had greater difficulties with this than with the story completion task, but the Normal group subjects and the Medical group subjects were more successful at overcoming it.

The Neurotics were able to perform slightly better in the more structured and directed story completion tasks. However, in the task to test for the density and coherence of events with which the future appears to be populated, they were left entirely to their own resources and could not cope with this type of task. Therefore, there is this highly significant difference between the Normals and Neurotics on this test ($t = 8.17$, $P = < .01$).

These results also indicate just how useful and valid the future events test (taken from Kastenbaum, 1961) is for discriminating between Normals and Neurotics in this context.

T.A.T. score differences have already been discussed above and also discriminate quite well between Neurotics and Normals. The Lindzey & Goldberg (1953) scoring system used serves to objectify the data derived from the T.A.T. stories in what appears to be a consistent and reliable fashion. Neurotic T.A.T. scores differ significantly from the Normals in this study.

A significant difference is also noted between Neurotics and Normals on the Ravens Matrices raw scores ($t = 2.58$, $P = < .05$). Anxiety is known to reduce intellectual performance (Wechsler, 1958) and the Neurotic subjects were far more agitated about doing this task than any of the other subjects. There was no difference in level of educational achievement between the groups, and there were two exceptionally well qualified subjects in the Neurotic group. Nevertheless, their Ravens scores were lower than that of the Normal group, and therefore, the significant difference between them was still observed as stated above. One can only postulate that their neurotic illness could have influenced these Neurotic subjects' performance on the Ravens Matrices, detrimentally.

Of all the time measures applied in this experiment, it is significant in itself that the one measure which demonstrates the most significant difference between Normals

the Neurotics and is the extent of the difference between initial test and retest on the production estimate of 4 seconds for the distance moved but not the time taken. This does seem to indicate that the use of the linear movement apparatus which permits both time and distance to be measured simultaneously, is a useful technique for measuring time estimation, particularly in the clinical sphere. The production method of measuring time estimation seems particularly useful in this clinical setting.

Other differences in test-retest differences and speed and accuracy do appear and have already been discussed.

6.8.2. Neurotics and Medicals.

Comparing the Neurotics and the Medicals, these are the main significant differences which do appear.

NEUROTICS AND MEDICALS

ITEM		t	d.f. 53
25	Density of Future Events	3.59	P = .01
26	Density, Extension and Coherence of Future Events	6.24	P = .01
27	Verbal Estimate--22 Minutes	3.34	P = .01
77	T.A.T. Aggression	4.83	P = .01
79	T.A.T. Abasement	5.52	P = .01
80	T.A.T. Nurturance	4.90	P = .01
139	Difference Between Test and Retest Speed 4" on the Reproduction Method	2.12	P = .05
145	Accuracy-Deviation from Std. Reproduction 2 Seconds	10.30	P = .01

NEUROTICS AND MEDICALS

ITEM		t	d.f. 53
153	Speed Difference Between Production 2 Seconds and 4 Seconds	2.21	P = .05
164	Speed Difference Between Reproduction 4 Seconds on Retest and Production 4 Seconds on Retest	2.36	P = .05

Differences between the Neurotics and the Medicals are similar to those observed between the Neurotics and the Normals. The Medical group approximate more closely to the Normal group in future time perspective for instance. The differences on Items 25 and 26 (the density and the density extension and coherence of future events) was also significant (t = 3.59 and t = 6.24).

There was also a significant difference between Neurotics and Medicals on the 22 minute verbal interval. As we have seen in Chapter V, the Medical group were rather inclined to overestimate this period, the Neurotic group to underestimate it. It is therefore, appropriate to find a significant difference between them (t = 3.34).

T.A.T. scores were also significantly different, in a direction similar to that found between the Normals and the Neurotics.

6.8.3. Normals and Medicals.

SIGNIFICANT DIFFERENCES BETWEEN NORMALS AND MEDICALS

ITEMS		t	d.f. 48
78	T.A.T. Sex	2.55	P = .05
79	T.A.T. Abasement	2.34	P = .05
80	T.A.T. Nurturance	5.16	P = .01
81	T.A.T. Narcissism	4.28	P = .01

The main difference between the Normal and Medical groups on T.A.T. scores are not in an unexpected direction considering the Medical subjects have just been through an acute physical illness involving special care, hospitalization and bed rest. The Medical group were highest on nurturance but lower than the Normals (Medicals, 11.88; Normals, 16.96). The Medical group's lowest T.A.T. score was on sex (9.08). The Normal group were also higher on Narcissism.

The T.A.T. scores do illustrate how illness itself can influence one's perception of T.A.T. pictures. It appears that both psychological and physical illness can have an effect on one's perception of T.A.T. pictures but not necessarily in the same direction. Significant differences between Normals and Medicals also appeared on speed and accuracy.

SPEED AND ACCURACY NORMALS AND MEDICALS

ITEM		t	d.f. 48
139	Speed Reproduction 4 Seconds	2.88	P = .01
141	Speed Production 2 Seconds	2.41	P = .05
145	Accuracy Reproduction 2 Seconds	9.58	P = .01
161	Speed Difference Between Reproduction 2 and Production 2	2.45	P = .05

The Medical group were on the whole, faster than either the Normal or Neurotic groups (Medical mean speed reproduction 4 seconds was 12.58; Normals was 9.84 and Neurotics was 11.45--speed in inches per second).

On production 2 seconds, the Neurotics happen to be the fastest (mean speed 13.46, Medicals 10.14 and Normals 10.71 inches per second). Neurotics appear to be faster on all production time estimate speed measures though not on the reproduction measures. These differences did appear here but little else. The Normals and Medicals did have very much more in common in their ways of performing in all respects than either of them did with the Neurotic group.

CHAPTER VII

CONCLUSIONS

Consideration of the Hypotheses as Stated, in View of the Results Obtained from the Experiment.

7.1. Hypothesis 1.

7.1.a. Time assessment will be relatively consistent for an individual;

7.1.b. This consistency will be revealed through the employment of a number of varying techniques of temporal assessment.

7.1.a.1.

The hypothesis was supported by the consistency of the subjects' performance on a number of test sessions, using the same methods of time assessment. This observation was most consistently supported by the Normal group and less so by the Neurotic. The Normal group's results yielded significant positive correlations between all test and retest time measures for all the methods of time estimation at a higher level of confidence than the other two groups. The production and reproduction methods reflected this finding more significantly than the verbal method. Speed on reproduction and production appeared to be the most reliable aspect of time

estimation: test-retest speeds were more positively and significantly correlated for all three groups than any of the other time measures.

7.1.a.2. Over and Underestimation.

All three groups showed the same tendencies with respect to over and underestimation of short time intervals. The amount and direction of estimation error depends upon the particular technique used and the length of the stimulus.

7.1.a.3. Verbal Method.

Short auditory stimuli (2, 4, and 9 seconds) were overestimated by 66% of Normal subjects, 75.3% of the Medical subjects, and 66.6% of the Neurotic subjects. The Normal group overestimated less than the other two groups, in terms of mean time estimates. Summed means of the short verbal estimates revealed overestimations of 21.68 seconds in the Normal group, 30.63 seconds in the Neurotic group, and 34.63 seconds in the Medical group.

7.1.a.4. Reproduction Method.

All three groups show an increased tendency to underestimation and greater accuracy when the reproduction method of measuring short time estimation was employed: 52% of the Normal subjects underestimated time intervals; 53% of the Medical subjects and 50.8% of the Neurotic subjects. The summed means for total estimates of 12 seconds using the

reproduction method were: Normals 11.70 seconds, Medicals 11.73 seconds and Neurotics 12.33 seconds. (Two Neurotic subjects gave completely accurate judgments of the two second interval.) Physical involvement in the form of linear arm movement aids greater accuracy. Where X^2 could be applied the null hypothesis was supported: namely that the estimates were in the same expected direction for all three groups. There was no significant difference between the groups using this method.

7.1.a.5. Production Method.

Using the production method of measuring time estimation the general tendency was also towards underestimation but more so for the Medical and Normal groups than the Neurotic group. The mean summed estimates for 12 seconds were Normals 10.72 seconds, Medicals 9.60 seconds, and Neurotics 13.92 seconds.

7.1.b.1.

This hypothesis was further supported by the consistently significant positive inter-relationships between different methods used to measure time estimations, in the Normal group and partly in the Medical and Neurotic groups.

7.1.b.2. Verbal Method.

All stimuli tended to be overestimated by all three groups using the verbal method of measuring short time interval estimates (2, 4 and 9 seconds). Although allowing

greater opportunity for individual accuracy (a greater number of subjects gave completely accurate estimates), the verbal method was less reliable and less accurate, on the whole, for all three groups. Verbal method estimates correlated with production method estimates at significant levels for all three groups, on an intersession as well as interest basis. The verbal method correlated significantly with the reproduction method, but not with the same degree of consistency as the production method. The correlations occurred more commonly with the distance moved than the time taken. Body tempo measures also correlated with verbal time estimates.

7.1.b.3. Reproduction Method.

Reproduction method estimates were consistently significantly correlated with other methods of measuring time estimation. This method results in greater accuracy of time estimation than the other methods in all three groups. However it was not necessarily more reliable than the production method.

7.1.b.4. Production Method.

Production method estimates were consistently intercorrelated and therefore reliable indicators of the way in which subjects estimate short time intervals. This was particularly observed in the Normal group's estimates. However the Neurotic was still less reliable in his time

estimations than the Normal or Medical subject using this method. The Normal and Medical groups demonstrated a relationship between different time measures more strongly than the Neurotics in the greater number of inter-method and inter-session significant correlations, particularly in respect of test-retest differences and speed and accuracy.

Support for an underlying rhythmicity inherent in the different methods of measuring time was supplied by these relationships. The positive relationships between the results derived from different methods of measuring time estimation lend support to the concept of an inherent time measuring capacity in an individual. In the Normal group verbal 2 seconds test-retest difference was also correlated with the test-retest difference on production 2 seconds ($r = .598$, $P = < .05$) and production 4 seconds ($r = .670$, $P = < .05$). The implication is that although the difference between test and retest performance exists for all groups and all methods, the degree of the difference on one method was consistently related to the degree of difference on the other methods.

7.1.b.5. Speed.

On retest speed increased for all three groups. Speed and body tempo contribute to organisational consistency. It appeared to be a relevant element in all methods of

estimating time. Spontaneous body movement was integrally involved in the time estimation procedures throughout this experiment. All three groups demonstrated this, particularly the Normal and Medical groups, e.g., circle drawing (body tempo) correlated with speed on the production method 2 seconds on initial test ($r = .504$ and on retest $r = .589$, $P = .05$). It is therefore evident that a tendency towards spontaneous rate of movement influences these productions creating a relationship between body tempo measures and speed, particularly on the production method.

Summary of Conclusions for Hypothesis 1.

1. There is underlying organisational rhythmicity within an individual which underlies the correlated relationships between the results derived from different methods of short time interval estimations. Body tempo measures reflected this same inate rhythmicity and are also linked to time estimation measures.

2. Different methods of measuring time estimation were significantly intercorrelated, contrary to previous findings documented by Clausen (1950), Kruup (1961), Siegman (1962), and Fraisse (1963).

3. Estimates on different sessions were reliably inter-related although this was also contrary to previous

findings (Kruup 1961 and Siegman 1962).

7.2. Hypothesis 2.

Time perception and assessment are closely related to personality structure, and are derived from the total complex of an individual's learning and experience.

7.2.1.

Personality variables appeared to influence certain aspects of time estimation in this study. The Neurotics were less reliable than the other two groups in their time estimations. This was consistently reflected in lower correlations between estimates across times, sessions and methods. Where the Neurotics did display stability and accuracy in their time judgments it appeared that it was the stability of movement which contributed towards this rather than the timing itself. In the Normal group the feeling that one would have been better off if clocks had never been invented was negatively correlated with accuracy or the production method ($r = -.770$, $P = < .05$). Had this statement been agreed to by Normals, it would have conveyed a negative attitude towards time. Perhaps it was indicative of the more positive orientation which the Normal group displayed

towards time when compared with the Neurotics. The Normals, being more positive and more balanced in their orientation to time, were able to be more consistent and more accurate, and therefore more stable within the limits of this experimental situation.

7.2.2.

The individual's time behaviour may be related to his personality structure in the fashion described above. It could also be related in other ways:- The 22 minute interval was generally underestimated by the Neurotic group--mean estimate 18.67 minutes. The Normals were the most accurate with a mean estimate of 21.28 minutes. The Medicals were more inclined to overestimate this period with a mean estimate of 23.80 minutes.

The Neurotics appeared to receive gratification from talking about themselves. The Medical group appeared impatient when asked to do the same thing. The Normal group were pleasantly communicative. Subjective impressions of the experimenter, which while not quantified, further support the importance of personality factors in governing time estimates.

7.2.3.

Among the many inadequacies of the T.A.T. (and other projective tests) described by Murstein (1963) is its deficiency as a psychiatric diagnostic instrument. However in the limited

manner in which T.A.T. scores were used in this study they distinguished, in the expected direction, between the Neurotics and the Normals. On aggression (which was the Neurotic group's highest score) t tests between Normals and Neurotics revealed the following differences: aggression t = 4.90, nurturance t = 8.58, Narcissism t - 3.28, achievement t = 2.31. Achievement scores were relatively low in comparison with other T.A.T. scores for all three groups, but lowest for the Neurotics.

Neurotics. For the Neurotics achievement was positively and significantly correlated with accuracy on the reproduction method 2 seconds estimate ($r = .839$, $P = < .01$). Achievement was also correlated with accuracy on the 22 minute longer interval ($r = .557$, $P = < .05$). This relationship suggests that an achievement orientation had an influence on the accuracy with which the Neurotic subjects estimated short and longer time intervals. Of the three experimental groups the Neurotics scored lowest on achievement and accuracy.

Normals. The Normal group demonstrated a significant relationship between T.A.T. aggression and the test-retest difference for the reproduction 4 seconds time estimate ($r = .646$, $P = < .05$). The Neurotics scored higher on the aggression scale than the Normals. It was possible that this excessive aggression was one of the factors contributing to the reduced reliability of this group and less consistent test-retest differences. The Neurotics handled the linear movement

apparatus with considerable physical aggression to the extent that two subjects succeeded in breaking the apparatus. It might be conjectured that this outward aggression was commensurate with inner feelings (as inferred from T.A.T. scores) which were projected into time estimations.

The aspects of personality structure suggested by the T.A.T. scores were further verified by many responses to the descriptive statements and much of the personal data.

7.2.4.

The discussion in Chapter II dealt with the rationale underlying the hypotheses that individuals acquire habits of assessing time as a direct result of learning and experience. Many day to day attitudes of the subjects taking part in this study were traceable to particular parental attitudes and particular child rearing practices, as the subjects in the different experimental groups reported them. However variations in time estimations in all three groups, in certain instances, were traceable to the nature of the method used to make the estimation rather than personality characteristics of the subjects, e.g., all subjects, regardless of their group, overestimated short time intervals using the verbal method of time estimation. The reproduction method yielded greater accuracy for all three groups than the other methods. The production method however, appeared to be much more sensitive to clinical state in the Neurotic

and physically ill group and personality variables in these groups. In the Normal group, personality variables were more closely related to the production method of time estimation than other methods, but not to the same degree as in the Neurotic and physically ill groups.

Summary of Conclusions for Hypothesis 2.

1. The direct measurement of estimations of short time duration was not necessarily a reliable means of distinguishing between the three groups in this experiment.

The longer filled time interval of 22 minutes was more effective in sorting the subjects into their respective groups.

2. The estimation of short time durations was greatly affected by the neurotic process which appeared to have a direct influence on the relationship between time and other variables to a greater extent than is true for the other two groups. Attitudes toward time, work, school, future time, childhood and parents could all be linked to the estimation of short time duration. But attitudes and feelings and personality variables, in relation to time were the principal discriminators of the three groups.

3. It is possible that aggression influenced reliability, and the Neurotics' excessive aggression

contributes to a lower level of stability in estimating time.

4. It also appeared that accuracy was significantly related to achievement which was lower in the Neurotic group than in the other groups.

7.3. Hypothesis 3.

Groups of individuals sharing common characteristics will share common characteristics in the area of time assessment and perception. Specifically neurotic subjects will differ from normals and also from a group of physically ill patients.

7.3.1. The time estimates made did not vary greatly among the three groups. Only on the long verbal estimate of 22 minutes was there a significant difference among estimates. Groups varied in the way in which different time measures are related to one another and in the stability with which these variations were manifested. Inspection of the raw data also revealed that the first estimate each subject makes on any of the three methods was usually the longest, confirming the observation of Eson and Kafka (1962).

The Normal and Medical groups showed less variation between test and retest session estimates than the Neurotics.

7.3.2. However the groups vary on speed and accuracy measures of the time estimates made. The Neurotics were the

least accurate and the Normals were the most accurate for the reproduction of 2 seconds. Speed differences among different methods also showed inter-group variations; for example between Normals and Medicals speed differences between reproduction and production 2 seconds $t = 2.45$, $P = .05$. The Neurotic and Medical group manifested speed differences between reproduction and production methods $t = 2.36$, $P = .05$.

7.3.3. Body tempo tasks and production estimates were carried out freely at the subjects' spontaneous rate of preferred movement. The pre-conditions of these two tasks varied but the preferred rate of body movement was a factor common to them both.

Body tempo varied from session to session for all three groups. Although time estimates also varied from session to session the differences were not as large as the body tempo measure differences. The Neurotic group showed only slight body tempo differences from session to session although their time estimates showed greater differences. Circle drawing differences between first test session and retest session were:- Mean difference 2.62 for the Neurotics, and 8.28 for the Medicals and 9.20 for the Normals.

The Neurotics' body tempo appeared to reflect their chronic mood state which showed little variation throughout the test period. For the Normal and Medical groups when time

estimations vary, body tempo was more likely to vary in accordance with the nature of the task.

Summary of Conclusions for Hypothesis 3.

1. Groups of subjects varied in the reliability and accuracy with which they estimated short time intervals. Neurotics were less reliable and therefore less stable on all measures of short time duration.

2. The production method was particularly affected by this instability and it was significantly apparent in inconsistencies between test-retest differences, accuracy, speed and speed differences and their relationships to one another. The Normal group was more stable then the Neurotic group and did not manifest these inconsistencies.

3. In the Neurotic time habits and attitudes were more readily identified, largely through their idiosyncratic approach to time. There was either exaggerated negativism or an overconcern with time. The Normal and Medical subjects seemed to maintain a more efficient, evenly balanced and flexible distribution of time habits and attitudes. It appeared that for the Neurotics, as distinct from the other groups, the underlying organisational consistency between different methods of estimating time, is disorganised by personality variables, among which were

aggression, achievement, and attitudes towards parents, work and time.

4. The Medical group generally were more stable than the Neurotics except in the area of speed consistency, and were therefore not as stable as the Normals.

5. The longer filled time interval of 22 minutes reflected major differences between the groups in estimating longer time intervals. The Neurotics underestimated the period, the Medicals overestimated the period and the Normals were most accurate.

7.4. Hypothesis 4.

In Neurotic subjects time perception will be more idiosyncratic than in Normal individuals: They will reveal more inconsistencies in measurable time experience, future time perspective and attitude orientation to time. Because of their greater stability, the Normal subjects will be more objective and realistic in the assessment of standard clock time.

7.4.1. That the Neurotic group was more disturbed than the other two groups was manifested by the test results. Their T.A.T. had higher aggression and abasement scores and lower achievement scores. The Neurotic displays greater inconsistencies in measurable time experience as compared

with the other two groups. (This has been discussed above, Hypothesis 3.) This applied to short time estimates where the Neurotic could be so consistent in relation to some varying internal standard that it appears as idiosyncratic rigidity and ignores external reality.

The Neurotics were less reliable than the other groups because of their lesser stability reflected in lower and often less significant correlations between initial test and retest estimates and between different time estimates in the same sessions. This was most clearly demonstrated by the accuracy measures of the reproduction method and production methods and verbal estimates.

Although the Medicals were more reliable in their estimates of short time duration than the Neurotics they were not as consistently reliable as the Normals.

On the production method the Neurotic's reliability was also lower than that of the other two groups.

7.4.2.

Consistency of times estimated in the same session was lower for the Neurotics than for the Normals and the Medicals. Across methods and times in the same session their instability showed up more markedly using the production method than the other methods. This was further illustrated when the test-retest differences were considered for the production method. A cluster of negative correlations was

observed. A clear illustration of the Neurotics' instability was the finding that if in general they had overestimated a time interval on initial testing they underestimated it on retest. Distance estimations were more sensitive to this instability than time estimations. It would appear that where stability did exist for the Neurotic in time estimation it was more likely to be created by the distance moved than the actual time taken, whereas for the Normals it was time rather than distance which was the determinant.

7.4.3. The Neurotic's display of instability between times appeared to be related to speed. One would expect that instability would emerge more clearly with speed rather than time alone since speed involves both time and distance. It was possible to vary the movement covering the distance but it was not possible to vary the time stimulus in this experiment.

The Neurotic's instability between different sessions was not so clearly related to the speed element. However it might be a factor, judging from the speed changes reflected in variables 153-164 which indicated the relationships between the changes in speed for various time and various methods.

The speed changes appeared to bring out differences in the orientation of the groups. For the Neurotics

differences across times appeared to be more crucial. For the Normals and the Medicals differences across the methods seemed to be of greater importance. The two latter groups responded more to method differences than to time differences. It was possible that the Neurotics respond more to the time itself and to their own internal impressions than to the instructions given by the experimenter.

In short, the Neurotics could be regarded as unstable in their assessment of time intervals and rigid in their adherence to their own internal impressions rather than the external realities of the experimental situation.

7.44.

Comparing the speed differences on the production method (157) which were consistently correlated with estimate differences between sessions (126-129) the following observations emerged:-

7.4.4.1.

If the length of the interval varied the bigger the speed differences, and the smaller the time estimate differences.

7.4.4.2.

Subjects who changed their speed with the changing time intervals succeeded in confusing themselves.

7.4.4.3.

These subjects vary their speed with the varying time intervals and were therefore less reliable in their estimates.

7.4.4.4.

The Neurotics followed this pattern of time estimation and were therefore less reliable in their time estimates, and may be regarded as unstable.

7.4.5.

The consistency of the Neurotic's tendency to change his speed with the different times was evident in the relationships between variables 153 and 154 which were the reproduction method speed differences and variables 157 and 158 which were the production method speed difference variables.

The differences between speed across methods was more clear when variables 122-129 were correlated with speed differences. Variables between methods were variables 161-164. The leas subjects varied across tests the more reliable test-retest differences were across methods. In this regard the Medicals' performance was similar to the Neurotics, suggesting that illness as such can affect time estimation reliability relationships in the area of speed. The illness factor may also account for the fact that while the Medicals were on the whole clearly more reliable than the Neurotics, they were not as consistently reliable as the Normals in all measures of time assessment. Perhaps illness produces a hypochondriasis with a concomitant alertness to internal stimuli and a reduced awareness of external reality clues compared with the healthy individual.

7.4.6.

Accuracy on the production method was related

to the extent of the test-retest differences on the production method (variables 149-152 and variables 126-129). The relationship suggested that stability and accuracy belong together, and further that the presence of some obsessive-compulsive trait was necessary for accurate, reliable time assessment in an individual.

The Neurotics were considerably less reliable in their accuracy on both reproduction and production methods but more so on the latter than the former. Their unreliability appeared to mainfest as an instability of time estimation.

Thus the Neurotic subjects were more likely to rely on idiosyncratic standards for estimating time. The Normal and Medical group seem to rely more on objective cues when estimating time using the different methods even though it was affected by these same methods.

7.4.7. Kagan and Wallach (1964) found most disturbed subjects to be consistent on what they called risk taking: They interpreted this as a reflection of a need to maintain a consistent self image at the expense of adaptation to the requirements of a given situation. This finding has a bearing on the Neurotics rigidity of estimates on different sessions in this experiment.

7.4.8. The judgment of the long filled time interval of 22 minutes did reveal a greater difference in measurable

time experience. 80% of the Neurotic subjects and 68% of the Normal group underestimated the interval, whereas only 44% of the Medical group did. The mean estimate for the Medical group was one of overestimation. (X^2 = 5.134 d.f.2 P = .05) The Normal subject's estimates were closest to the actual measure. In this group the time estimate and the accuracy with which it was measured correlated significantly with many other different time measures, particularly speed differences on the reproduction and the production methods.

7.4.9. Future Time Perspective.

7.4.9.1.

Future time perspective was significantly poorer for the Neurotic subjects than for the Medicals or Normals. It was highest for the Normals. Attitudes towards time were highly unfavourable in the Neurotic group and favourable in the other two groups. The Neurotic's attitudes towards future time appeared to derive from the incapacity to perceive a healthy extension into the future, which they then attempted to disregard. They plan for the immediate future rather than the distant future.

7.4.9.2. Future Orientation and Attitude.

85.7% of the Neurotic group had no definite idea of what they would be doing during the following summer as compared with 48% of the Normals and 36% of the Medical group. The examiner was not satisfied with monosyllabic yes or no

answers to the question, but where possible pressed the subjects until they produced complete answers. In spite of the experimenter's efforts most of the subjects in the Neurotic group seemed genuinely unable to complete an answer to this type of question and this was perhaps further evidence of the Neurotic group's avoidance of commitment to the future.

Only 23.4% of the Neurotic group had faith in the future, 68% of the Normal group (none of whom appeared to be depressed as far as this could be ascertained) and 72% of the Medical group.

It might be argued that poor future orientation is simply another manifestation of the general feeling of worthlessness that accompanies depression. Although many individuals in the Neurotic group were depressed, as many manifested anxiety.

The t test for significant difference on the coherence and extent of future time perspective (future events score) between Neurotics and Normals was 8.17, $P = < .01$; between the Neurotics and Medicals $t = -6.24$, $P = < .01$. Mean score for the Neurotics was 13.83 (S.D. 7.54) and for the Normals was 28.92 (S.D. 5.82) on future time perspective. 7.4.9.3.

This latter finding suggests a therapeutic approach. Knowing the extent of the Neurotics' lack of

future orientation and their fear of approaching it has an advantage for the therapist. Behavioural therapy designed and approached on an hierarchial system directed towards specific planning for the future and supported by positive realistic training procedures, may be of real benefit to this type of patient. It offers an alternative to the pervading sense of hopelessness so characteristic of neurotics.

Meerloo (1948) has said that we can get lost in the past with "gnostic memories" whereas in day dreaming one is lost in the future. The Neurotics, with their excessive day dreaming phantasize a future without being able to make realistic plans for action. It is the job of the therapist to bring this imaginative capacity to a reality level of functioning.

7.4.9.4.

The Medical group demonstrated a consistent relationship between future time perspective scores, as manifested in the individual stories, and time estimates made on the production method. This pertains to both time and distance aspects of time estimation and accuracy on the production method. So future time sense could be said to be related to the manner in which one produces one's own impression of a short time interval. And if future time perspective is seen as an aspect of the individual's personality then personality

attributes enter into short time estimations as well as longer time estimations.

7.4.9.5.

As mentioned above Ricks and Umbarger (1964) have shown how vocationally directed psychotherapy could bring about an increase in future time perspective. They had forcibly directed their adolescent patients towards extinguishing their poor orientation to the future by providing them with positive goals.

Their form of therapy is supported by Murray (1959, pp. 34-35) who has said that:- "We cannot manipulate time, only the variables which have consequences in time. It is the capacity to manipulate these variables which brings about full and healthy use of time and planning for the future."

One could not justifiably accept that part of the hypothesis, which states that the Normal subjects will be more objective and realistic in their assessment of standard clock time because of their greater stability. In fact no gross distortion of short time duration was reflected by any of the groups. However the Normal group and the Medical group gave estimates more closely approximating the objective clock time than the Neurotics. There was however no significant difference between estimates between the three groups although there were considerable differences in the way in which the different time measures were related to each other within the different groups.

Summary of Conclusions for Hypothesis 4.

It appeared from the discussion on the pressure of time items (Chapter VI) that both psychological and physical illness had an affect on attitudes to time. Illness has the affect of isolating the patient from many of the time pressures of society. The recovery process can therefore be made more difficult for the patient by having to give up the personally related and unpressured time expectation of the sick bed for the impersonal rush of the workaday world. That was perhaps why the Medical group felt the specifically defined time pressures of society to almost the same degree as the Neurotics. All subjects expressed an awareness of the time pressures of society, including the Normal group, but they felt its demands to a lesser extent than the Medical group and the Neurotic group.

The Neurotic appeared to be handicapped by his inability to adapt to the varying time demands of his environment, by his idiosyncratic rigidity on the one hand, and his complete lack of commitment to time and his instability on the other hand. This was reflected in measurable clock time experience and even more strongly in his "time sense," his attitudes towards time and particularly his future time perspective which was greatly affected by the neurotic process. The medically ill group were not affected in the same way.

7.5. Hypothesis 5.

7.5.1.

Although interrelated, different techniques of time assessment will reveal different levels of accuracy.

7.5.2.

Although the main tendency of all three groups was towards overestimation on short verbal estimates the Normal group were more accurate and less inclined towards overestimation. Accuracy on the reproduction method correlated consistently with accuracy on the production method and with speed. This finding applied to all three groups, but to a lesser extent for the Neurotics than the Normals and the Medicals. The Neurotics appeared to be slightly more accurate in individual instances probably because they are more stimulus bound, as Angyal (1948) suggests.

7.5.3.

The reproduction method seemed to be such an accurate gauge of measurement that the healthiest side of the neurotic personality responded to its demands and the Neurotics were closer to accuracy on this method than on either of the other methods. However on this method the Normals moved a shorter distance on the whole, but in less time than the other groups. Their accuracy and speed measures were consistently reliable. Speed increased on retest session estimates for all the groups and body tempo measures were

faster too.

7.5.4. Lhamon, Goldstone and Goldfarb (1965) have investigated the effects of various factors upon short time judgments in many different ways. One cannot but agree when they state:- "Each experiment increased the scope of the problem area. And after eight years and 5,000 subjects, the writers are left with a healthy respect for the complex processes that lead to ordered and disordered temporal behaviour. They have not unravelled the mysteries of human time judgments, but increased their conviction that man's temporal experience could be systematically explored with the methods and traditions of the laboratory."

CHAPTER VIII

THE NEUROTIC AND TIME

8.1. Variables Relating to Short Time Estimation.

8.1.1. Stability.

In this study stability has been inferred from the reliability measures reflected in the differences between estimates on initial test and retest sessions, and from the relationships between time estimates in the same test session across different times and different methods. The Neurotics were the least stable of the three groups in all these respects. The production method of short time estimation, test-retest difference measures, speed measures, speed differences, and accuracy measures, revealed this instability in all the test situations.

In order to evaluate which factors in their personal histories may have led to instability and reduced reliability of short time estimation in the Neurotics, the variables which significantly correlated with time estimation measures were extrapolated from the correlation matrix. (Many of these variables have already been discussed in relation to the different time measures.)

8.1.2. Extent Test-Retest Differences and Accuracy.

Variables 4 and 81 were both significantly correlated with extent test-retest differences and accuracy on the production method (4 and 127 r = .637, 4 and 152 r = .559, 81 and 129 r = .527 which were significant at the 5% level of confidence). Item 4 related to the number of family members, while Item 81 was the T.A.T. Narcissism score. On the whole the Neurotic group came from larger families than the members of the other two groups. Not only were the Neurotics more often from larger families but they were also more often the younger members of their families. Both the size of the Neurotic's family and Narcissism related to production method measures. This relationship suggests that subtle personality forces had a bearing on the assessment of short time duration. If Narcissism was a reflection of self esteem, as the T.A.T. scores indicated, then the Neurotics were lower on this than the Normals and higher on self abasement. The Neurotic's marked instability as compared with the Normals on the production measures was possibly a consequence of his inability to maintain stable judgments of short time duration in which he was freer to set his own time limits as in the production method. If self esteem was indeed low then one might conjecture that he would not have the necessary inner conviction to maintain stable time judgments.

Consequently he would fluctuate according to his unstable inner needs. Possibly healthy self esteem is not fostered in larger families as a result of increased distance from their mothers and all judgments depending upon a well-integrated ego suffer. However this is purely speculative and further research is required.

8.1.3. Schooling and Work.

It seems that the further the Neurotics went in school the less they were inclined to overestimate the verbal intervals of 4 and 9 seconds ($r = -.728$ and $-.700$). The Neurotics' increased sensitivity may have allowed variables such as schooling to have an effect on their short time estimation.

The Neurotics had a more unfavourable attitude towards school than the Normals (53.3% of the Neurotics and 20% of the Normals). An even greater percentage of the Neurotics had an unfavourable attitude towards working (76.7% Neurotics and 32% of the Normals). 40% of the Neurotics had recently been dismissed from their jobs but none of the Normals or the Medicals had. These unfavourable attitudes towards work and school are themselves symptomatic of the neurotic illness and perhaps a long history of dissatisfaction with life conditions and an accumulation of feelings of failure extending over many years.

The Neurotics' poor attitude towards work was positively correlated with a body tempo measure of tapping speed. If this was an accurate index of body tempo it could be possible that it was also indicative of a general level of arousal. This would be important whatever one was doing. Many of the Neurotics had symptoms suggestive of depression and anxiety. Body tempo is often slowed down by anxiety. One might speculate that the reduced body tempo is associated with reduced level of arousal and a reduction of alerting mechanisms. The failure of alerting could perhaps manifest in difficulty coping with the demands of consistent work.

8.1.4. Ravens Matrices.

There was a significant difference between the Neurotics and the Normals on the Ravens Matrices raw scores ($t = 2.58$, $P < .05$). The Neurotics' mean score was 20.20 and the Normals' was 24.16. The Neurotics were observed to be more agitated during this test than the other groups, and excessive anxiety is known to reduce intellectual performance. And indeed this same anxiety may have been the reason for the inefficiency with which the Neurotics as a group coped with the experimental tasks.

8.1.5. Orientation.

While 84% of the Normals gave the day and the date correctly only 50% of the Neurotics were able to do this.

This was a possible further indication of the subject's general level of alertness and sensitivity to external stimuli. Neurotics had a more accurate awareness of day and date than they gave themselves credit for. This finding was supported by their high abasement scores and feeling of worthlessness.

8.1.6. Future Time Perspective.

The Neurotics had marked difficulty projecting themselves into the future. The difficulty was highlighted by the large difference between their future time perspective scores and that of the Normal group, e.g. Item 25. ($t = 8.17$, $P = .01$) This difference was most marked in the open future events test (taken from Kastenbaum, 1961) in which their lack of direction and poor orientation toward the future was apparent. It was less apparent in the more structured story completion tasks. A mature sense of reality is essential in establishing future time perspective and in order to plan for the future it is necessary to be able to evaluate the present realistically and learn from the past. The Neurotics generally appeared to have great difficulty doing this. Because of the difficulty they avoid approaching this area of concern. When they can no longer avoid it and are confronted with the need for action they tend to become immobilized in the present and cannot move forward.

8.1.7. Childhood and Time.

The Neurotic group revealed highly unfavourable attitudes towards time, work, school and childhood. The personality variables and affect assessed in these appeared to be more sensitive to the Neurotic's poor sense of time than the direct short time intervals, which reflected the Neurotic's instability rather than distorted sense of time. The amount of error on the longer time interval of 22 minutes was correlated negatively with T.A.T. achievement, so that the higher their achievement score, the less their error. Having had a happy childhood was also correlated with accuracy. Amount of schooling was also correlated with future time perspective and accuracy on the 22 minute long interval.

The emotional climate of childhood and the characteristics of the parent appeared to have an important relationship to time assessments. Future time perspective is a reflection of the cognitive patterns which have been derived from the consistent practices of child rearing and training, the relationship between future time perspective and body tempo is a reflection of a general "Weltanschaung."

8.1.8. Guilt About Time.

For the 60% of the subjects for whom the fathers were unpleasantly dominant there was a correlation with

feeling guilty when a little late for appointments. Time too is governed by "super-ego" expectations as is all obsessional behaviour. An every day example is extreme punctuality which is often a characteristic of the obsessional personality.

On the other hand lack of punctuality could also reflect neurotic mechanisms at work. Fraisse (1963, Chapter 9) observed that submitting to the time of the group implies choosing security. To state one's independence by constantly not being punctual is a form of aggressiveness. Meerloo (1948) suggested a number of reasons underlying this behaviour: because of indifference to others; aggressive desire for independence; wanting to be the centre of attention; or wanting to delay a pleasurable activity so that it can be a source of gratification later.

For this Neurotic group guilt about time tended to be related to the father. However feelings of being pressured by time tend to be related to the mother. These findings reflect a conception of parenting behaviour in which the mother teaches the child how to organise his life, while the father instructs the child in moral codes of conduct and feeling. In turn the mother helps the child to learn how to cope with the demands of the father. In this way she can be perceived as applying pressure of her own yet nevertheless being less demanding than the father.

8.1.9. Subjective Feelings About Time.

For the Neurotics a few minutes often seem like hours and the days drag when the weeks and the months fly. Time drags but in retrospect they do not know where it has fled. That this feeling arouses anxiety is borne out by their feeling that they waste time a lot and they often wished that clocks had never been invented.

They were consistent in their feeling that they are not using time profitably, and become bored very easily and find it hard to get started on doing things. However it is easier once they have somehow managed the first move. The environment had to provide the interest and the impetus to get started on things because it cannot come from internal resources. The complaint often was that the world will not devote itself to making them happy.

Those who had great faith in the future were not anxious when uncertain of the time. Knowledge of where one is going reflects a greater sense of internal security and capacity to rely on and trust internal resources. Those few in this group who did have great faith in the future and were good at saving time, are endowed with more stable egos. Unfortunately few of the Neurotic group demonstrated this.

The feeling of having lots of spare time but often being late for appointments, is reminiscent of the childish

wish "to have it all" and keep the demands of reality at bay.

8.2. Understanding the Neurotic and How this Understanding Could Contribute Toward Treatment.

8.2.1.

The results demonstrated a relationship between different methods of estimating time and the nature of the psychological time concepts and attitudes held by individuals. This was particularly applicable to the Neurotics. They were more rigid in their adherence to internal cues in the manner in which they estimated times and therefore less stable and less reliable than Normal and physically ill subjects. They were more negative and exaggerated about the concepts and attitudes they have in relation to psychological time. This had a detrimental effect on their perception of the future and they are tied to a present which is paradoxically dominated by past experience.

Time perception and assessment are closely related to personality structure and are derived from the total complex of an individual's learning and experience. The longer time interval was more affected by the differences between the groups. Parental handling played an important part in fostering the feelings of guilt and the pressure of "time" as applied to ordinary living. The excessive

aggression evidenced by the Neurotics seemed to have had a negative effect on the development of healthy time habits and attitudes.

8.2.2.

The nature of the method used to measure time estimation imposed a directional trend on the actual estimation. This trend from objective clock time was more deviant in the Neurotic group than the two control groups, but could not be labelled as time distortion. Therefore one cannot state that Normal subjects because of their greater stability were more objective and realistic in their assessment of standard clock time, but they were more stable and reliable in the manner in which they estimated short time intervals. The Neurotics were clearly lower on all reliability measures and consistently less reliable on accuracy. The lower reliability of the Neurotics across times and methods suggests strongly that they were less stable in estimating short time intervals. Their instability has been interpreted in this study as a consequence of their increased sensitivity to internal cues which force them to pay greater attention to internal impressions rather than the external realities of the test situation. Instead of adhering closely to objective instructions they relied more on their own moment to moment impressions, which in turn resulted in

greater inconsistencies. Neurotic instability was less marked on the reproduction method of time estimation even though it was still lower than that of the Normals. On this method the time estimation technique was more structured and it is significant that the Neurotic responded more consistently to such tasks where there was less scope for variation and he therefore varied less than on the production method.

8.2.3.

On the future time perspective measures which were in the form of a story completion task which were also more structured than the future events test, the Neurotics were able to do almost as well as the Normals. Both these sets of results therefore seemed to imply that the Neurotic could be helped to perform better where direction and structure are clearly provided for him. It also has the implication that therapists should not fear imposing directed guidelines for specific behaviour patterns which need to be changed in the course of therapy.

8.2.4.

In the whole area of short time estimation the Neurotics demonstrated a tendency to vary their speed with the different times. This in itself creates inconsistency. If the length of the interval varied then they would change

the speed with which they moved the linear movement apparatus handle. This meant that they would confuse themselves and become less reliable in their estimates. Subjects were constantly told to move the handle at a speed which was comfortable for them and not to vary this. The Neurotics were not able to do this.

There seemed to be an expressive lability operating which interfered with consistency and prevented the Neurotics from functioning as the Normals did in the same experimental situation. The fact that test-retest differences (stability measures) and accuracy on the production method were correlated with each other suggests the need for the presence of a quasi-compulsive component which would enable subjects to imagine some standard time, which they could apply across all times and all methods as a reference point. The Normals were far more able to do this than the Neurotics. Perhaps the Neurotics would be able to do this with help in the form of concrete guidance which would aid them in controlling their lability. Perhaps this control would be generated to other areas of behaviour. It appears that the more important the subjects felt time was, the less they were likely to make speed changes when estimating different times. (This was suggested by the correlations between feeling that time was very important and test differences.)

8.2.5.

The use of different methods of time estimation promoted different levels of accuracy:

1. The verbal method was least accurate and over-estimation occurred in all groups.

2. The reproduction method was the most accurate.

3. The production method was clinically the most sensitive and tended towards underestimation. All methods interrelated for all three groups but the correlation was highest and most significant in the control groups. Body tempo and the use of the linear movement apparatus were important variables in this context.

8.2.6.

Although future time perspective was related to level of school achievement for all three groups, the study showed that Neurotics differ greatly from the other two groups. These experiments demonstrated the marked inadequacy of the Neurotic's future orientation and his attitudes and feelings concerning time. It was apparent that the Neurotic was unable to use his imagination and intellectual skills to project into the future. This in turn, fostered his feelings of inadequacy and depression which have reinforced his committment to the present. The rigid attitude to time displayed by the Neurotic is incompatible with efficient or

adaptive functioning. The awareness and appreciation of this pattern is an important prerequisite to the understanding of the Neurotic. An awareness of the difficulties concerning time may aid one in obtaining a more complete picture of the area of malfunction, and a clearer insight into the crippling nature of the disease.

It should be remembered that poor future orientation is not only associated with clinical depression. The comprehension of this process has important implications and the degree of poor future orientation should be carefully assessed in all Neurotic patients. An understanding of this picture aids considerably in the planning of an adequate therapeutic programme directed towards realistic and specified goals.

8.3. Implications for Psychotherapy.

Psychological time is an internal rather than external phenomenon which we all recognise as such. It varies from person to person and situation to situation, maybe even with the state of the weather or one's bank balance. Two people in the same situation can experience it differently. It will drag for the patient in the dentist's chair but not necessarily for the dentist. Traditionally it is said to race in the condemned cell but pause for life to rush by at the

very moment it ends. Yet, curiously, patient's attitudes to time have been neglected by psychotherapists. The neurotic's conception and perception of time is seldom directly dealt with in traditional psychotherapy and is consistently stressed principally by the existential psychiatrists.

8.3.2.

In this study we have tried to identify some of the variables which could be said to govern time's appearance for the Neurotic, as well as its reality, so that we can perhaps learn something more about him and eventually how to apply this understanding to helping him. In this way we could perhaps help him to learn how to put aside the rush for a while and enjoy some tranquil relaxation without damage to the continuity of time. One often hears comment that it is the busiest people who seem to find the time to do the most interesting things. The more rewarding the tasks we have to do, the more we can convince ourselves that we can pack them into the space available. And then the more flexible that space seems to become.

The findings of this study drew attention to the neurotic's lesser stability and reliability in the area of short time estimation. The study suggested a possible explanation for this viz.- that the Neurotics relied more heavily on their own internal cues and impressions rather

than external directives when estimating short time intervals.

In addition subjects who were inclined to change their speed when making different time estimates succeed in confusing themselves. This confusion possibly prevented them from estimating different time intervals with the same degree of consistency and reliability as the controls. The study also emphasised the poor future orientation of the Neurotics. This was evident both in his scores on future time perspective tasks and in his subjectively expressed attitudes toward time.

At the same time this study also demonstrated that in more directed and structured tasks involving short time estimation, the Neurotic was almost as reliable, consistent and accurate as the control subjects. This more favourable type of response was also evident in the relatively structured and limited tasks within the future time perspective measures. On these items the Neurotic scores were not significantly different from those of the controls. The study therefore emphasises the importance of time and the crippling effects idiosyncratic and inefficient time habits can have on functioning. It is a problem area which should be directly approached in psychotherapy. Because the Neurotic has great difficulty using his intellectual and imaginative skills in order to project himself into the future he avoids the very behaviours which might make this feasible. The avoidance of

active behaviours which might lay the foundations of healtheir extension into the future is therefore constantly reinforced by inevitable failure which further demoralises the neurotic. It is essential that this destructive cycle must be broken in therapy.

The manner in which this could be done is suggested by the Neurotic's healthier responses elicited by the more structured and directed time estimation and future time perspective tasks in this study.

8.3.3.

Psychotherapy should be actively directed towards helping the neurotic to make gradually graded approaches towards goal orientated behaviours as present time investments for the realisation of future ambitions. As the neurotic had great difficulty envisaging an extension of himself into the future he should be helped to acquire the skills and the foundations on which to build these skills. Initial success even in a limited area could well act as a reinforcement to motivate him to take further steps alone. Clearly, goals have to be established and defined and structured according to the individual assets of the neurotic patient. It would also be necessary to take into account the low self esteem which invariably accompanies a history of life failure.

The psychotherapist should not wait for the neurotic

spontaneously to take the first step towards breaking the cycle outlined above. Active interference on the part of the psychotherapist is required in order to put this programme into action.

8.4. Suggestions for Future Research.

8.4.1.

The production of short time estimation has been shown to be a more useful method of measuring differences between groups of subjects in this study. Clinically it appeared to be more sensitive to the neurotic process than the other methods used. In particular the relationships between differences between estimates on different sessions and accuracy and speed differences demonstrated this. The Neurotic's instability between time estimates in the same sessions appeared to be related to changes in speed. Because the Neurotics changed their speed they confused themselves and became less reliable. In the process of doing this the Neurotics seemed to find the differences between the times more crucial while the Normals and the Medicals seem to have responded more to the differences between the methods. It has been postulated that the reason for this probably lay in the Neurotic's rigid adherence to his internal impression rather than the external reality. This needs to be further

validated and a more refined study involving a greater number of subjects and a concentration on Production method variables related to speed, accuracy and test differences. A factorial analysis would be required in order to elicit more accurately the factors directly responsible for the Neurotics lesser stability. The neurotic subjects in such a study would have to be carefully and more objectively rated for the degree of their illness. It would also be necessary to classify different groups of neurotics in order to ascertain whether different types of neurotic illness affected production method time estimation in different ways, and whether degree of illness also had a specific affect. Should this be feasible, production method time estimation measures could perhaps be tested at different stages of the neurotic illness. This could possibly yield an index of clinical progress.

8.4.2.

Future time perspective in Neurotics was found to be significantly low in this study. Most of the subjects were seen at a fairly acute stage of their illness therefore it would be of value to investigate whether this poor FTP was merely a function of the severity of their illness at the time or part of a more general life style. Once this is ascertained by regular follow-up assessments, specific psychotherapy could be undertaken to actively improve FTP by providing new learning

experiences in therapy directed at future goal orientation. Psychotherapy based on this type of programme should then be compared with other types of psychotherapy in a carefully controlled study.

8.4.3.

The role of the parents in helping the child build up attitudes and feelings about time has been referred to in this study. The specific nature of their influence on the development of time concepts and assessment has not however been clarified. The suggestion has been made that while guilt about time might be related to the father the feeling of being pressured by time might be related to the dominant role of the mother. This finding raises interesting possibilities which could only be realised in further research planned to study both parents and their children's perception of short and long time periods and future orientation. It would also require clarification of the roles of each parent by some more objective criteria. Overall the Neurotic's feelings and attitudes towards time as documented in this study were not conducive to rewarding use of time. They seemed to cripple the Neurotic in time and it is necessary to throw more light on the source of these attitudes and feelings in order to understand them more fully and avoid the development of such damaging attitudes.

8.5.

Every man must find his own way of making time work for him. It is not necessarily only the practices he resorts to that count but that he should be able to make those practices work effectively.

What really matters is not that time should always be the same, either always dragging or always rushing but that it should be able to move appropriately with each man according to where he really wants it to go. For the Neurotic more than the Normal this does not usually happen and is a cause of further anguish and misery. As well as being able to use time profitably man must also be able to put it aside temporarily when appropriate and derive pleasure and satisfaction from just "being." We cannot stop time by breaking the clock but living in a paradise of relaxation for a while is a far more pleasant way of trying to attain this goal.

> Time is a gift of God, given to man that he might use it,--use it Engineer to serve the advancement of humanity. (Settembrini to Hans Castorp in The Magic Mountain)

In the general field of contemporary studies, there is a growing feeling that mental illness is not a private misery confined only to the world of the disturbed person, but rather a social problem to which many disciplines can make relevant contributions. This is especially valid when one realises that society has left only a small percentage of

our personal time to be freely determined and utilised according to our own wishes and feelings.

The capacity to accept the implications and demands of this external time system is one of the parameters of healthy adaption. In mental disturbances this may be affected to a varying degree. It behoves us to be aware of its significance in our expectations for the individual and in planning his integration into social living.

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APPENDIX A

TABLE I

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX PERSONAL DATA

ITEMS	r	EXPLANATION
1 & 127	.554*	Age and B extent test diff. time 4"
1 & 150	.468	Age and B 2" R accuracy
1 & 152	.481	Age and B 4" R accuracy
1 & 18	-.714*	Age and Present attitude to work
4 & 127	.637*	No. in family and B estent test diff. time 4"
4 & 152	.559*	No. in family and Accuracy B 4" R
4 & 150	.446	No. in family and B 2" R time-accuracy dev. fr. std.
4 & 151	.436	No. in family and B 4 time-accuracy dev. fr. std.
5 & 127	.522	Position in family and B extent test diff. time 4"
5 & 150	.502	Position in family and B accuracy 2 R
5 & 152	.528	Position in family and B accuracy 4 R
5 & 129	.417	Position in family and B 4" dist. amount test diff.
5 & 151	.363	Position in family and Accuracy B 4" time dev. fr. std.
6 & 26	.504	School std. and Future events score, ext. and coherence
6 & 25	.491	School std. and No. of future events and coherence density
6 & 7	-.759*	School std. and Occupation
6 & 13	-.541	School std. and Attitude to school
6 & 22	.358	School Std. and Time perspec. I
7 & 25	-.498	Occupation and Future events no.
7 & 26	-.548*	Occupation and Future events score
7 & 126	-.455	Occupation and B 2" time test retest diff.
8 & 150	.498	Parents living together and Accuracy B 2 R
8 & 152	.471	Parents living together and Accuracy B 4 R
8 & 129	.359	Parents living together and B 4" dist. test retest diff.
8 & 151	.389	Parents living together and B 4" accuracy time
9 & 121	-.507	Diagnosis and Early for appointments

ITEMS	r	EXPLANATION
9 & 84	-.508	Diagnosis and Keeping watch set fast
10 & 128	.374	Work consistency record and B amount test diff. 2" dist.
11 & 78	.501	Living conditions and T.A.T. sex
12 & 145	.669*	Brought up at home and A 2" accuracy (amount error)
12 & 76	.584*	Brought up at home and T.A.T. achievement
12 & 82	.699*	Brought up at home and Getting up same time daily
12 & 109	-.560*	Brought up at home and Definite idea of what be doing next summer
17 & 99	-.594*	Religion and Often in a hurry
19 & 152	-.383	Orientated for date and Accuracy 4 B R dev. fr. std.
1 & 2	-.711*	Age and Sex
1 & 150	.402	Age and Accuracy B 2 R
2 & 150	-.465	Sex and Accuracy B 2 R
4 & 84	-.557	No. in family and Keep watch set fast
5 & 84	-.554	Position in family and Keep watch set fast
6 & 7	-.784*	School std. achieved and Occupation
6 & 31	-.728*	School std. achieved and Verbal est. 4"
6 & 32	-.700*	School std. achieved and Verbal 4 R
6 & 33	-.634	School std. achieved and Verbal est. 9
7 & 31	.650*	Occupation and Verbal est. 4"
7 & 16	.600*	Occupation and Parents Soc. ec. status
7 & 109	.512	Occupation and Definite idea of what you'll be doing next summer
7 & 151	-.412	Occupation and Accuracy B 4
11 & 93	.657*	Living at home and Days go slowly and weeks and months fly
12 & 87	.479	Brought up at home and Happy childhood
12 & 90	-.468	Brought up at home and More pressed for time than most
17 & 109	-.544	Intensity of religion and Definite idea of what will be doing next summer
19 & 128	.390	Date accurate and Test retest diff. ext. B 2 dist.
1 & 2	-.711*	Age and Sex
1 & 20	-.611	Age and Ravens raw score
1 & 128	.446	Age and Ext. test diff. B 2 dist.
1 & 129	.411	Age and Ext. test diff. B 4 dist.
1 & 149	.427	Age and Accuracy B 2
2 & 94	.600	Sex and Not enough time to do things really want to do

ITEMS	r	EXPLANATION
5 & 76	.545	Position in family and T.A.T. achievement
6 & 7	-.857*	School std. achieved and Occupation
6 & 16	-.563	School std. achieved and Parents soc. ec. status
6 & 23	.430	School std. achieved and Time persp. II (future)
7 & 152	.398	Occupation and Accuracy B 4 R
8 & 81	.500	Parents together or divorced and T.A.T. Narcissism
8 & 98	.563	Parents together or divorced and Few minutes like hours
8 & 76	.475	Parents together or divorced and T.A.T. achievement
10 & 22	.406	Previous work record and Time persp. I
12 & 43	.633	Brought up at home and B 2 time
12 & 45	.627	Brought up at home and B 4 time
12 & 47	.691*	Brought up at home and B 2 dist.
12 & 48	.689*	Brought up at home and B 2 R dist.
12 & 49	.695*	Brought up at home and B 4 dist.
12 & 50	.696*	Brought up at home and B 4 R dist.
12 & 62	.693*	Brought up at home and Test diff. dist. B 4"
12 & 99	.732*	Brought up at home and Often in a hurry
12 & 111	.573	Brought up at home and Impatient to wait
12 & 123	.654*	Brought up at home and A ext. test diff. A 4 time
12 & 127	.620	Brought up at home and A ext. test diff. B 4
12 & 128	.662*	Brought up at home and A ext. test diff. B 2 dist.
12 & 129	.684*	Brought up at home and A ext. test diff. B 4 dist.
12 & 151	.627	Brought up at home and Accuracy B 4
12 & 149	.633	Brought up at home and Accuracy B 2
12 & 61	-.677*	Brought up at home and Test diff. B 2 dist.
12 & 150	.466	Brought up at home and Accuracy B 2 R
12 & 152	.425	Brought up at home and Accuracy B 4 R
19 & 68	.692*	Date correct and Range 2 time
19 & 128	.639	Date correct and Ext. test diff. B 2 dist.
19 & 129	.582	Date correct and Ext. test diff. B 4 dist.
19 & 149	.562	Date correct and Accuracy B 2
19 & 151	.529	Date correct and Accuracy B 4
19 & 61	-.649*	Date correct and Test diff. B 2 dist.
19 & 126	.477	Date correct and Ext. test diff. B 2 time
19 & 127	.466	Date correct and Ext. test diff. B 4 time
19 & 92	-.452	Date correct and Hard to get started
19 & 104	-.384	Date correct and Father dominant

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE II

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX ATTITUDES TO WORK AND TIME, RAVENS SCORE AND FUTURE TIME PERSPECTIVE

ITEMS	r	EXPLANATION
13 & 111	-.557*	Attitude to school and Impatient to wait
13 & 126	-.374	Attitude to school and Amount test retest diff. B 2" time
13 & 127	-.390	Attitude to school and Amount test retest diff. B 4 time
13 & 25	-.450	Attitude to school and No. of future events
13 & 26	-.399	Attitude to school and Future events score
13 & 152	-.362	Attitude to school and Accuracy B 4 R
14 & 25	-.386	Time important and No. of fut. events
14 & 26	-.387	Time important and Future events score
15 & 152	.383	Speed of time and Accuracy B 4 R deviation
18 & 26	-.374	Pres. attitude to work and Future events score
20 & 26	.460	Ravens score and Future events score-density and coherence
22 & 100	-.402	Time persp. I and Day dreaming
22 & 102	-.437	Time persp. I and On waking seems just gone to sleep
22 & 106	-.382	Time persp. I and Better off if clocks never invented
25 & 26	.852*	No. future events and Future events score ext. and coherence
25 & 127	.420	No. future events and Amount test diff. B 4" time
26 & 96	-.387	Fut. Events score and Often feel in a trance
26 & 95	-.504	Fut. events score and Future too uncertain to plan
13 & 105	.408	Attitude to school and Mother dominant
13 & 92	-.503	Attitude to school and Often hard to get started
13 & 96	-.520	Attitude to school and Often in a trance
13 & 86	-.443	Attitude to school and Difficulty remembering what day or date it is
15 & 117	-.562	Speed of time and Anxious when uncertain of time

ITEMS	r	EXPLANATION
15 & 22	-.426	Speed of time passing and Time persp. I
15 & 23	-.398	Speed of time passing and Time persp. II
18 & 115	.514	Present attitude to work and Guilty if sleep late
18 & 119	.449	Present attitude to work and Guilty when late
18 & 26	-.411	Present attitude to work and Future events score
22 & 24	.649*	Time perspective I and Time persp. III
23 & 159	.555	Time perspective II and Speed diff. betw. B 2 and B 2 R
23 & 24	.879*	Time perspective II and Time persp. III
23 & 123	-.502	Time perspective II and Ext. test diff. A 2 time
23 & 117	.431	Time perspective II and Anxious when uncertain of time
24 & 117	.508	Time perspective III and Anxious when uncertain of time
24 & 159	.504	Time perspective III and Speed diff. betw. B 2 and B 2 R
24 & 66	-.528	Time perspective III and Speed diff. betw. B 2 and B 2 R
25 & 26	.745*	No. of future events and Future events score
25 & 132	-.524*	No. of future events and Ext. test diff. V 9"
20 & 126	.404	Ravens raw score and Ext. test retest diff. B 2 time
20 & 149	.423	Ravens raw score and Accuracy B 2"
20 & 150	.399	Ravens raw score and Accuracy B 2 R
20 & 151	.452	Ravens raw score and Accuracy B 4
20 & 70	-.562	Ravens raw score and Range 4" time
20 & 71	-.602	Ravens raw score and Range 4 R time
20 & 123	-.627	Ravens raw score and Ext. test diff. A 4" time
13 & 84	.575	Attitude to school and Keeping watch set fast
14 & 18	.657*	Time important and Present attitude to work
14 & 126	.531	Time important and Ext. test diff. B 2 time
14 & 128	.644	Time important and Ext. test diff. B 2 dist.
14 & 129	.585	Time important and Ext. test diff. B 4 dist.
14 & 149	.545	Time important and Accuracy B 2
14 & 151	.587	Time important and Accuracy B 4
14 & 61	-.644	Time important and Test diff. B 2 dist.
14 & 37	.465	Time important and A 4 time
14 & 150	.489	Time important and Accuracy B 2 R
18 & 22	.469	Present attitude to work and Time persp. I
18 & 24	.428	Present attitude to work and Time persp. II
18 & 128	.422	Present attitude to work and Ext. test diff. B 2 dist.

ITEMS	r	EXPLANATION
20 & 137	.641	Ravens raw score and Speed A 2
22 & 24	.795*	Time persp. I and Time persp. III (total)
22 & 44	.615	Time persp. I and B 2 R time
22 & 126	.535	Time persp. I and Ext. test diff. B 2 time
22 & 128	.554	Time persp. I and Ext. test diff. B 2 dist.
22 & 129	.547	Time persp. I and Ext. test diff. B 4 dist.
22 & 149	.574	Time persp. I and Accuracy B 2
22 & 150	.594	Time persp. I and Accuracy B 2 R
22 & 157	-.561	Time persp. I and Speed diff. betw. B 2 and B 4
23 & 24	.684*	Time persp. II and Time persp. III
24 & 126	.505	Time persp. III and Ext. test diff. B 2 time
24 & 128	.549	Time persp. III and Ext. test diff. B 2 dist.
24 & 129	.515	Time persp. III and Ext. test diff. B 4 dist.
24 & 149	.524	Time persp. III and Accuracy B 2
24 & 150	.510	Time persp. III and Accuracy B 2 R
24 & 157	-.464	Time persp. III and Speed diff. betw. B 2 and B 4

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE III

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX VERBAL ESTIMATES

ITEMS	r	EXPLANATION
29 & 31	.604*	Verbal 2" and Verbal 4"
29 & 33	.738*	Verbal 2" and Verbal 9"
29 & 151	.555*	Verbal 2" and Accuracy error B 4"
29 & 41	.661*	Verbal 2" and A dist. 4"
29 & 164	-.612*	Verbal 2" and Speed diff. betw. A 4 R and B 4 R
30 & 32	.940*	Verbal 2" R and Verbal 4" R
30 & 34	.890*	Verbal 2" R and Verbal 9 R
30 & 104	-.529	Verbal 2" R and Dominant father
30 & 163	-.637*	Verbal 2" R and Speed diff. betw. A 4 and B 4
31 & 33	.911*	Verbal 4" and Verbal 9"
31 & 151	.570*	Verbal 4" and Accuracy-error B 4
32 & 34	.892*	Verbal 4" R and Verbal 9" R
32 & 163	-.598*	Verbal 4" R and Speed diff. betw. A 4 and B 4
33 & 60	-.627*	Verbal 9" and B test diff. time 4"
33 & 62	-.523*	Verbal 9" and B test diff. dist. 4"
33 & 41	.656*	Verbal 9" and A dist. 4"
33 & 127	.643*	Verbal 9" and B extent test diff. time 4"
33 & 150	.583*	Verbal 9" and Accuracy-error B 2 R
33 & 151	.744*	Verbal 9" and Accuracy-error B 4"
34 & 100	.543	Verbal 9" R and Daydreaming a lot
63 & 64	.691*	Verbal test diff. 2" and Verbal test diff. 4"
63 & 65	.834*	Verbal test diff. 2" and Verbal test diff. 9"
63 & 70	-.639*	Verbal test diff. 2" and Range time 4"
63 & 130	-.903*	Verbal test diff. 2" and Verbal ext. test diff. 2"
63 & 132	-.679*	Verbal test diff. 2" and Verbal ext. test diff. 9"
64 & 65	.940*	Verbal test diff. 4" and Verbal test diff. 9"
64 & 130	-.655*	Verbal test diff. 4" and Verbal ext. test diff. 2"
64 & 131	-.870*	Verbal test diff. 4" and Verbal ext. test diff. 4"
64 & 132	-.920*	Verbal test diff. 4" and Verbal ext. test diff. 9"
65 & 70	-.556*	Verbal test diff. 9" and Range time 4"
65 & 130	-.803*	Verbal test diff. 9" and Verbal ext. test diff. 2"

ITEMS	r	EXPLANATION
65 & 131	-.943*	Verbal test diff. 9" and Verbal ext. test diff. 4"
65 & 132	-.877*	Verbal test diff. 9" and Verbal ext. test diff. 9"
65 & 123	-.544	Verbal test diff. 9" and A ext. test diff. time 4
29 & 31	.646*	Verbal 2" and Verbal 4
29 & 115	-.555	Verbal 2" and Guilty if sleep late
30 & 63	.902*	Verbal 2" R and V test diff. 2"
30 & 130	.890*	Verbal 2" R and Ext. test diff. V 2" time
30 & 33	.815*	Verbal 2" R and Verbal 9 R
30 & 59	-.608	Verbal 2" R and Test diff. B 2" time
30 & 60	-.612	Verbal 2" R and Test diff. B 4" time
31 & 131	.650*	Verbal 4 and Ext. test diff. V 4"
31 & 132	.649*	Verbal 4 and V 9" ext. test diff.
31 & 32	.740*	Verbal 4 and Verbal 4" R
31 & 33	.808*	Verbal 4 and Verbal 9
31 & 64	-.709*	Verbal 4 and Verbal 4"
31 & 65	-.650*	Verbal 4 and Verbal 9"
32 & 65	-.817*	Verbal 4 R and Test diff. V 9"
33 & 132	.887*	Verbal 9" and Ext. test diff. V 9"
33 & 134	.662*	Verbal 9" and Ext. test diff. circles 30"
34 & 127	.681*	Verbal 9" R and Ext. test diff. B 4 time
34 & 130	.852*	Verbal 9" R and Ext. test diff. V 2"
34 & 596	-.682*	Verbal 9" R and Test diff. B 2" time
34 & 60	-.732*	Verbal 9" R and Test diff. B 4" time
34 & 63	.753*	Verbal 9" R and Test retest diff. V 2"
63 & 127	.670*	Test diff. verbal 2" and Ext. test diff. B 4 time
63 & 130	.865*	Test diff. verbal 2" and Ext. test diff. V 2
64 & 67	-.655*	Test diff. V 4 and Test diff. circles 30"
64 & 131	-.825*	Test diff. V 4 and Ext. test diff. V 4
64 & 134	-.688*	Test diff. V 4 and Ext. test diff. circles 30"
65 & 132	-.743*	Test diff. V 9" and Ext. test diff. V 9
65 & 134	-.646*	Test diff. V 9" and Ext. test diff. circles
27 & 135	.999*	Verbal 22 mins. est. and Error on V 22
27 & 92	-.635*	Verbal 22 mins. est. and Hard to get started
28 & 118	.610	No. of the's and Written timetables
29 & 31	.820*	Verbal 2" and Verbal 4
29 & 33	.760*	Verbal 2" and Verbal 9
29 & 74	.700*	Verbal 2" and A range 4 dist.
29 & 132	.722*	Verbal 2" and Ext. test diff. V 9"
30 & 31	.821*	Verbal 2" R and Verbal 4"
30 & 32	.963*	Verbal 2" R and Verbal 4 R

ITEMS	r	EXPLANATION
30 & 33	.761*	Verbal 2" R and Verbal 9
30 & 34	.919*	Verbal 2" R and Verbal 9 R
30 & 63	.896*	Verbal 2" R and Test diff. V 2"
30 & 65	.744*	Verbal 2" R and Test diff. V 9"
30 & 73	.760*	Verbal 2" R and Range 2 R dist.
30 & 75	.748*	Verbal 2" R and Range 4 R dist.
30 & 118	.714*	Verbal 2" R and Written timetables
30 & 130	.929*	Verbal 2" R and Ext. test diff. V 2"
30 & 132	.735*	Verbal 2" R and Ext. test diff. V 9"
30 & 91	-.910*	Verbal 2" R and Poor memory for past events
31 & 32	.852*	Verbal 4 and Verbal 4" R
31 & 33	.872*	Verbal 4 and Verbal 9
31 & 34	.820*	Verbal 4 and Verbal 9 R
31 & 39	.622	Verbal 4 and A 2 dist.
31 & 73	.763*	Verbal 4 and Range 2 R dist.
31 & 74	.730*	Verbal 4 and Range 4 dist.
31 & 75	.853*	Verbal 4 and Range 4 R dist.
31 & 118	.675*	Verbal 4 and Written timetables
31 & 130	.804*	Verbal 4 and Ext. test diff. V 2"
31 & 131	.698*	Verbal 4 and Ext. test diff. V 4"
31 & 132	.871*	Verbal 4 and Ext. test diff. V 9"
31 & 91	-.793*	Verbal 4 and Poor memory for past events
32 & 33	.772*	Verbal 4 R and Verbal 9"
32 & 34	.993*	Verbal 4 R and Verbal 9 R
32 & 63	.832*	Verbal 4 R and Test diff. V 2"
32 & 65	.756*	Verbal 4 R and Test diff. V 9"
32 & 73	.691*	Verbal 4 R and Range 2" R dist.
32 & 75	.731*	Verbal 4 R and Range 4 R dist.
32 & 118	.699*	Verbal 4 R and Written timetables
32 & 130	.858*	Verbal 4 R and Ext. test diff. V 2"
32 & 132	.726*	Verbal 4 R and Ext. test diff. V 9"
32 & 91	-.945*	Verbal 4 R and Poor memory for past events
33 & 91	-.730*	Verbal 9 and Poor memory for past events
33 & 34	.884*	Verbal 9 and Verbal 9" R
33 & 35	.637*	Verbal 9 and A 2 time
33 & 40	.688*	Verbal 9 and A 2 R dist.
33 & 42	.682*	Verbal 9 and A 4 R dist.
33 & 73	.828*	Verbal 9 and Range 2" R dist.
33 & 74	.853*	Verbal 9 and Range 4 dist.
33 & 75	.894*	Verbal 9 and Range 4 R dist.
33 & 118	.657*	Verbal 9 and Written timetables
33 & 130	.793*	Verbal 9 and Ext. test diff. V 2"
33 & 132	.821*	Verbal 9 and Ext. test diff. V 9"
34 & 63	.832*	Verbal 9" R and Test diff. V 2"
34 & 65	.726*	Verbal 9" R and Test diff. V 9"
34 & 73	.792*	Verbal 9" R and Range 2" R dist.

ITEMS	r	EXPLANATION
34 & 74	.673*	Verbal 9" R and Range 4 dist.
34 & 75	.800*	Verbal 9" R and Range 4 R dist.
34 & 118	.710*	Verbal 9" R and Written timetables
34 & 130	.852	Verbal 9" R and Ext. test diff. V 2"
34 & 132	.692*	Verbal 9" R and Ext. test diff. V 9"
34 & 91	-.905*	Verbal 9" R and Poor memory for past events
63 & 65	.898*	Test diff. V 2" and Test diff. V 9
63 & 130	.804*	Test diff. V 2" and Ext. test diff. V 2"
63 & 73	.667*	Test diff. V 2" and Range 2" R dist.
63 & 91	-.851*	Test diff. V 2" and Poor memory for past events
63 & 124	.889*	Test diff. V 2" and Ext. test diff. A 2 dist.
64 & 65	.772*	Test diff. V 4" and Test diff. V 9"
64 & 131	-.674*	Test diff. V 4" and Ext. test diff. V 9"
65 & 95	-.763*	Test diff. V 9" and Future uncertain

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE IV

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX REPRODUCTION METHOD OF TIME ESTIMATION

ITEMS	r	EXPLANATION
35 & 37	.664*	A time 2" and A time 4
36 & 38	.768*	A time 2" and A time 4 R
36 & 40	.676*	A time 2" and A dist. 2 R
37 & 38	.630*	A time 4 and A time 4 R
38 & 105	.598*	A time 4 R and Mother dominant
39 & 40	.601*	A dist. 2 and A dist. 2" R
39 & 41	.708*	A dist. 2 and A dist. 4
40 & 42	.922*	A dist. 2 R and A dist. 4 R
40 & 48	.544	A dist. 2 R and B dist. 2" R
40 & 100	.537	A dist. 2 R and Daydream a lot
40 & 118	.649*	A dist. 2 R and Written timetables
41 & 42	.679*	A dist. 4 and A dist. 4 R
41 & 127	.662*	A dist. 4 and B ext. test diff. time 4"
41 & 137	-.551*	A dist. 4 and Speed A 2"
41 & 151	-.670*	A dist. 4 and Accuracy error B 4
42 & 43	.595*	A dist. 4 R and B dist. 2 R
55 & 71	.579*	A test diff. time 2" and Range 4" R
57 & 71	.575*	A test diff. dist. 2" and Range time 4 R
57 & 58	.725*	A test diff. dist. 2" and Test diff. dist. 4"
57 & 128	.707*	A test diff. dist. 2" and Ext. test diff. B dist. 2"
57 & 122	.668*	A test diff. dist. 2" and Ext. test diff. A time 2
57 & 124	.932*	A test diff. dist. 2" and Ext. test diff. A dist. 2
57 & 125	.674*	A test diff. dist. 2" and Ext. test diff. A dist. 4
57 & 146	.597*	A test diff. dist. 2" and Accuracy-error A 2 R
57 & 149	.796*	A test diff. dist. 2" and Accuracy-error B 2
57 & 155	.652*	A test diff. dist. 2" and Speed diff. betw. A 2 and A 2 R
57 & 160	.607*	A test diff. dist. 2" and Speed diff. betw. B 4 and B 4 R
57 & 59	-.796*	A test diff. dist. 2" and B test diff. time 2"
57 & 61	-.696*	A test diff. dist. 2" and B test diff. dist. 2"

ITEMS	r	EXPLANATION
58 & 125	.740*	A test diff. dist. 4" and A ext. test diff. dist. 2"
58 & 149	.666*	A test diff. dist. 4" and Accuracy error B 2
58 & 155	.676*	A test diff. dist. 4" and Speed diff. betw. A 2 and A 2 R
58 & 156	.629*	A test diff. dist. 4" and Speed diff. betw. A 4 and A 4 R
58 & 159	.620*	A test diff. dist. 4" and Speed diff. betw. B 2 and B 2 R
58 & 160	.677*	A test diff. dist. 4" and Speed diff. betw. B 4 and B 4 R
58 & 63	.679*	A test diff. dist. 4" and Verbal test diff. 2"
58 & 65	.560*	A test diff. dist. 4" and Verbal test diff. 9"
58 & 59	-.706*	A test diff. dist. 4" and B test diff. 2" time
35 & 68	.709*	A 2" time and Range 2" time
35 & 145	.959*	A 2" time and Accuracy error A 2
35 & 146	.675*	A 2" time and Accuracy error A 2 R
35 & 147	.772*	A 2" time and Accuracy error A 4
35 & 36	.675*	A 2" time and A 2 R time
35 & 37	.772*	A 2" time and A 4" time
36 & 142	.707*	A 2 R time and Speed B 2 R
36 & 38	.881*	A 2 R time and A 4" R time
36 & 46	.736*	A 2 R time and B 4" R time
36 & 145	.691*	A 2 R time and Accuracy A 2"
36 & 148	.854*	A 2 R time and Accuracy A 4 R
37 & 38	.779*	A 4 time and A 4" R time
37 & 70	.734*	A 4 time and Range time 4
37 & 145	.790*	A 4 time and Accuracy A 2"
37 & 148	.772	A 4 time and Accuracy A 4 R
38 & 46	.645*	A 4 R time and B 4 R dist.
38 & 145	.665*	A 4 R time and Accuracy A 2
38 & 146	.881*	A 4 R time and Accuracy A 2 R
39 & 164	.684*	A 2 dist. and Speed diff. betw. A 4 R and B 4 R
39 & 40	.914*	A 2 dist. and A 2 R dist.
39 & 41	.960*	A 2 dist. and A 4 dist.
39 & 42	.949*	A 2 dist. and A 4 R dist.
39 & 47	.850*	A 2 dist. and B 2 dist.
39 & 48	.834*	A 2 dist. and B 2 R dist.
39 & 49	.848*	A 2 dist. and B 4 dist.
39 & 50	.846*	A 2 dist. and B 4 R dist.
39 & 57	.744*	A 2 dist. and B 4 R dist.
39 & 58	.780*	A 2 dist. and Test diff. A 4 dist.
39 & 155	.700*	A 2 dist. and Speed diff. A 2 and A 2 R
39 & 137	.747*	A 2 dist. and Speed A 2
39 & 138	.846*	A 2 dist. and Speed A 2 R

ITEMS	r	EXPLANATION
39 & 139	.852*	A 2 dist. and Speed A 4
39 & 140	.862*	A 2 dist. and Speed A 4 R
39 & 141	.679*	A 2 dist. and Speed B 2
39 & 142	.749*	A 2 dist. and Speed B 2 R
39 & 72	.847*	A 2 dist. and Range 2" dist.
39 & 73	.846*	A 2 dist. and Range 2 R dist.
39 & 74	.885*	A 2 dist. and Range 4 dist.
39 & 124	.807*	A 2 dist. and Ext. test diff. A 2 dist.
39 & 125	.812*	A 2 dist. and Ext. test diff. A 4 dist.
39 & 128	.818*	A 2 dist. and Ext. test diff. B 2 dist.
39 & 106	-.761*	A 2 dist. and Better off if clocks never invented
40 & 106	-.890*	A 2 R dist. and Better off if clocks never invented
40 & 41	.925*	A 2 R dist. and A 4 dist.
40 & 42	.975*	A 2 R dist. and A 4 R dist.
40 & 44	.679*	A 2 R dist. and B 2 R time
40 & 46	.699*	A 2 R dist. and B 4 R time
40 & 47	.946*	A 2 R dist. and B 2 dist.
40 & 48	.941*	A 2 R dist. and B 2 R dist.
40 & 49	.934*	A 2 R dist. and B 4 dist.
40 & 50	.937*	A 2 R dist. and B 4 R dist.
40 & 57	.926*	A 2 R dist. and A 2 test dist. diff.
40 & 58	.924*	A 2 R dist. and A 4 test diff. dist.
40 & 61	.711*	A 2 R dist. and B test diff. 2" dist.
40 & 68	.652*	A 2 R dist. and Range time 2"
40 & 72	.937*	A 2 R dist. and Range dist. 2"
40 & 73	.945*	A 2 R dist. and Range dist. 2 R
40 & 74	.919*	A 2 R dist. and Range dist. 4
40 & 123	.924*	A 2 R dist. and Ext. test diff. A 4 time
40 & 125	.923*	A 2 R dist. and Ext. test diff. A 4 dist.
40 & 128	.943*	A 2 R dist. and Ext. test diff. B 2 dist.
40 & 129	.609	A 2 R dist. and Ext. test diff. B 4 dist.
40 & 137	.676*	A 2 R dist. and Speed A 2
40 & 138	.850*	A 2 R dist. and Speed A 2 R
40 & 139	.837*	A 2 R dist. and Speed A 4
40 & 140	.846*	A 2 R dist. and Speed A 4 R
40 & 141	.705*	A 2 R dist. and Speed B 2
40 & 142	.737*	A 2 R dist. and Speed B 2 R
40 & 152	.707*	A 2 R dist. and Accuracy B 4 R
40 & 155	.815*	A 2 R dist. and Speed diff. betw. A 2 and A 2 R
40 & 157	.676*	A 2 R dist. and Speed diff. betw. B 2 and B 4
40 & 164	.725*	A 2 R dist. and Speed diff. betw. A 4 R and B 4 R
41 & 106	-.773*	A 4 dist. and Better off if clocks never invented

ITEMS	r	EXPLANATION
41 & 42	.975*	A 4 dist. and A 4 R dist.
41 & 47	.834*	A 4 dist. and B 2 dist.
41 & 48	.824*	A 4 dist. and B 2 R dist.
41 & 49	.819*	A 4 dist. and B 4 dist.
41 & 50	.832*	A 4 dist. and B 4 R dist.
41 & 58	.774*	A 4 dist. and A 4 test diff. dist.
41 & 68	.662*	A 4 dist. and Range 2" time
41 & 72	.867*	A 4 dist. and Range 2" dist.
41 & 73	.861*	A 4 dist. and Range 2 R dist.
41 & 74	.946*	A 4 dist. and Range 4 dist.
41 & 75	.696*	A 4 dist. and Range 4 R dist.
41 & 124	.815*	A 4 dist. and Ext. test diff. A 2 dist.
41 & 125	.794*	A 4 dist. and Ext. test diff. A 4 dist.
41 & 128	.824*	A 4 dist. and Ext. test diff. B 2 dist.
41 & 137	.676*	A 4 dist. and Speed A 2"
41 & 139	.829*	A 4 dist. and Speed A 4
41 & 155	.710*	A 4 dist. and Speed diff. betw. A 2 and A 2 R
41 & 164	.776*	A 4 dist. and Speed diff. betw. A 4 R and B 4 R
42 & 46	.658*	A 4 R dist. and B 4 R time
42 & 48	.900*	A 4 R dist. and B 2 R dist.
42 & 50	.898*	A 4 R dist. and B 4 R dist.
42 & 57	.868*	A 4 R dist. and A 2" test diff. dist.
42 & 58	.896*	A 4 R dist. and A 4" test diff. dist.
42 & 61	.716*	A 4 R dist. and B 2 test diff. dist.
42 & 69	.675*	A 4 R dist. and Range 2 R time
42 & 73	.918*	A 4 R dist. and Range 2 R dist.
42 & 75	.654*	A 4 R dist. and Range 4 R dist.
42 & 124	.889*	A 4 R dist. and Ext. test diff. A 2 dist.
42 & 125	.882*	A 4 R dist. and Ext. test diff. A 4 dist.
42 & 128	.901*	A 4 R dist. and Ext. test diff. B 2 dist.
42 & 138	.830*	A 4 R dist. and Speed A 2 R
42 & 140	.858*	A 4 R dist. and Speed A 4 R
42 & 142	.787*	A 4 R dist. and Speed B 2 R
42 & 152	.660*	A 4 R dist. and Accuracy B 4 R
42 & 155	.804*	A 4 R dist. and Speed diff. betw. A 2 and A 2 R
42 & 164	.770*	A 4 R dist. and Speed diff. betw. A 4 R and B 4 R
42 & 106	-.864*	A 4 R dist. and Better off if clocks never invented
55 & 56	.813*	A 2" test diff. time and A 4" test diff. time
55 & 122	-.873*	A 2" test diff. time and Ext. test diff. A 2 time
55 & 123	-.758*	A 2" test diff. time and Ext. test diff. A 4 time
56 & 77	-.600	A 4 test diff. time and T.A.T. aggression
56 & 122	-.769*	A 4 test diff. time and Ext. test diff. A 2 time

ITEMS	r	EXPLANATION
56 & 123	-.867*	A 4 test diff. time and Ext. test diff. A 4 time
57 & 58	.955*	A 2 test diff. dist. and A 4 test diff. dist.
57 & 61	.723*	A 2 test diff. and B 2 test diff. dist.
57 & 68	.614*	A 2 test diff. dist. and Range 2" time
57 & 69	.905*	A 2 test diff. dist. and Range 2" dist.
57 & 73	.923*	A 2 test diff. dist. and Range 2 R dist.
57 & 74	.830*	A 2 test diff. dist. and Range 4 dist.
57 & 124	.925*	A 2 test diff. dist. and Ext. test diff. A 2 dist.
57 & 125	.917*	A 2 test diff. dist. and Ext. test diff. A 4 dist.
57 & 128	.950*	A 2 test diff. dist. and Ext. test diff. B 2 dist.
57 & 138	.736*	A 2 test diff. dist. and Speed A 2 R
57 & 139	.705*	A 2 test diff. dist. and Speed A 4
57 & 140	.709*	A 2 test diff. dist. and Speed A 4 R
57 & 141	.637	A 2 test diff. dist. and Speed B 2
57 & 142	.621	A 2 test diff. dist. and Speed B 2 R
57 & 152	.763*	A 2 test diff. dist. and Accuracy B 4 R
57 & 155	.830*	A 2 test diff. dist. and Speed diff. betw. A 2 and A 2 R
57 & 157	.749*	A 2 test diff. dist. and Speed diff. betw. B 2 and B 4
57 & 164	.671*	A 2 test diff. dist. and Speed diff. betw. A 4 R and B 4 R
57 & 106	-.909*	A 2 test diff. dist. and Better off if clocks never invented
58 & 124	.902*	Test diff. A 4 dist. and Ext. test diff. A 2" dist.
58 & 61	.779*	Test diff. A 4 dist. and Range 2" time
58 & 73	.893*	Test diff. A 4 dist. and Range 2 R dist.
58 & 74	.849*	Test diff. A 4 dist. and Range 4 dist.
58 & 128	.915*	Test diff. A 4 dist. and Ext. test diff. B 2 dist.
58 & 138	.755*	Test diff. A 4 dist. and Speed A 2 R
58 & 139	.715*	Test diff. A 4 dist. and Speed A 4
58 & 140	.757*	Test diff. A 4 dist. and Speed A 4 R
58 & 141	.673*	Test diff. A 4 dist. and Speed B 2
58 & 142	.682*	Test diff. A 4 dist. and Speed B 2 R
58 & 152	.668*	Test diff. A 4 dist. and Accuracy B 4 R
58 & 155	.867*	Test diff. A 4 dist. and Speed diff. betw. A 2 and A 2 R
58 & 163	.722*	Test diff. A 4 dist. and Speed diff. betw. A 4 and B 4
58 & 164	.642*	Test diff. A 4 dist. and Speed diff. betw. A 4 R and B 4 R

ITEMS	r	EXPLANATION
58 & 125	.926*	Test diff. A 4 dist. and Ext. test diff. A 4 dist.
58 & 106	-.915*	Test diff. A 4 dist. and Better off if clocks never invented
35 & 36	.732*	A time 2" and A 2" R time R
35 & 38	.818*	A time 2" and Range 2" time R
35 & 37	.755*	A time 2" and A 4" time
35 & 122	.721*	A time 2" and Ext. test diff. A 2" time
35 & 147	.755*	A time 2" and Accuracy A 4
36 & 38	.939*	A 2 R time and A 4 R time
36 & 148	.928*	A 2 R time and Accuracy A 4 R
37 & 38	.911*	A 4 time and A 4" R time R
37 & 145	.755*	A 4 time and Accuracy A 2
38 & 146	.940*	A 4 R time and Accuracy A 2 R
38 & 148	.990*	A 4 R time and Accuracy A 4 R
39 & 40	.895*	A 2 dist. and A 2 R dist. R
39 & 41	.944*	A 2 dist. and A 4 dist.
39 & 72	.846*	A 2 dist. and Range 2 dist.
39 & 74	.709*	A 2 dist. and Range 4 dist.
39 & 124	.631	A 2 dist. and Ext. test diff. A 2 dist.
39 & 131	.696*	A 2 dist. and Ext. test diff. V 4
39 & 137	.694*	A 2 dist. and Speed A 2
39 & 139	.774*	A 2 dist. and Speed A 4
39 & 76	-.541	A 2 dist. and T.A.T. achievement
40 & 42	.963*	A 2 R dist. and A 4 R dist.
40 & 138	.768*	A 2 R dist. and Speed A 2 R
40 & 96	-.589	A 2 R dist. and Often in a trance
41 & 42	.952*	A 4 dist. and A 4" R dist. R
41 & 72	.746*	A 4 dist. and Range 2" dist.
41 & 74	.732*	A 4 dist. and Range 4 dist.
41 & 131	.666*	A 4 dist. and Ext. test diff. V 4"
41 & 139	.797*	A 4 dist. and Speed A 4
41 & 96	-.593	A 4 dist. and Often in a trance
42 & 138	.739*	A 4 R dist. and Speed A 2 R
42 & 96	-.664*	A 4 R dist. and Often in a trance
55 & 157	.657*	Test diff. 2 time A and Speed diff. betw. B 2 and B 4
55 & 155	-.668*	Test diff. 2 time A and Speed diff. betw. A 2 and A 2 R
56 & 123	-.750*	Test diff. A 4 time and Ext. test diff. A 4 time
57 & 58	.671*	Test diff. A 4 dist. and Test diff. A 4 dist.
57 & 163	-.754*	Test diff. A 2 dist. and Speed diff. betw. A 4 R and B 4 R

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE V

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX PRODUCTION METHOD OF TIME ESTIMATION

ITEMS	r	EXPLANATION
43 & 47	.552*	B time 2" and B dist. 2"
43 & 76	.655*	B time 2" and Achievement T.A.T.
43 & 82	.755*	B time 2" and Getting up same time daily
43 & 145	-.561*	B time 2" and Accuracy-error A 2"
43 & 136		B time 2" and Verbal extent error 22 min.
44 & 46	.872*	B time 2 R and B time 4 R
44 & 48	.737*	B time 2 R and B dist. 2 R
44 & 50	.735*	B time 2 R and B dist. 4 R
45 & 61	-.561*	B time 4" and B test diff. dist. 2"
45 & 46	.800*	B time 4" and B time 4" R
45 & 49	.863*	B time 4" and B dist. 4
45 & 129	.566*	B time 4" and B ext. test diff. dist. 4"
46 & 48	.685*	B time 4 R and B dist. 2" R
45 & 50	.722*	B time 4 R and B dist. 4 R
46 & 128	.571*	B time 4 R and B ext. test diff. dist. 2"
46 & 129	.673*	B time 4 R and B ext. test diff. dist. 4"
47 & 48	.701*	B dist. 2" and B dist. 2" R
47 & 118	.631*	B dist. 2" and Written timetables
48 & 50	.936*	B dist. 2 R and B dist. 4 R
48 & 129	.634*	B dist. 2 R and B dist. ext. test retest diff. 2 R
49 & 50	.973*	B dist. 4" and B dist. 4" R
49 & 128	.644*	B dist. 4" and B dist. 2 ext. test retest diff.
49 & 129	.546*	B dist. 4" and B dist. 4 ext. test retest diff.
50 & 129	.632*	B dist. 4 R and B dist. 4 ext. test retest diff.
59 & 122	-.546*	B test diff. time 2" and Often early
59 & 124	-.848*	B test diff. time 2" and A ext. test diff. dist. 2"
59 & 125	-.551*	B test diff. time 2" and A ext. test diff. dist. 4"
59 & 145	-.711*	B test diff. time 2" and Accuracy-error A 2
59 & 155	-.551*	B test diff. time 2" and Speed diff. betw. B 2 and B 2 R
59 & 149	-.865*	B test diff. time 2" and Accuracy-error B 2
59 & 128	-.731	B test diff. time 2" and B ext. test diff. dist. 2"

ITEMS	r	EXPLANATION
59 & 142	-.568*	B test diff. time 2" and Speed B 2 R
59 & 62	.921*	B test diff. time 2" and B test diff. time 4
60 & 62	.603*	B test diff. time 4" and B test diff. dist. 4"
60 & 151	-.834*	B test diff. time 4" and Accuracy error B 4
60 & 160	-.567*	B test diff. time 4" and Speed diff. betw. B 4 and B 4 R
61 & 149	-.735*	B test diff. dist. 2" and B test diff. time 4
61 & 75	-.588*	B test diff. dist. 2" and Range dist. 4" R
61 & 122	-.547*	B test diff. dist. 2" and Often early for appointments
61 & 124	-.741*	B test diff. dist. 2" and A ext. test diff. dist. 2"
61 & 128	-.745*	B test diff. dist. 2" and B ext. test diff. dist. 2
61 & 146	-.662*	B test diff. dist. 2" and Accuracy error A 2 R
62 & 153	-.651*	B test diff. dist. 4" and Speed diff. betw. A 2 and A 4
43 & 45	.876*	B 2" time and B 4 time
43 & 126	.953*	B 2" time and Ext. test diff. B 2" time
43 & 127	.960*	B 2" time and Ext. test diff. B 4 time
43 & 136	.686*	B 2" time and V 22 mins. ext. error
43 & 149	.995*	B 2" time and Accuracy B 2
43 & 151	.874*	B 2" time and Accuracy B 4
43 & 161	.702*	B 2" time and Speed diff. betw. A 2 and B 2
43 & 162	.747*	B 2" time and Speed diff. betw. A 2 R and B 2 R
43 & 59	-.880*	B 2" time and Test diff. B 2 time
43 & 60	-.914*	B 2" time and Test diff. B 4 time
44 & 106	-.746*	B 2 R time and Better off if clocks never invented
44 & 46	.905*	B 2 R time and B 4 R time
44 & 47	.763*	B 2 R time and B 2 dist.
44 & 48	.705*	B 2 R time and B 2 R dist.
44 & 50	.755*	B 2 R time and B 4 R dist.
44 & 57	.729*	B 2 R time and A 2" test diff. dist.
44 & 69	.685*	B 2 R time and Range 2" R time
44 & 72	.704*	B 2 R time and Range 2 dist.
44 & 73	.685*	B 2 R time and Range 2 R dist.
44 & 128	.727*	B 2 R time and Ext. test diff. B 2 dist.
44 & 150	.870*	B 2 R time and Accuracy B 2 R
44 & 152	.895*	B 2 R time and Accuracy B 4 R
44 & 163	.685*	B 2 R time and Speed diff. betw. A 4 and B 4
45 & 60	-.853*	B 4 time and Test diff. B 4 time
45 & 106	-.555*	B 4 time and Better off if clocks never invented

ITEMS	r	EXPLANATION
45 & 46	.725*	B 4 time and B 4 R time
45 & 47	.770*	B 4 time and B 2 dist.
45 & 49	.769*	B 4 time and B 4 dist.
45 & 126	.883*	B 4 time and Ext. test diff. B 2 time
45 & 127	.861*	B 4 time and Ext. test diff. B 4 time
45 & 149	.877*	B 4 time and Accuracy B 2"
45 & 151	.995*	B 4 time and Accuracy B 4
45 & 162	.765*	B 4 time and Speed diff. betw. A 2 R and B 2 R
45 & 163	.736*	B 4 time and Speed diff. betw. A 4 and B 4
46 & 48	.807*	B 4 R time and B 2 R dist.
46 & 50	.816*	B 4 R time and B 4 R dist.
46 & 57	.748*	B 4 R time and A 2 test diff. dist.
46 & 58	.657*	B 4 R time and A 4 test diff. dist.
46 & 61	.688*	B 4 R time and B 2 test diff. dist.
46 & 73	.730*	B 4 R time and Range 2 R dist.
46 & 124	.658*	B 4 R time and Ext. test diff. A 2" dist.
46 & 125	.688*	B 4 R time and Ext. test diff. A 4 dist.
46 & 128	.700*	B 4 R time and Ext. test diff. B 2 dist.
46 & 146	.736*	B 4 R time and Accuracy A 2 R
46 & 148	.625*	B 4 R time and Accuracy A 4 R
46 & 150	.760*	B 4 R time and Accuracy B 2 R
46 & 152	.982*	B 4 R time and Accuracy B 4 R
46 & 157	.652*	B 4 R time and Speed diff. betw. B 2 and B 4
46 & 163	.727*	B 4 R time and Speed diff. betw. A 4 and B 4
46 & 106	-.777*	B 4 R time and Better off if clocks never invented
47 & 106	-.839*	B 2 dist. and Better off if clocks never invented
47 & 48	.917*	B 2 dist. and B 2 R dist. R
47 & 49	.994*	B 2 dist. and B 4 dist.
47 & 57	.921*	B 2 dist. and A 2" test diff.
47 & 58	.850*	B 2 dist. and A 4 test diff.
47 & 72	.869*	B 2 dist. and Range 2" dist.
47 & 124	.902*	B 2 dist. and Ext. test diff. A 2 dist.
47 & 125	.865*	B 2 dist. and Ext. test diff. A 4 dist.
47 & 128	.931*	B 2 dist. and Ext. test diff. B 2" dist.
47 & 129	.719*	B 2 dist. and Ext. test diff. B 4 dist.
47 & 137	.697*	B 2 dist. and Speed A 2
47 & 139	.808*	B 2 dist. and Speed A 4
47 & 151	.771*	B 2 dist. and Accuracy B 4
47 & 155	.750*	B 2 dist. and Speed diff. betw. A 2 R and A 2
47 & 162	.662*	B 2 dist. and Speed diff. betw. A 2 R and B 2 R
47 & 164	.687*	B 2 dist. and Speed diff. betw. A 4 R and B 4 R
48 & 50	.983*	B 2 R dist. and B 4 R dist.
48 & 57	.928*	B 2 R dist. and A 2 test diff.
48 & 61	.866*	B 2 R dist. and B 2 test diff.

ITEMS	r	EXPLANATION
48 & 73	.934*	B 2 R dist. and Range 2 R dist.
48 & 124	.931*	B 2 R dist. and Ext. test diff. A 2" dist.
48 & 125	.938*	B 2 R dist. and Ext. test diff. A 4 dist.
48 & 128	.955*	B 2 R dist. and Ext. test diff. B 2 dist.
48 & 138	.761*	B 2 R dist. and Speed A 2 R
48 & 140	.761*	B 2 R dist. and Speed A 4 R
48 & 152	.810*	B 2 R dist. and Accuracy B 4 R
48 & 155	.823*	B 2 R dist. and Speed diff. betw. A 2 R and A 2
48 & 157	.684*	B 2 R dist. and Speed diff. betw. B 2 and B 4
48 & 163	.705*	B 2 R dist. and Speed diff. betw. A 4 and B 4
48 & 164	.715*	B 2 R dist. and Speed diff. betw. A 4 R and B 4 R
49 & 57	.900*	B 4 dist. and A 2" test diff. dist.
49 & 58	.828*	B 4 dist. and A 4 test diff. dist.
49 & 72	.849*	B 4 dist. and Range 2 dist.
49 & 74	.811*	B 4 dist. and Range 4 dist.
49 & 124	.880*	B 4 dist. and Ext. test diff. A 2 dist.
49 & 125	.855*	B 4 dist. and Ext. test diff. A 4 dist.
49 & 128	.913*	B 4 dist. and Ext. test diff. B 2 dist.
49 &129	.703*	B 4 dist. and Ext. test diff. B 4 dist.
48 & 118	-.667*	B 2 R dist. and Written timetables
48 & 106	-.971*	B 2 R dist. and Better off if clocks never invented
49 & 106	-.824*	B 4 dist. and Better off if clocks never invented
49 & 137	.715*	B 4 dist. and Speed A 2"
49 & 139	.829*	B 4 dist. and Speed A 4
49 & 151	.771*	B 4 dist. and Accuracy B 4
49 & 155	.705*	B 4 dist. and Speed diff. betw. A 2 R and A 2
49 & 164	.650*	B 4 dist. and Speed diff. betw. A 4 R and B 4 R
49 & 50	.912*	B 4 dist. and B 4 R dist. R
50 & 106	-.951*	B 4 R dist. and Better off if clocks never invented
50 & 118	-.651	B 4 R dist. and Written timetables
50 & 153	-.661*	B 4 R dist. and Speed diff. betw. A 2 and A 4
50 & 57	.907*	B 4 R dist. and A 2 test diff. dist.
50 & 59	.892*	B 4 R dist. and B 2 test diff. time
50 & 61	.840*	B 4 R dist. and B 2 test diff. dist.
50 & 73	.927*	B 4 R dist. and Range 2 R dist.
50 & 124	.914*	B 4 R dist. and Ext. test diff. A 2 dist.
50 & 125	.944*	B 4 R dist. and Ext. test diff. A 4 dist.
50 & 128	.914*	B 4 R dist. and Ext. test diff. B 2 dist.
50 & 138	.747*	B 4 R dist. and Speed A 2 R
50 & 140	.762*	B 4 R dist. and Speed A 4 R
50 & 142	.683*	B 4 R dist. and Speed B 2 R
50 & 152	.819*	B 4 R dist. and Accuracy B 4 R

ITEMS	r	EXPLANATION
50 & 155	.772*	B 4 R dist. and Speed diff. betw. A 2 R and A 2
50 & 157	.682*	B 4 R dist. and Speed diff. betw. B 2 and B 4
50 & 163	.682*	B 4 R dist. and Speed diff. betw. A 4 and B 4
59 & 149	-.880*	Test diff. B 2" time and Accuracy B 2"
59 & 161	-.701*	Test diff. B 2" time and Speed diff. betw. A 2 and B 2
59 & 60	.845*	Test diff. B 2" time and Test diff. B 4 time
59 & 63	-.681*	Test diff. B 2" time and Test diff. V 2"
59 & 126	-.802*	Test diff. B 2" time and Ext. test diff. B 2 time
59 & 127	-.875*	Test diff. B 2" time and Ext. test diff. B 4 time
59 & 130	-.683*	Test diff. B 2" time and Ext. test diff. V 2 time
60 & 127	-.921*	Test diff. B 4 time and Ext. test diff. B 4 time
60 & 126	-.925*	Test diff. B 4 time and Ext. test diff. B 2 time
60 & 130	-.791*	Test diff. B 4 time and Ext. test diff. V 2"
60 & 136	-.662*	Test diff. B 4 time and Verbal 22 acc.
60 & 149	-.914*	Test diff. B 4 time and Accuracy B 2
60 & 151	-.858*	Test diff. B 4 time and Accuracy B 4
60 & 162	-.755*	Test diff. B 4 time and Speed diff. btw. A 2 R and B 2 R
60 & 63	-.691*	Test diff. B 4 time and Test diff. V 2"
61 & 163	-.743*	Test diff. B 2 dist. and Speed diff. betw. A 4 and B 4
61 & 106	-.906*	Test diff. B 2 dist. and Better off if clocks never invented
61 & 118	-.656*	Test diff. B 2 dist. and Written timetables
61 & 62	.744*	Test diff. B 2 dist. and Test diff. B 4 dist.
61 & 68	.696*	Test diff. B 2 dist. and Range 2" time
61 & 72	.861*	Test diff. B 2 dist. and Range 2" dist.
61 & 73	.773*	Test diff. B 2 dist. and Range 2 R dist.
61 & 74	.741*	Test diff. B 2 dist. and Range 4 dist.
61 & 124	.750*	Test diff. B 2 dist. and Ext. test diff. A 2 dist.
61 & 125	.810*	Test diff. B 2 dist. and Ext. test diff. A 4 dist.
61 & 128	.762*	Test diff. B 2 dist. and Ext. test diff. B 2 dist.
61 & 155	.736*	Test diff. B 2 dist. and Speed diffs. betw. A 2 and A 2 R
61 & 163	.637*	Test diff. B 2 dist. and Speed diffs. betw. A 4 and B 4
62 & 67	-.704*	Test diff. B 4 dist. and Test diff. circles 20

ITEMS	r	EXPLANATION
62 & 131	-.712*	Test diff. B 4 dist. and Ext. test diff. B 2 dist.
43 & 44	.889*	B 2" time and B 2 R time R
43 & 45	.931*	B 2" time and B 4 time
43 & 47	.952*	B 2" time and B 2 dist.
43 & 49	.945*	B 2" time and B 4 dist.
43 & 62	.925*	B 2" time and Test diff. B 4 dist.
43 & 99	.672*	B 2" time and Often in a hurry
43 & 126	.916*	B 2" time and Ext. test diff. B 2 time
43 & 127	.917*	B 2" time and Ext. test diff. B 4 time
43 & 128	.935*	B 2" time and Ext. test diff. B 2 dist.
43 & 129	.938*	B 2" time and Ext. test diff. B 4 dist.
43 & 143	.646*	B 2" time and Speed B 4
43 & 151	.929*	B 2" time and Accuracy B 4
43 & 59	-.837*	B 2" time and Test diff. B 2 time
43 & 60	-.774*	B 2" time and Test diff. B 4 time
43 & 61	-.942*	B 2" time and Test diff. B 2 dist.
43 & 157	-.83[illegible]*	B 2" time and Speed diff. betw. B 2 and B 4
44 & 46	.865*	B 2 R time and B 4 R time
44 & 48	.873*	B 2 R time and B 2 R dist.
44 & 50	.851*	B 2 R time and B 4 R dist.
44 & 62	.851*	B 2 R time and Test diff. B 4 dist.
44 & 99	.603	B 2 R time and Often in a hurry
44 & 126	.850*	B 2 R time and Ext. test diff. B 2 time
44 & 127	.825*	B 2 R time and Ext. test diff. B 4 time
44 & 128	.880*	B 2 R time and Ext. test diff. B 2 dist.
44 & 129	.866*	B 2 R time and Ext. test diff. B 4 dist.
44 & 150	.987*	B 2 R time and Accuracy B 2 R
44 & 152	.864*	B 2 R time and Accuracy B 4 R
44 & 59	-.666*	B 2 R time and Test diff. B 2 time
44 & 60	-.736*	B 2 R time and Test diff. B 4 time
44 & 61	-.845*	B 2 R time and Test diff. B 2 dist.
45 & 46	.866*	B 4 time and B 4 R time
45 & 47	.942*	B 4 time and B 2 dist.
45 & 49	.939*	B 4 time and B 4 dist.
45 & 62	.925*	B 4 time and Test diff. B 4 dist.
45 & 99	.694*	B 4 time and Often in a hurry
45 & 126	.824*	B 4 time and Ext. test diff. B 2 time
45 & 127	.880*	B 4 time and Ext. test diff. B 4 time
45 & 128	.928*	B 4 time and Ext. test diff. B 2 dist.
45 & 129	.934*	B 4 time and Ext. test diff. B 4 dist.
45 & 149	.931*	B 4 time and Accuracy B 2
45 & 152	.866*	B 4 time and Accuracy B 4 R
45 & 59	-.829*	B 4 time and Test diff. B 2 time
45 & 60	-.861*	B 4 time and Test diff. B 4 time

ITEMS	r	EXPLANATION
45 & 61	-.927*	B 4 time and Test diff. B 2 dist.
45 & 157	-.648*	B 4 time and Speed diff. betw. B 2 and B 4
46 & 48	.738*	B 4 R time and B 2 R dist.
46 & 50	.758*	B 4 R time and B 4 R dist.
46 & 62	.706*	B 4 R time and Test diff. B 4 dist.
46 & 69	.745*	B 4 R time and Range 2 R time
46 & 126	.765*	B 4 R time and Ext. test diff. B 2 time
46 & 127	.809*	B 4 R time and Ext. test diff. B 4 time
46 & 128	.733*	B 4 R time and Ext. test diff. B 2 dist.
46 & 129	.726*	B 4 R time and Ext. test diff. B 4 dist.
46 & 150	.860*	B 4 R time and Accuracy B 2 R
46 & 152	.999*	B 4 R time and Accuracy B 4 R
46 & 59	-.707*	B 4 R time and Ext. test diff. B 2 time
46 & 61	-.745*	B 4 R time and Ext. test diff. B 2 dist.
47 & 48	.993*	B 2 dist. and B 2 R dist. R
47 & 49	.998*	B 2 dist. and B 4 dist.
47 & 62	.986*	B 2 dist. and Test diff. B 4 dist.
47 & 99	.783*	B 2 dist. and Often in a hurry
47 & 126	.890*	B 2 dist. and Ext. test diff. B 2 time
47 & 127	.924*	B 2 dist. and Ext. test diff. B 4 time
47 & 128	.987*	B 2 dist. and Ext. test diff. B 2 dist.
47 & 129	.996*	B 2 dist. and Ext. test diff. B 4 dist.
47 & 143	.700*	B 2 dist. and Speed B 4
47 & 149	.952*	B 2 dist. and Accuracy B 2
47 & 151	.944*	B 2 dist. and Accuracy B 4
47 & 59	-.860*	B 2 dist. and Test diff. B 2 time
47 & 60	-.879*	B 2 dist. and Test diff. B 4 time
47 & 61	-.984*	B 2 dist. and Test diff. B 2 dist.
47 & 157	-.750*	B 2 dist. and Speed diff. betw. B 2 and B 4
47 & 163	-.674*	B 2 dist. and Speed diff. betw. A 4 and B 4
48 & 50	.992*	B 2 R dist. and B 4 R dist.
48 & 62	.994*	B 2 R dist. and Test diff. B 4 dist.
48 & 99	.779*	B 2 R dist. and Often in a hurry
48 & 126	.899*	B 2 R dist. and Ext. test diff. B 2 time
48 & 127	.933*	B 2 R dist. and Ext. test diff. B 4 time
48 & 128	.973*	B 2 R dist. and Ext. test diff. B 2 dist.
48 & 129	.994*	B 2 R dist. and Ext. test diff. B 4 dist.
48 & 150	.786*	B 2 R dist. and Accuracy B 2 R
48 & 152	.737*	B 2 R dist. and Accuracy B 4 R
48 & 59	-.832*	B 2 R dist. and Test diff. B 2 time
48 & 60	-.879*	B 2 R dist. and Test diff. B 4 time
48 & 61	-.947*	B 2 R dist. and Test diff. B 2 dist.
48 & 157	-.759*	B 2 R dist. and Speed diff. betw. B 2 and B 4
48 & 163	-.704*	B 2 R dist. and Speed diff. betw. A 4 and B 4
49 & 50	.991*	B 4 dist. and B 4 R dist. R
49 & 62	.992*	B 4 dist. and Test diff. B 4 dist.

ITEMS	r	EXPLANATION
49 & 99	.791*	B 4 dist. and Often in a hurry
49 & 126	.888*	B 4 dist. and Ext. test diff. B 2 time
49 & 127	.931*	B 4 dist. and Ext. test diff. B 4 time
49 & 128	.979*	B 4 dist. and Ext. test diff. B 2 dist.
49 & 129	.996*	B 4 dist. and Ext. test diff. B 4 dist.
49 & 143	.707*	B 4 dist. and Speed B 4
49 & 149	.945*	B 4 dist. and Accuracy B 2
49 & 151	.941*	B 4 dist. and Accuracy B 4
49 & 59	-.852*	B 4 dist. and Test. diff. B 2 time
49 & 50	-.882*	B 4 dist. and Test diff. B 4 time
49 & 61	-.973*	B 4 dist. and Test diff. B 2 dist.
49 & 157	-.757*	B 4 dist. and Speed diff. betw. B 2 and B 4
49 & 163	-.690*	B 4 dist. and Speed diff. betw. A 4 and B 4
50 & 62	.988*	B 4 R dist. and Test diff. B 4 dist.
50 & 99	.758*	B 4 R dist. and Often in a hurry
50 & 126	.883*	B 4 R dist. and Ext. test diff. B 2 time
50 & 127	.938*	B 4 R dist. and Ext. test diff. B 4 time
50 & 128	.954*	B 4 R dist. and Ext. test diff. B 2 dist.
50 &129	.982*	B 4 R dist. and Ext. test diff. B 4 dist.
50 & 144	.656*	B 4 R dist. and Speed B 4 R
50 & 150	.760*	B 4 R dist. and Accuracy B 2 R
50 & 152	.757*	B 4 R dist. and Accuracy B 4 R
50 & 59	-.858*	B 4 R dist. and Test diff. B 2 time
50 & 60	-.866*	B 4 R dist. and Test diff. B 4 time
50 & 61	-.951*	B 4 R dist. and Test diff. B 2 dist.
50 & 157	-.780*	B 4 R dist. and Speed diff. betw. A 2 and B 4
50 & 163	-.706*	B 4 R dist. and Speed diff. betw. A 4 and B 4
59 & 60	.724*	Test diff. B 2 time and Test diff. B 4 time
59 & 61	.879*	Test diff. B 2 time and Test diff. B 2 dist.
59 & 157	.691*	Test diff. B 2 time and Speed diff. betw. B 2 and B 4
59 & 127	-.804*	Test diff. B 2 time and Ext. test diff. B 4 time
59 & 128	-.822*	Test diff. B 2 time and Ext. test diff. B 2 dist.
59 & 126	-.671*	Test diff. B 2 time and Ext. test diff. B 2 time
59 & 143	-.651*	Test diff. B 2 time and Speed B 4
59 & 149	-.837*	Test diff. B 2 time and Accuracy B 2
59 & 151	-.826*	Test diff. B 2 time and Accuracy B 4
59 & 152	-.706*	Test diff. B 2 time and Accuracy B 4 R
59 & 62	-.807*	Test diff. B 2 time and Test diff. B 4 dist.
59 & 99	-.644*	Test diff. B 2 time and Often in a hurry
60 & 61	.857*	Test diff. B 4 time and Test diff. B 2 dist.
60 & 144	-.679*	Test diff. B 4 time and Speed B 4 R
60 & 149	-.774*	Test diff. B 4 time and Accuracy B 2
60 & 151	-.862*	Test diff. B 4 time and Accuracy B 4
60 & 62	-.894*	Test diff. B 4 time and Test diff. B 4 dist.
60 & 99	-.742*	Test diff. B 4 time and Often in a hurry

ITEMS	r	EXPLANATION
60 & 126	-.657*	Test diff. B 4 time and Ext. text diff. B 2 time
60 & 127	-.710*	Test diff. B 4 time and Ext. test diff. B 4 time
60 & 128	-.871*	Test diff. B 4 time and Ext. test diff. B 2 dist.
60 & 129	-.888*	Test diff. B 4 time and Ext. test diff. B 4 dist.
61 & 157	.716*	Test diff. B 2 dist. and Speed diff. betw. B 2 and B 4
61 & 62	-.948*	Test diff. B 2 dist. and Test diff. B 4 dist.
61 & 99	-.769*	Test diff. B 2 dist. and Often in a hurry
61 & 126	-.853*	Test diff. B 2 dist. and Ext. test diff. B 2 time
61 & 127	-.885*	Test diff. B 2 dist. and Ext. test diff. B 4 time
61 & 128	-.984*	Test diff. B 2 dist. and Ext. test diff. B 2 dist.
61 & 129	-.975*	Test diff. B 2 dist. and Ext. test diff. B 4 dist.
61 & 149	-.942*	Test diff. B 2 dist. and Accuracy B 2
61 & 150	-.758*	Test diff. B 2 dist. and Accuracy B 2 R
61 & 151	-.928*	Test diff. B 2 dist. and Accuracy B 4
61 & 152	-.744*	Test diff. B 2 dist. and Accuracy B 4 R
62 & 149	.925*	Test diff. B 4 dist. and Accuracy B 2
62 & 150	.758*	Test diff. B 4 dist. and Accuracy B 2 R
62 & 151	.929*	Test diff. B 4 dist. and Accuracy B 4
62 & 152	.705*	Test diff. B 4 dist. and Accuracy B 4 R
62 & 99	.805*	Test diff. B 4 dist. and Often in a hurry
62 & 126	.877*	Test diff. B 4 dist. and Ext. test diff. B 2 time
62 & 127	.918*	Test diff. B 4 dist. and Ext. test diff. B 4 time
62 & 128	.961*	Test diff. B 4 dist. and Ext. test diff. B 2 dist.
62 & 129	.992*	Test diff. B 4 dist. and Ext. test diff. B 4 dist.
62 & 143	.690*	Test diff. B 4 dist. and Speed B 4
62 & 157	-.744*	Test diff. B 4 dist. and Speed diff. betw. B 2 and B 4
62 & 163	-.709*	Test diff. B 4 dist. and Speed diff. betw. A 4 and B 4

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE VI

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX BODY TEMPO

ITEMS	r	EXPLANATION
51 & 52	.578*	Tapping and Tapping R
51 & 54	.755*	Tapping and Circles R
53 & 54	.655*	Circles drawing and Circles R
66 & 134	-.568*	Tapping test diff. and Circles ext. test diff.
51 & 52	.793*	Tapping 30" and Tapping 30 R
53 & 54	.794*	Circles 30 and Circles 30 R
54 & 67	.691*	Circles 30 R and Circles test diff.
54 & 134	.755*	Circles 30 R and Ext. test diff. circles 30
66 & 133	.831*	Test diff. tapping and Ext. test diff. tapping 30"
67 & 131	.733*	Test diff. circiles 30" and Ext. test diff. V 4
67 & 134	.815*	Test diff. circles 30" and Ext. test diff. circles
51 & 52	.884*	Tapping 30 and Tapping 30 R
51 & 79	.500	Tapping 30 and T.A.T. abasement
53 & 54	.854*	Circles 30 and Circles 30 R
54 & 134	.678*	Circles 30 R and Ext. test diff. circles
67 & 134	.931*	Circles test diff. and Ext. test diff. circles 30

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE VII

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX CONSISTENCY, DIFFERENCES BETWEEN INITIAL TEST SESSION ESTIMATES AND RETEST

ITEMS	r	EXPLANATION
122 & 146	.557*	Ext. test diff. A 2" time and Accuracy dev. fr. std. A 2" R
122 & 126	.546*	Ext. test diff. A 2" and B time 2" ext. test retest diff.
122 & 162	-.368	Ext. test diff. A 2" time and Speed diffs. A 2 R and B 2 R
123 & 130	.617*	Ext. test diff. A 4" time and Verbal ext. test diff. 2"
123 & 131	.552*	Ext. test diff. A 4" time and Verbal ext. test diff. 4"
123 & 153	-.636*	Ext. test diff. A 4" time and Speed diff. betw. A 2 and A 4
124 & 125	.788*	Ext. test diff. A 2" dist. and Ext. test diff. A 4 dist.
124 & 128	.748*	Ext. test diff. A 2" dist. and Ext. test diff. B 2 dist.
124 & 138	.614*	Ext. test diff. A 2" dist. and Speed A 2 R
124 & 142	.548*	Ext. test diff. A 2" dist. and Speed B 2 R
124 & 146	.697*	Ext. test diff. A 2" dist. and Accuracy-error A 2 R
124 & 149	.827*	Ext. test diff. A 2" dist. and Accuracy-error B 2
124 & 155	.712*	Ext. test diff. A 2" dist. and Speed diff. betw. A 2 and A 2 R
124 & 156	.571*	Ext. test diff. A 2" dist. and Speed diff. betw. A 4 and A 4 R
124 & 159	.594*	Ext. test diff. A 2" dist. and Speed diff. betw. B 2 and B 2 R
124 & 160	.619*	Ext. test diff. A 2" dist. and Speed diff. betw. B 4 and B 4 R
125 & 128	.601*	Ext. test diff. A 4" dist. and Ext. test retest diff. B 2 dist.
125 & 130	.583*	Ext. test diff. A 4" dist. and Verbal ext. test retest diff. 2"
125 & 138	.697*	Ext. test diff. A 4" dist. and Speed A 2 R

ITEMS	r	EXPLANATION
125 & 139	.559*	Ext. test diff. A 4" dist. and Speed A 4
125 & 140	.724*	Ext. test diff. A 4" dist. and Speed A 4 R
125 & 149	.617*	Ext. test diff. A 4" dist. and Accuracy error B 2
125 & 155	.639*	Ext. test diff. A 4" dist. and Speed diff. betw. A 2 and A 2 R
125 & 156	.624*	Ext. test diff. A 4" dist. and Speed diff. betw. A 4 and A 4 R
126 & 141	.744*	Ext. test retest diff. B 2" time and Speed B 2"
126 & 142	.691*	Ext. test retest diff. B 2" time and Speed B 2 R
126 & 157	.561*	Ext. test retest diff. B 2" time and Speed diff. betw. B 2 and B 4
126 & 161	-.661*	Ext. test retest diff. B 2" time and Speed diff. betw. B 2 and A 2
127 & 129	.638*	Ext. test retest diff. B 4" time and Ext. test diff. dist. 4"
127 & 150	.810*	Ext. test retest diff. B 4" time and Accuracy-error B 2 R
127 & 151	.817*	Ext. test retest diff. B 4" time and Accuracy-error B 4
127 & 152	.872*	Ext. test retest diff. B 4" time and Accuracy-error B 4 R
128 & 129	.557*	Ext. test retest diff. B 2" dist. and Ext. test diff. B dist. 4"
128 & 138	.557*	Ext. test retest diff. B 2" dist. and Speed A 2" R
128 & 140	.550*	Ext. test retest diff. B 2" dist. and Speed A 4" R
128 & 146	.565*	Ext. test retest diff. B 2" dist. and Accuracy-error A 2 R
128 & 149	.859*	Ext. test retest diff. B 2" dist. and Accuracy-error B 2
129 & 137	.572*	Ext. test retest diff. B 4" dist. and Speed A 2"
129 & 139	.639*	Ext. test retest diff. B 4" dist. and Speed A 4"
129 & 140	.599*	Ext. test retest diff. B 4" dist. and Speed A 4" R
129 & 150	.599*	Ext. test retest diff. B 4" dist. and Accuracy-error B 2 R
129 & 152	.619*	Ext. test retest diff. B 4" dist. and Accuracy-error B 4 R
130 & 131	.831*	Verbal ext. test diff. 2" and Verbal ext. test diff. 4"
130 & 132	.679*	Verbal ext. test diff. 2" and Verbal ext. test diff. 9"

ITEMS	r	EXPLANATION
131 & 132	.934*	Verbal ext. test diff. 4" and Verbal ext. test diff. 9"
122 & 123	.755*	Ext. test diff. A 2 time and Ext. test diff. A 4 time
124 & 128	.961*	Ext. test diff. A 2 dist. and Ext. test diff. B 2 dist.
124 & 138	.747*	Ext. test diff. A 2 dist. and Speed A 2 R
124 & 139	.752*	Ext. test diff. A 2 dist. and Speed A 4
124 & 140	.777*	Ext. test diff. A 2 dist. and Speed A 4 R
124 & 141	.644*	Ext. test diff. A 2 dist. and Speed B 2
124 & 142	.686*	Ext. test diff. A 2 dist. and Speed B 2 R
124 & 152	.665*	Ext. test diff. A 2 dist. and Accuracy B 4 R
124 & 155	.814*	Ext. test diff. A 2 dist. and Speed diff. betw. A s and A 2 R
124 & 157	.713*	Ext. test diff. A 2 dist. and Speed diff. betw. B 2 and B 4
124 & 164	.683*	Ext. test diff. A 2 dist. and Speed diff. betw. A 4 R and B 4 R
125 & 153	-.709*	Ext. test diff. A 4 dist. and Speed diff. betw. A 2 and A 4
125 & 128	.922*	Ext. test diff. A 4 dist. and Ext. test diff. B 2" dist.
125 & 138	.689*	Ext. test diff. A 4 dist. and Speed A 2 R
125 & 139	.720*	Ext. test diff. A 4 dist. and Speed A 4
125 & 140	.721*	Ext. test diff. A 4 dist. and Speed A 4 R
125 & 141	.660*	Ext. test diff. A 4 dist. and Speed B 2
125 & 152	.691*	Ext. test diff. A 4 dist. and Accuracy B 4 R
125 & 155	.800*	Ext. test diff. A 4 dist. and Speed diff. betw. A 2 and A 2 R
125 & 163	.607	Ext. test diff. A 4 dist. and Speed diff. betw. A 4 and B 4
125 & 167	.732*	Ext. test diff. A 4 dist. and Speed diff. betw. B 2 and B 4
125 & 164	.596	Ext. test diff. A 4 dist. and Speed diff. betw. A 4 R and B 4 R
126 & 127	.954*	Ext. test diff. B 2 time and Ext. test B 4 time
126 & 136	.670*	Ext. test diff. B 2 time and Ext. test diff. V 22 mins.
126 & 149	.952*	Ext. test diff. B 2 time and Accuracy B 2
126 & 151	.881*	Ext. test diff. B 2 time and Accuracy B 4
126 & 161	.628	Ext. test diff. B 2 time and Speed diff. betw. A 2 and B 2
126 & 162	.774*	Ext. test diff. B 2 time and Speed diff. betw. A 2 R and B 2 R

ITEMS	r	EXPLANATION
126 & 163	.500	Ext. test diff. B 2 time and Speed diff. betw. A 4 and B 4
127 & 130	.696*	Ext. test diff. B 4 time and Ext. test diff. V 2"
127 & 136	.675*	Ext. test diff. B 4 time and Verbal ext. error 22 min.
127 & 149	.960*	Ext. test diff. B 4 time and Accuracy B 2
127 & 151	.858*	Ext. test diff. B 4 time and Accuracy B 4
127 & 161	.678*	Ext. test diff. B 4 time and Speed diff. betw. A 2 and B 2
127 & 162	.744*	Ext. test diff. B 4 time and Speed diff. betw. A 2 R and B 2 R
127 & 163	.508	Ext. test diff. B 4 time and Speed diff. betw. A 4 and B 4
127 & 164	.441	Ext. test diff. B 4 time and Speed diff. betw. A 4 R and B 4 R
128 & 138	.798*	Ext. test diff. B 2 dist. and Speed A 2 R
128 & 139	.768*	Ext. test diff. B 2 dist. and Speed A 4
128 & 140	.794*	Ext. test diff. B 2 dist. and Speed A 4 R
128 & 141	.636	Ext. test diff. B 2 dist. and Speed B 2
128 & 142	.672*	Ext. test diff. B 2 dist. and Speed B 2 R
128 & 152	.702*	Ext. test diff. B 2 dist. and Accuracy-error B 4 R
128 & 155	.848*	Ext. test diff. B 2 dist. and Speed diff. betw. A 2 and A 2 R
128 & 157	.676*	Ext. test diff. B 2 dist. and Speed diff. betw. B 2 and B 4
128 & 162	.594	Ext. test diff. B 2 dist. and Speed diff. betw. A 2 R and B 2 R
128 & 163	.619	Ext. test diff. B 2 dist. and Speed diff. betw. A 4 and B 4
128 & 164	.749*	Ext. test diff. B 2 dist. and Speed diff. betw. A 4 R and B 4 R
129 & 131	.677*	Ext. test diff. B 4 dist. and Ext. test diff. V 4"
129 & 132	.696*	Ext. test diff. B 4 dist. and Ext. test diff. V 9"
139 & 134	.715*	Ext. test diff. B 4 dist. and Ext. test diff. circles 30 body T.
129 & 138	.676*	Ext. test diff. B 4 dist. and Speed A 2 R
129 & 162	.612*	Ext. test diff. B 4 dist. and Speed diff. betw. A 2 R and B 2 R
122 & 145	.721*	Ext. test diff. A 2 time and Accuracy A 2
122 & 163	-.408	Ext. test diff. A 2 time and Speed diff. betw. A 4 and B 4

ITEMS	r	EXPLANATION
123 & 155	.681*	Ext. test diff. A 4 time and Speed diff. betw. A 2 and A 2 R
124 & 138	.639*	Ext. test diff. A 2 dist. and Speed A 2 R
124 & 161	.467	Ext. test diff. A 2 dist. and Speed diff. betw. A 2 and B 2
126 & 127	.921*	Ext. test diff. B 2 time and Ext. test diff. B 4 time
126 & 128	.888*	Ext. test diff. B 2 time and Ext. test diff. B 2 dist.
126 & 129	.888*	Ext. test diff. B 2 time and Ext. test diff. B 4 dist.
126 & 149	.916*	Ext. test diff. B 2 time and Accuracy B 2
126 & 150	.794*	Ext. test diff. B 2 time and Accuracy B 2 R
126 & 151	.830*	Ext. test diff. B 2 time and Accuracy B 4
126 & 152	.763*	Ext. test diff. B 2 time and Accuracy B 4 R
126 & 157	-.766*	Ext. test diff. B 2 time and Speed diff. betw. B 2 and B 4
127 & 128	.886*	Ext. test diff. B 4 time and Ext. test diff. B 2 dist.
127 & 129	.916*	Ext. test diff. B 4 time and Ext. test diff. B 4 dist.
127 & 149	.917*	Ext. test diff. B 4 time and Accuracy B 2
127 & 150	.746*	Ext. test diff. B 4 time and Accuracy B 2 R
127 & 151	.882*	Ext. test diff. B 4 time and Accuracy B 4
127 & 152	.808*	Ext. test diff. B 4 time and Accuracy B 4 R
127 & 157	-.763*	Ext. test diff. B 4 time and Speed diff. betw. B 2 and B 4
127 & 163	-.656*	Ext. test diff. B 4 time and Speed diff. betw. A 4 and B 4
127 & 164	-.430	Ext. test diff. B 4 time and Speed diff. betw. A 4 R and B 4 R
128 & 159	.985*	Ext. test diff. B 2 dist. and Ext. test diff. B 4 dist.
128 & 143	.662*	Ext. test diff. B 2 dist. and Speed B 4
128 & 149	.935*	Ext. test diff. B 2 dist. and Accuracy B 2
128 & 150	.801*	Ext. test diff. B 2 dist. and Accuracy B 2 R
128 & 151	.801*	Ext. test diff. B 2 dist. and Accuracy B 4
128 & 152	.732*	Ext. test diff. B 2 dist. and Accuracy B 4 R
128 & 157	-.699*	Ext. test diff. B 2 dist. and Speed diff. betw. B 2 and B 4
128 & 163	-.601*	Ext. test diff. B 2 dist. and Speed diff. betw. A 4 and B 4
129 & 143	.692*	Ext. test diff. B 4 dist. and Speed B 4
129 & 149	.938*	Ext. test diff. B 4 dist. and Accuracy B 2
129 & 150	.777*	Ext. test diff. B 4 dist. and Accuracy B 2 R
129 & 151	.937*	Ext. test diff. B 4 dist. and Accuracy B 4
129 & 152	.725*	Ext. test diff. B 4 dist. and Accuracy B 4 R

ITEMS	r	EXPLANATION
129 & 163	-.673*	Ext. test diff. B 4 dist. and Speed diff. betw. A 4 and B 4
129 & 157	-.737*	Ext. test diff. B 4 dist. and Speed diff. betw. B 2 and B 4
130 & 132	.852*	Ext. test diff. V 2 and Ext. test diff. V 9
131 & 132	.695*	Ext. test diff. V 4 and Ext. test diff. V 9

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE VIII

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX RANGE OF TIME ESTIMATES

ITEMS	r	EXPLANATION
68 & 70	.615*	Range time 2" and Range dist. 2"
68 & 123	-.554*	Range time 2" and A ext. test diff. time 4"
69 & 71	.576*	Range time 2 R and Range time 4" R
70 & 130	.626*	Range time 4" and Verbal ext. test diff. 2"
70 & 131	.569*	Range time 4" and Verbal ext. test diff. 4"
70 & 123	.788*	Range time 4" and Ext. test diff. A 4" time
70 & 147	.690*	Range time 4" and Accuracy error A 4
70 & 163	-.564*	Range time 4" and Speed diff. betw. A 2 and A 4
71 & 75	.650*	Range time 4 R and Range dist. 4 R
71 & 122	.593*	Range time 4 R and A ext. test diff. time 2"
71 & 125	.604*	Range time 4 R and A ext. test diff. dist. 4"
71 & 120	-.558*	Range time 4 R and Lots of spare time
73 & 74	.750*	Range dist. 2 R and Range dist. 4"
73 & 75	.607*	Range dist. 2 R and Range dist. 4 R
73 & 90	.559*	Range dist. 2 R and Pressed for time
73 & 124	.612*	Range dist. 2 R and A ext. test diff. dist. 2"
73 & 125	.689*	Range dist. 2 R and A ext. test diff. dist. 4
73 & 138	.784*	Range dist. 2 R and Speed A 2 R
73 & 140	.705*	Range dist. 2 R and Speed A 4 R
73 & 142	.581*	Range dist. 2 R and Speed B 2 R
73 & 144	.572*	Range dist. 2 R and Speed B 4 R
73 & 155	.666*	Range dist. 2 R and Speed diff. betw. A 2 and A 2 R
74 & 75	.670*	Range dist. 4" and Range dist. 4 R
74 & 125	.767*	Range dist. 4" and A ext. test diff. dist. 4
74 & 138	.768*	Range dist. 4" and Speed A 2 R
74 & 139	.595*	Range dist. 4" and Speed A 4
74 & 140	.755*	Range dist. 4" and Speed A 4 R
74 & 155	.559*	Range dist. 4" and Speed diff. betw. A 2 and A 2 R
74 & 156	.626*	Range dist. 4" and Speed diff. betw. A 4 and A 4 R
75 & 128	.679*	Range dist. 4 R and B ext. test diff. dist. 2"
75 & 130	.561*	Range dist. 4 R and Verbal ext. test diff. 2"
75 & 124	.772*	Range dist. 4 R and A ext. test diff. dist. 2"
75 & 125	.945*	Range dist. 4 R and A ext. test diff. dist. 4"
75 & 138	.628*	Range dist. 4 R and Speed A 2 R

ITEMS	r	EXPLANATION
75 & 140	.659*	Range dist. 4 R and Speed A 4 R
75 & 149	.654*	Range dist. 4 R and Accuracy-error B 2
75 & 155	.545*	Range dist. 4 R and Speed diff. betw. A 2 and A 2 R
68 & 74	.708*	Range 2" time and Range 4" dist.
68 & 153	-.666*	Range 2" time and Speed diff. betw. A 2
68 & 124	.679*	Range 2" time and Ext. test diff. A 2 dist.
68 & 125	.698*	Range 2" time and Ext. test diff. A 4 dist.
68 & 145	.683*	Range 2" time and Accuracy A 2
68 & 106	-.752*	Range 2" time and Better off if clocks never invented
69 & 73	.734*	Range 2 R time and Range 2 R dist.
70 & 123	.676*	Range 4" time and Ext. test diff. A 4" time
70 & 147	.734*	Range 4" time and Accuracy A 4
72 & 153	-.693*	Range 2" dist. and Speed diff. betw. A 2 and A 4
72 & 73	.941*	Range 2" dist. and Range 2 R dist. R
72 & 74	.921*	Range 2" dist. and Range 4 dist.
72 & 124	.949*	Range 2" dist. and Ext. test diff. A 2 dist.
72 & 125	.955*	Range 2" dist. and Ext. test diff. A 4 dist.
72 & 128	.930*	Range 2" dist. and Ext. test diff. B 2 dist.
72 & 139	.747*	Range 2" dist. and Speed A 4
72 & 141	.558*	Range 2" dist. and Speed B 2
72 & 155	.862*	Range 2" dist. and Speed diffs. betw. A 2 and A 2 R
72 & 157	.665*	Range 2" dist. and Speed diffs. betw. B 2 and B 4
72 & 163	.706*	Range 2" dist. and Speed diffs. betw. A 4 and B 4
72 & 164	.723*	Range 2" dist. and Speed diffs. betw. A 4 R and B 4 R
72 & 106	-.971*	Range 2" dist. and Better off if clocks never invented
73 & 106	-.938*	Range 2 R dist. and Better off if clocks never invented
73 & 124	.955*	Range 2 R dist. and Ext. test diff. A 2 dist.
73 & 125	.949*	Range 2 R dist. and Ext. test diff. A 4 dist.
73 & 128	.936*	Range 2 R dist. and Ext. test diff. B 2 dist.
73 & 138	.690*	Range 2 R dist. and Speed A 2 R
73 & 140	.729*	Range 2 R dist. and Speed A 4 R
73 & 152	.728*	Range 2 R dist. and Accuracy B 4 R
73 & 155	.759*	Range 2 R dist. and Speed diff. betw. A 2 and A 2 R
73 & 157	.735*	Range 2 R dist. and Speed diff. betw. B 2 and B 4

ITEMS	r	EXPLANATION
73 & 164	.709*	Range 2 R dist. and Speed diff. betw. A 4 R and B 4 R
74 & 75	.688*	Range 4" dist. and Range 4" R dist. R
74 & 128	.881*	Range 4" dist. and Ext. test diff. B 2 dist.
74 & 139	.760*	Range 4" dist. and Speed A 4
74 & 155	.764*	Range 4" dist. and Speed diff. betw. A 2 and A 2 R
74 & 164	.773*	Range 4" dist. and Speed diff. betw. A 4 R and B 4 R
74 & 124	.858*	Range 4" dist. and Ext. test diff. A 2" dist.
74 & 125	.866*	Range 4" dist. and Ext. test diff. A 4 dist.
68 & 122	.682*	Range time 2" and Ext. test diff. A 2 time
68 & 145	.818*	Range time 2" and Accuracy A 2
69 & 126	.767*	Range 2 R time and Ext. test diff. B 2 time
69 & 127	.693*	Range 2 R time and Ext. test diff. B 4 time
69 & 157	-.691*	Range 2 R time and Speed diff. betw. B 2 and B 4
69 & 152	.744*	Range 2 R time and Accuracy B 4 R
72 & 124	.757*	Range 2 dist. and Ext. test diff. A 2 dist.
72 & 137	.671*	Range 2 dist. and Speed A 2
72 & 139	.752*	Range 2 dist. and Speed A 4
73 & 130	.834*	Range 2 R dist. and Ext. test diff. V 2
73 & 132	.814*	Range 2 R dist. and Ext. test diff. V 9
73 & 91	-.745*	Range 2 R dist. and Poor memory for past events
74 & 130	.725*	Range 4 dist. and Ext. test diff. verbal 2
74 & 131	-.659*	Range 4 dist. and Ext. test diff. verbal 4
74 & 132	.729*	Range 4 dist. and Ext. test diff. verbal 9
75 & 130	.841*	Range 4 R dist. and Ext. test diff. V 2
75 & 131	.722*	Range 4 R dist. and Ext. test diff. V 4
75 & 132	.905*	Range 4 R dist. and Ext. test diff. V 9
75 & 91	-.763*	Range 4 R dist. and Poor memory for past events

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE IX

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX SPEED

ITEMS	r	EXPLANATION
137 & 138	.802*	Speed A 2" and Speed A 2 R
137 & 139	.854*	Speed A 2" and Speed A 4
137 & 140	.793*	Speed A 2" and Speed A 4 R
137 & 143	.599*	Speed A 2" and Speed B 4
137 & 144	.629*	Speed A 2" and Speed B 4 R
138 & 139	.798*	Speed A 2" and Speed A 4
138 & 140	.929*	Speed A 2" R and Speed A 4 R
138 & 142	.660*	Speed A 2" R and Speed B 2 R
138 & 144	.746*	Speed A 2" R and Speed B 4 R
138 & 155	.605*	Speed A 2" R and Speed diff. betw. A 2 and A 2 R
138 & 156	.696*	Speed A 2" R and Speed diff. betw. A 4 and A 4 R
138 & 160	.621*	Speed A 2" R and Speed diff. betw. B 4 and B 4 R
139 & 140	.884*	Speed A 4" and Speed A 4 R
139 & 142	.565*	Speed A 4" and Speed B 2 R
139 & 143	.630*	Speed A 4" and Speed B 4
139 & 144	.671*	Speed A 4" and Speed B 4 R
140 & 142	.614*	Speed A 4 R and Speed B 2" R
140 & 143	.555*	Speed A 4 R and Speed B 4
140 & 144	.744*	Speed A 4 R and Speed B 4 R
140 & 156	.731*	Speed A 4 R and Speed diff. betw. A 4 and A 4 R
141 & 142	.659*	Speed B 2" and Speed B 2 R
141 & 157	.611*	Speed B 2" and Speed diff. betw. B 2 and B 4
141 & 159	-.582*	Speed B 2" and Speed diff. betw. B 2 and B 2 R
141 & 161	-.749*	Speed B 2" and Speed diff. betw. A 2 and B 2
141 & 162	-.588*	Speed B 2" and Speed diff. betw. A 2 R and B 2 R
142 & 143	.640*	Speed B 2 R and Speed B 4
142 & 144	.808*	Speed B 2 R and Speed B 4 R
143 & 144	.080*	Speed B 4 and Speed B 4 R
143 & 163	-.737*	Speed B 4 and Speed diff. betw. A 4 and B 4
143 & 164	-.622*	Speed B 4 and Speed diff. betw. A 4 R and B 4 R
144 &160	.569*	Speed B 4 R and Speed diff. betw. B 4 and B 4 R
144 & 164	-.666*	Speed B 4 R and Speed diff. betw. A 4 R and B 4 R

ITEMS	r	EXPLANATION
153 & 154	.564*	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 2 R and A 4 R
153 & 158	.476	Speed diff. betw. A 2 and A 4 and Speed diff. betw. B 2 and B 4 R
154 & 159	.388	Speed diff. betw. A 2 R and A 4 R and Speed diff. betw. B 2 and B 2 R
155 & 159	.445	Speed diff. betw. A 2 and A 2 R and Speed diff. bets. B 2 and B 2 R
155 & 156	.651*	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 4 and A 4 R
155 & 160	.500	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. B 4 and B 4 R
156 & 160	.617*	Speed diff. betw. A 4 and A 4 R and Speed diff. betw. B 4 and B 4 R
157 & 163	.408	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 4 and B 4
157 & 164	.423	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 4 R and B 4 R
159 & 161	.571*	Speed diff. betw. B 2 and B 2 R and Speed diff. betw. A 2 and B 2
159 & 160	.424	Speed diff. betw. B 2 and B 2 R and Speed diff. betw. B 4 and B 4 R
161 & 162	.737*	Speed diff. betw. A 2 and B 2 and Speed diff. betw. A 2 R and B 2 R
163 & 164	.758*	Speed diff. betw. A 4 and B 4 and Speed diff. betw. A 4 R and B 4 R
137 & 138	.909*	Speed A 2" and Speed A 2" R
137 & 139	.883*	Speed A 2" and Speed A 4
137 & 141	.665*	Speed A 2" and Speed B 2
137 & 143	.685*	Speed A 2" and Speed B 4
138 & 140	.950*	Speed A 2 R and Speed A 4 R
138 & 142	.874*	Speed A 2 R and Speed B 2 R
138 & 144	.707*	Speed A 2 R and Speed B 4 R
138 & 155	.787*	Speed A 2 R and Speed diff. betw. A 2 and A 2 R
138 & 156	.722*	Speed A 2 R and Speed diff. betw. A 4 and A 4 R
138 & 162	.681*	Speed A 2 R and Speed diff. betw. A 2 R and B 2 R
139 & 141	.763*	Speed A 4 and Speed B 2
139 & 143	.687*	Speed A 4 and Speed B 4
140 & 142	.906*	Speed A 4 R and Speed B 2 R
140 & 144	.789*	Speed A 4 R and Speed B 4 R
140 & 155	.749*	Speed A 4 R and Speed diff. betw. A 2 and A 2 R
140 & 156	.759*	Speed A 4 R and Speed diff. betw. A 4 and A 4 R

ITEMS	r	EXPLANATION
141 & 142	.860*	Speed B 2 and Speed B 2 R
141 & 143	.812*	Speed B 2 and Speed B 4
142 & 144	.860*	Speed B 2 R and Speed B 4 R
143 & 144	.848	Speed B 4 and Speed B 4 R
153 & 157	-.490	Speed diff. betw. A 2 and A 4 and Speed diff. betw. B 2 and B 4
153 & 161	.468	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 2 and B 2
153 & 163	-.482	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 4 and B 4
153 & 154	.568	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 2 R and A 4 R
153 & 155	-.511	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 2 and A 2 R
154 & 162	.447	Speed diff. betw. A 2 R and A 4 R and Speed diff. betw. A 2 R and B 2 R
155 &164	.684*	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 4 R and B 4 R
155 & 156	.785*	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 4 and A 4 R
155 & 157	.541	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. B 2 and B 4
155 & 162	.519	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 2 R and B 2 R
155 & 163	.509	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 4 and B 4
156 & 162	.519	Speed diff. betw. A 4 and A 4 R and Speed diff. betw. A 2 R and B 2 R
156 & 164	.518	Speed diff. betw. A 4 and A 4 R and Speed diff. betw. A 4 R and B 4 R
157 & 158	.614	Speed diff. betw. B 2 and B 4 and Speed diff. betw. B 2 R and B 4 R
157 & 163	.554	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 4 and B 4
157 & 164	.523	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 4 R and B 4 R
157 & 161	-.496	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 2 and B 2
158 & 164	.680*	Speed diff. betw. B 2 and B 4 R and Speed diff. betw. A 4 R and B 4 R
158 & 163	.474	Speed diff. betw. B 2 and B 4 R and Speed diff. betw. A 4 and B 4
159 & 160	.513	Speed diff. betw. B 2 and B 2 R and Speed diff. betw. A 2 and B 2
159 & 161	.721*	Speed diff. betw. B 2 and B 2 R and Speed diff. betw. A 4 and B 4

ITEMS	r	EXPLANATION
159 & 163	.446	Speed diff. betw. B 2 and B 2 R and Speed diff. betw. A 4 and B 4
160 & 163	.539	Speed diff. betw. B 4 and B 4 R and Speed diff. betw. A 4 and B 4
161 & 162	.464	Speed diff. betw. A 2 and B 2 and Speed diff. betw. A 2 R and B 2 R
162 & 163	.531	Speed diff. betw. A 2 R and B 2 R and Speed diff. betw. A 4 and B 4
162 & 164	.701*	Speed diff. betw. A 2 R and B 2 R and Speed diff. betw. A 4 R and B 4 R
163 & 164	.731*	Speed diff. b etw. A 4 and B 4 and Speed diff. betw. A 4 R and B 4 R
137 & 138	.731*	A 2 speed and A 2 R speed R
137 & 139	.800*	A 2 speed and Speed A 4
137 & 161	.709*	A 2 speed and Speed diff. betw. A 2 and B 2
137 & 162	.665*	A 2 speed and Speed diff. betw. A 2 R and B 2 R
137 & 164	.703*	A 2 speed and Speed diff. betw. A 4 R and B 4 R
138 & 140	.920*	Speed A 2 R and Speed A 4 R
138 & 162	.658*	Speed A 2 R and Speed diff. betw. A 2 R and B 2 R
130 & 140	.857*	Speed A 4 and Speed A 4 R
139 & 164	.731*	Speed A 4 and Speed diff. betw. A 4 R and B 4 R
140 & 164	.755*	Speed A 4 R and Speed diff. betw. A 4 R and B 4 R
142 & 159	.825*	Speed B 2 R and Speed diff. betw. B 2 and B 2 R
143 & 157	-.778*	Speed B 4 and Speed diff. betw. B 2 and B 4
143 & 144	.770*	Speed B 4 and Speed B 4 R
153 & 155	-.510	Speed diff. betw. A 2 and A 4 and Speed diff. betw. A 2 and A 2 R
154 & 164	-.431	Speed diff. betw. A 2 R and A 4 R and Speed diff. betw. A 4 R and B 4 R
155 & 156	.593	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. A 4 and A 4 R
155 & 159	.400	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. B 2 and B 2 R
155 & 157	-.553	Speed diff. betw. A 2 and A 2 R and Speed diff. betw. B 2 and B 4
156 & 164	.426	Speed diff. betw. A 4 and A 4 R and Speed diff. btw. A 4 R and B 4 R
157 & 163	.624	Speed diff. betw. B 2 and B 4 and Speed diff. betw. A 4 and B 4
157 & 159	-.760*	Speed diff. betw. B 2 and B 4 and Speed diff. betw. B 2 and B 2 R
158 & 159	.494	Speed diff. betw. B 2 and B 4 R and Speed diff. betw. B 2 and B 2 R

ITEMS	r	EXPLANATION
158 & 162	-.515	Speed diff. betw. B 2 and B 4 R and Speed diff. betw. A 2 R and B 2 R
161 & 164	.519	Speed diff. betw. A 2 and B 2 and Speed diff. betw. A 4 R and B 4 R
161 & 163	.427	Speed diff. betw. A 2 and B 2 and Speed diff. betw. A 4 and B 4
161 & 162	.420	Speed diff. betw. A 2 and B 2 and Speed diff. betw. A 2 R and B 2 R
162 & 163	.535	Speed diff. betw. A 2 R and B 2 R and Speed diff. betw. A 4 and B 4
162 & 164	.698*	Speed diff. betw. A 2 R and B 2 R and Speed diff. betw. A 4 R and B 4 R
163 & 164	.664*	Speed diff. betw. A 4 and B 4 and Speed diff. betw. A 4 R and B 4 R

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

TABLE X

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX ACCURACY

ITEMS	r	EXPLANATION
136 & 145	-.653*	Verbal 22 min. extent and Accuracy error A 2 secs.
146 & 148	.673*	Accuracy A 2" R and Accuracy A 4 R
147 & 148	.543	Accuracy A 4 and Accuracy A 4 R
149 & 151	.427	Accuracy B 2 and Accuracy B 4
149 & 159	.668*	Accuracy B 2 and Speed diff. betw. B 2 and B 2 R
150 & 152	.929	Accuracy B 2 R and Accuracy B 4 R
151 & 152	.789*	Accuracy B 4 and Accuracy B 4 R
151 & 158	.619*	Accuracy B 4 and Speed diff. betw. B 2 and B 4 R
131 & 134	.730	Ext. test diff. V 4" and Ext. test diff. circles 30 and body T.
132 &134	.682*	Ext. test diff. V 9 and Ext. test diff. circles 30 body T.
136 & 149	.686*	Verbal ext. error 22 min. and Accuracy B 2
145 & 146	.691*	Accuracy A 2 and Accuracy A 2 R
145 & 147	.790*	Accuracy A 2 and Accuracy A 4
146 & 148	.854*	Accuracy A 2 R and Accuracy A 4 R
146 & 152	.707*	Accuracy A 2 R and Accuracy B 4 R
147 & 148	.772*	Accuracy A 4 and Accuracy A 4 R
149 & 151	.874*	Accuracy B 2 and Accuracy B 4
149 & 161	.702*	Accuracy B 2 and Speed diff. betw. A 2 and B 2
149 & 162	.748*	Accuracy B 2 and Speed diff. betw. A 2 R and B 2 R
150 & 152	.773*	Accuracy B 2 R and Accuracy B 4 R
151 & 152	.691*	Accuracy B 4 and Accuracy B 4 R
151 & 162	.755*	Accuracy B 4 and Speed diff. betw. A 2 R and B 2 R
151 & 163	.730*	Accuracy B 4 and Speed diff. betw. A 4 and B 4
152 & 163	.709*	Accuracy B 4 R and Speed diff. betw. A 4 and B 4
145 & 146	.745*	Accuracy A 2 and Accuracy A 2 R
145 & 147	.755*	Accuracy A 2 and Accuracy A 4
146 & 148	.929*	Accuracy A 2 R and Accuracy A 4 R
147 & 148	.888*	Accuracy A 4 and Accuracy A 4 R
149 & 150	.823*	Accuracy B 2 and Accuracy B 2 R
149 & 151	.929*	Accuracy B 2 and Accuracy B 4

ITEMS	r	EXPLANATION
149 & 157	-.834*	Accuracy B 2 and Speed diff. betw. B 2 and B 4
150 & 152	.859*	Accuracy B 2 R and Accuracy B 4 R
151 & 152	.861*	Accuracy B 4 and Accuracy B 4 R
151 & 157	-.634	Accuracy B 4 and Speed diff. betw. B 2 and B 4
151 & 163	-.634	Accuracy B 4 and Speed diff. betw. A 4 and B 4

* P = .05
A = Reproduction method
B = Producation method
V = Verbal method
R = Retest session

TABLE XI

CORRELATION COEFFICIENTS EXTRACTED FROM THE INTERCORRELATION MATRIX PERSONALITY VARIABLES

ITEMS	r	EXPLANATION
76 & 80	.570*	Achievement and Nurturance
76 & 82	.827*	Achievement and Getting up at same time daily
76 & 145	.839*	Achievement and Accuracy error A 2"
76 & 136	-.557*	Achievement and Verbal ext. error 22 min.
77 & 102	.587*	Aggression and Waking up though just fallen asleep
78 & 107	.574*	Sex and Accurate sense of time
80 & 136	-.629*	Nurturance and Verbal ext. error 22
80 & 145	.547*	Nurturance and Accuracy-error A 2"
80 & 129	-.372	Nurturance and B 4" dist. test retest trials
81 & 129	.527	Narcissism and B ext. test diff. dist. 4"
81 & 150	.432	Narcissism and Accuracy time B 2 R
81 & 152	.390	Narcissism and Speed B 4 R
82 & 136	-.617*	Get up same time daily and Verbal accuracy 22 mins.
82 & 145	.954*	Get up same time daily and Accuracy A 2"
83 & 107	.512	Wearing a watch and Accurate sense of time
85 & 98	.397	Wish to live in world without time and Few minutes often seems hours
85 & 106	.700*	Wish to live in world without time and Clocks never invented
86 & 138	.508	Difficulty remembering what day or date and Speed A 2 R
86 & 140	.476	Difficulty remembering what day or date and Speed A 4 R
86 & 104	.361	Difficulty remembering what day or date and Father dominant
86 & 88	.366	Difficulty remembering what day or date and Like relive childhood
87 & 103	.597*	Happy childhood and Childhood days unreal
87 & 136	.371	Happy childhood and Verbal accuracy 22 mins.
87 & 162	-.368	Happy childhood and Speed diff. betw. A 2 R and B 2 R
87 & 131	-.417	Happy childhood and Test retest diff. V 4"
90 & 105	.544	Pressed for time and Dominant father
91 & 103	.439	Poor memory for past events and Childhood days unreal

ITEMS	r	EXPLANATION
91 & 136	-.508	Poor memory for past events and Verbal accuracy 22 mins.
92 & 101	.554*	Hard to get started and Memories of childhood events like yesterday
93 & 96	.484	Days go slowly weeks and months fly and Often in a trance
98 & 116	.366	Few minutes often seems like hours and Waste time a lot
98 & 106	.397	Few minutes often seems like hours and Better off if clocks never invented
100 & 147	-.381	Daydream a lot and Accuracy A 4
101 & 148	.385	Memory for childhood events like yesterday and Accuracy A 4 R
101 & 147	.652*	Memory for childhood events like yesterday and Accuracy A 4
103 & 130	-.696*	Childhood days unreal and Verbal ext. test diff. 2"
104 & 158	.464	Father dominant and Speed diff. betw. B 2 and B 2 R
104 & 119	.429	Father dominant and Guilty when late
108 & 151	.441	Easily bored and Accuracy B 4
108 & 152	.398	Easily bored and Accuracy B 4 R
108 & 127	.391	Easily bored and Ext. test retest diff. B 4 time
111 & 150	.361	Impatient to wait and Accuracy B 2 R
112 & 124	.590*	Great faith in future and A ext. test diff. dist. 2"
114 & 117	.653*	Annoyed if watch stops and Anxious when uncertain of time
116 & 119	.578*	Waste time a lot and Guilty when late
76 & 97	-.586	T.A.T. achievement and Hard time remembering dates
77 & 123	.646*	T.A.T. aggression and Ext. test diff. A 4" time
79 & 150	-.429	T.A.T. abasement and Accuracy B 2 R
80 & 81	-.541	T.A.T. nurturance and T.A.T. Narcissism
80 &127	.389	T.A.T. nurturance and Ext. test diff. B 4 time
86 & 122	.528	Difficulty remembering dates and Ext. test diff. A 2 time
86 & 117	-.678*	Difficulty remembering dates and Anxious about time
91 & 92	.478	Poor memory for past events and Hard to get started on things
91 & 96	.454	Poor memory for past events and Often in a trance
97 & 105	-.400	Hard time remembering dates and Mother dominant

ITEMS	r	EXPLANATION
101 & 104	-.432	Memories of childhood events as tho' happened yesterday and Father dominant
105 & 115	.408	Mother dominant and Guilty if sleep late
105 & 116	-.523	Mother dominant and Waste time a lot
106 & 124	-.940*	Better off if clocks never invented and Ext. test diff. A 2 dist.
106 & 125	-.953*	Better off if clocks never invented and Ext. test diff. A 4 dist.
106 & 128	-.928*	Better off if clocks never invented and Ext. test diff. B 2 dist.
106 & 139	-.669*	Better off if clocks never invented and Speed A 4
106 & 140	-.677*	Better off if clocks never invented and Speed A 4 R
106 & 151	-.555	Better off if clocks never invented and Accuracy B 4
106 & 152	-.770*	Better off if clocks never invented and Accuracy B 4 R
106 & 155	-.802*	Better off if clocks never invented and Speed diff. betw. A 2 and A 2 R
106 & 163	-.719*	Better off if clocks never invented and Speed diff. betw. A 4 and B 4
106 & 157	-.720*	Better off if clocks never invented and Speed diff. betw. B 2 and B 4
106 & 164	-.692*	Better off if clocks never invented and Speed diff. betw. A 4 R and B 4 R
106 & 110	-.468	Better off if clocks never invented and Good at saving time
106 & 150	-.441	Better off if clocks never invented and Accuracy B 2 R
106 & 153	.736*	Better off if clocks never invented and Speed diff. betw. A 2 and A 4
111 & 151	.393	Impatient to wait and Accuracy B 4
111 & 152	.460	Impatient to wait and Accuracy B 4 R
116 & 152	-.398	Waste time a lot and Accuracy B 4 R
82 & 147	.423	Get up same time daily and Accuracy A 4
82 & 145	.388	Get up same time daily and Accuracy A 2
92 & 105	-.645*	Hard to get started and Mother dominant
110 & 139	.466	Good at saving time and Speed A 4
110 & 140	.489	Good at saving time and Speed A 4 R
110 & 142	.443	Good at saving time and Speed B 2 R
110 & 144	.432	Good at saving time and Speed B 4 R
110 & 128	.509	Good at saving time and Ext. test diff. B 2 dist.
110 & 118	-.676*	Good at saving time and Written timetables
118 & 151	-.389	Written timetables and Accuracy B 4
118 & 125	-.664*	Written timetables and Ext. test diff. A 4 dist.

ITEMS	r	EXPLANATION
118 & 128	-.640	Written timetables and Ext. test diff. B 2 dist.
118 & 152	-.622	Written timetables and Accuracy B 4 R
121 & 126	.398	Often early for appts. and Ext. test diff. B 2 time
121 & 127	.393	Often early for appts. and Ext. test diff. B 4 time
95 & 96	.529	Future too uncertain to plan and Often in a trance
96 & 97	.599	Often in a trance and Hard time remembering dates
100 & 117	.408	Day dream a lot and Anxious when uncertain of time
79 & 128	.391	T.A.T. abasement and Ext. test diff. B 2 dist.
79 & 129	.409	T.A.T. abasement and Ext. test diff. B 4 dist.
91 & 103	.553	Poor memory for past events and Childhood days unreal
91 & 145	-.600	Poor memory for past events and Accuracy A 2
91 & 130	-.870*	Poormemory for past events and Ext. test diff. V 4
91 & 132	-.751*	Poor memory for past events and Ext. test diff. V 9
87 & 164	.659*	Happy childhood and Speed diff. betw. A 4 R and B 4 R
87 & 93	-.402	Happy childhood and Days go slowly weeks and months fly
87 & 95	-.446	Happy childhood and Future too uncertain to plan
87 & 107	.418	Happy childhood and Accurate idea of time
88 & 108	.480	Like to relive childhood and Easily bored
104 &105	-.529*	Father dominant and Mother dominant
105 & 134	.395	Mother dominant and Ext. test diff. circles 30
105 & 135	-.442	Mother dominant and Error 22 minds. V-accuracy
85 & 106	.431	Wish lived in world of no time and Better off if clocks never invented
99 & 152	.458	Often in a hurry and Accuracy B 4 R
99 & 111	.606	Often in a hurry and Impatient to wait
99 & 123	.678*	Often in a hurry and Ext. test diff. A 4 time
99 & 126	.670*	Often in a hurry and Ext. test diff. B 2 time
99 & 127	.695*	Often in a hurry and Ext. test diff. B 4 time
99 & 128	.772*	Often in a hurry and Ext. test diff. B 2 dist.
99 & 129	.803*	Often in a hurry and Ext. test diff. B 4 dist.
99 & 149	.672*	Often in a hurry and Accuracy B 2
99 & 151	.710*	Often in a hurry and Accuracy B 4
111 & 128	.541	Impatient to wait and Ext. test diff. B 2 dist.
111 & 129	.561	Impatient to wait and Ext. test diff. B 4 dist.
111 & 151	.501	Impatient to wait and Accuracy B 4

ITEMS	r	EXPLANATION
111 & 126	.478	Impatient to wait and Ext. test diff. B 2 time
111 & 127	.443	Impatient to wait and Ext. test diff. B 4 time
111 & 149	.432	Impatient to wait and Accuracy B 2
111 & 150	.452	Impatient to wait and Accuracy B 2 R
82 & 115	.461	Get up same time daily and Guilty if sleep late
82 & 145	-.401	Get up same time daily and Accuracy A 2
82 & 147	-.445	Get up same time daily and Accuracy A 4
84 & 88	.514	Watch set fast and Like to relive childhood
107 & 130	.539	Accurate idea of time and Ext. test diff. V 2
107 & 162	.510	Accurate idea of time and Speed diff. betw. A 2 R and B 2 R
118 & 130	.701*	Written timetables and Ext. test diff. V 2"
118 & 132	.664*	Written timetables and Ext. test diff. V 9
89 & 99	.625	One track mind and Often in a hurry
89 & 128	.564	One track mind and Ext. test diff. B 2 dist.
89 & 129	.565	One track mind and Ext. test diff. B 4 dist.
89 & 151	.550	One track mind and Accuracy B 4
89 & 149	.463	One track mind and Accuracy B 2
89 & 150	.493	One track mind and Accuracy B 2 R
89 & 126	.478	One track mind and Ext. test diff. B 2 time
95 & 96	.543	Future too uncertain to plan and Hard to get started

* P = .05
A = Reproduction method
B = Production method
V = Verbal method
R = Retest session

APPENDIX A-1

MEANS AND STANDARD DEVIATIONS FOR ALL ITEMS SUBJECTED TO STATISTICAL ANALYSIS

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
1	Age	28.07	7.47	27.08	6.66	27.08	6.66
2	Sex	1.43	.50	1.48	.51	1.48	.51
3	Marital status	1.37	.61	1.48	.59	1.40	.50
4	No. in family	3.63	1.52	3.40	1.96	2.76	1.96
5	Position in family	2.40	1.45	2.15	1.80	1.84	1.55
6	School standard achieved	9.47	.94	9.48	.92	9.48	.92
7	Occupation	3.47	1.38	3.36	1.08	3.64	.91
8	Parents marital status	2.27	1.66	2.28	1.40	2.24	1.51
9	Diagnosis-severity	2.23	.90	3.04	1.70	-	-
10	Work consistency	1.93	.83	1.35	.70	1.16	.38
11	Living conditions	1.33	.48	1.12	.33	1.12	.33
12	Upbringing	1.07	.25	1.08	.28	1.04	.20

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
13	School attitude	1.53	.51	1.32	.48	1.20	.41
14	Importance of time	1.70	.47	1.12	.33	1.04	.20
15	Speed of time	1.73	.83	1.40	.58	1.36	.57
16	Parents soc. ec. status	3.87	1.36	3.72	1.10	4.40	1.50
17	Religious intensity	3.37	1.43	3.12	1.36	3.32	1.38
18	Attitude to work	1.77	.43	1.24	.44	1.32	.48
19	Date and day	1.50	.51	1.12	.33	1.16	.37
20	Ravens Matrices	20.20	6.81	23.48	4.86	24.16	3.90
21	No. time words	4.30	1.78	4.28	1.79	3.84	1.57
22	Time Perspective I Extension	4.57	1.76	5.16	1.84	4.80	1.76
23	Time Perspective II Extension	10.73	3.69	14.72	1.62	14.56	2.77
24	Time Perspective III Extension & Coherence	15.30	4.16	19.96	2.51	19.40	3.62
25	Future-Density	6.17	2.97	8.56	1.64	8.68	1.38
26	*Future-Density Coherence&Organisation	13.83	7.54	26.08	6.88	28.92	5.82

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
27	Verbal estimate 22 mins.	18.67	6.01	23.80	6.17	21.28	7.07
28	Concentration-No. the's	10.67	3.30	11.12	3.35	10.72	3.02
29	Verbal est. 2 secs.	4.96	4.14	4.28	2.64	3.08	1.12
30	Verbal est. 2 secs. retest	3.57	3.56	4.84	5.75	3.72	2.56
31	Verbal est. 4 secs.	10.25	10.13	10.88	10.27	9.92	8.85
32	Verbal est. 4 secs. retest	6.20	5.31	9.10	11.22	7.88	6.13
33	Verbal est. 9 secs.	22.20	21.78	18.00	11.99	15.08	14.81
34	Verbal est. 9 secs. retest	13.45	12.29	17.50	16.69	12.00	7.52
35	A Linear reproduction of buzzer 2 sec. Time	2.27	.70	2.18	.79	2.13	.62
36	A Linear reproduction of buzzer 2 sec. R Time	2.04	.64	1.90	.61	1.90	.57
37	A Linear reproduction of buzzer 4 sec. Time	4.22	1.13	4.04	1.34	4.04	1.20
38	A Linear reproduction of buzzer 4 sec. R Time	3.80	1.15	3.61	1.39	3.62	1.09

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
39	A Linear Reproduction of buzzer 2 sec. Dist.	27.09	9.28	27.10	13.85	23.01	12.27
40	A Linear Reproduction of buzzer 2sec. R Dist.	31.42	26.19	28.04	15.57	25.36	21.77
41	A Linear Reproduction of buzzer 4 sec. Dist.	46.91	30.30	50.71	27.92	40.49	27.45
42	A Linear Reproduction of buzzer 4sec. R Dist.	52.95	40.34	52.13	29.29	43.86	39.14
43	B Verbal stimulus & linear production 2 sec. Time	3.14	4.67	2.13	3.06	1.90	.24
44	B Verbal stimulus & linear production 2 sec. R Time	2.18	1.46	1.73	1.59	1.82	1.13
45	B Verbal stimulus & linear production 4 sec. Time	4.49	4.03	2.97	2.53	3.70	2.89
46	B Verbal stimulus & linear production 4 sec. R Time	4.11	2.90	2.75	2.07	3.31	2.10
47	B Verbal stimulus & linear production 2 sec. Dist.	29.79	22.37	26.49	16.51	17.31	16.83

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
48	B Verbal stimulus & linear production 2 sec. R Dist.	26.41	26.19	21.04	18.58	20.11	16.84
49	B Verbal stimulus & linear production 4 sec. Dist.	59.85	41.68	42.70	21.20	33.09	25.91
50	B Verbal stimulus & linear production 4 sec. R Dist.	57.79	48.71	28.92	27.19	30.66	27.39
51	Body tempo Tapping No.	91.37	46.65	99.60	39.25	82.20	25.39
52	Body tempo Tapping No. retest	95.37	35.70	112.60	37.90	91.40	34.23
53	Body tempo Circles No.	26.60	16.09	21.56	10.27	19.68	9.41
54	Body tempo Circles No. retest	30.13	13.81	30.48	13.49	24.40	12.95
55	A Amount of test retest difference-Direction A 2 Time	-.39	.37	-.30	.24	-.26	.05
56	A Amount of test retest difference-Direction A 4 Time	-.48	.11	-.42	.37	-.41	.08

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
57	A Amount of test retest difference-Direction A 4 Dist.	4.35	2.19	-.30	.09	2.35	1.04
58	A Amount of test retest difference-Direction A 4 Dist.	5.68	3.04	1.42	.89	3.42	1.40
59	B Amount of test retest difference-Direction B 2 Time	-.37	.27	-.22	.18	-.77	.20
60	B Amount of test retest difference-Direction B 4 Time	-.25	.26	-.21	.20	-.40	.28
61	B Amount of test retest difference-Direction B 2 Dist.	-3366	3.03	-5.47	4.62	2.81	1.32
62	B Amount of test retest difference-Direction B 4 Dist.	4.98	2.95	12.46	6.60	-1.09	1.34
63	Amount of test retest difference V 2 secs.	-1.48	.60	.72	.47	.64	.22
64	Amount of test retest difference V 4 sec.	-4.18	1.53	-1.38	.60	-2.20	.59

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
65	Amount of test retest difference V 9 secs.	-9.00	6.64	-.34	.28	-3.08	1.47
66	Amount of test retest difference Body Tempo Tapping	2.62	1.90	8.28	2.13	9.20	2.24
67	Amount of test retest difference Body Tempo Circles	3.91	2.93	8.52	7.62	4.72	3.91
68	A Range of estimations 2 sec. Time	1.37	1.19	1.34	.95	.94	.69
69	A Range of estimations 2 R sec. Time	.91	.46	.86	.60	.66	.35
70	A Range of estimations 4 sec. Time	2.10	1.78	2.05	1.10	1.94	1.53
71	A Range of estimations 4 R sec. Time	1.59	.95	1.41	.75	1.30	.67
72	A Range of estimations 2 sec. Dist.	9.64	5.74	10.58	9.46	10.32	7.33
73	A Range of estimations 2 R sec. Dist.	9.96	8.92	11.76	5.51	7.98	2.58
74	A Range of estimations 4 sec. Dist.	22.29	21.41	20.08	18.80	20.46	9.51

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
75	A Range of estimations 4 R sec. Dist.	24.47	21.20	14.56	7.57	11.95	6.17
76	T.A.T. Achievement	9.50	3.03	9.64	1.98	10.16	2.15
77	T.A.T. Aggression	16.43	4.92	11.68	2.23	11.48	3.57
78	T.A.T. Sex	10.63	4.41	9.08	1.63	10.44	2.10
79	T.A.T. Abasement	14.57	3.70	10.52	1.85	12.68	4.22
80	T.A.T. Nurturance	9.67	1.90	11.88	2.07	16.96	4.47
81	T.A.T. Narcissism	2.10	2.03	1.56	.51	1.76	.44
82	Getting up in morning	2.10	2.03	1.56	.51	1.76	.44
83	Wearing a watch	1.27	.45	1.08	.28	1.20	.41
84	Watch set fast	1.83	.59	1.68	.48	1.76	.44
85	World without time	1.67	.48	1.88	.33	1.84	.47
86	Difficulty remembering day date	1.67	.80	1.48	.51	1.44	.51
87	Happy childhood	1.27	.58	1.32	.48	1.08	.40
88	Relive childhood	1.77	.43	1.80	.41	1.80	.41
89	One tracked mind	1.60	.56	1.84	.80	1.72	.46

Item No.	Description	NEUROTIC M.	NEUROTIC S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
90	Pressed for time	1.80	.92	1.56	.51	1.68	.48
91	Poor memory for past	1.67	.55	1.96	.20	1.84	.37
92	Hard to get started	1.30	.47	1.60	.50	1.36	.57
93	Weeks & months fly	1.30	.65	1.32	.56	1.24	.44
94	Not enough time	1.70	.79	1.44	.51	1.52	.51
95	Future too uncertain	1.57	.82	1.72	.74	1.44	.51
96	Feel in a trance(dwaal)	1.33	.55	1.40	.50	1.52	.51
97	Difficulty remembering when things happened	1.17	.38	1.36	.49	1.28	.46
98	Minutes often like hours	1.40	.72	1.48	.51	1.60	.50
99	Often in a hurry	1.47	.82	1.32	.69	1.36	.49
100	Day dreaming a lot	1.47	.73	1.55	.51	1.60	.50
101	Childhood memories	1.47	.51	1.36	.49	1.64	.49
102	Wake up	1.67	.96	1.56	.71	1.68	.69
103	Childhood days unreal	1.70	.54	1.88	.33	1.76	.44
104	Father dominant	1.37	.56	1.52	.51	1.56	.58

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
105	Mother dominant	1.67	.48	1.56	.51	1.60	.50
106	Clocks never invented	1.67	.48	1.80	.41	1.96	.20
107	Accurate idea of time	1.43	.68	1.24	.44	1.04	.35
108	Easily bored	1.57	.73	1.48	.51	1.68	.56
109	Definite idea next summer	1.83	.65	1.64	.49	1.52	.51
110	Good at saving time	1.80	.76	1.28	.46	1.16	.37
111	Impatient to wait	1.27	.52	1.40	.58	1.36	.49
112	Faith in future	1.90	.80	1.28	.46	1.28	.54
113	Need deadlines	1.43	.68	1.76	.44	1.52	.59
114	Annoyed watch stops	1.60	.50	1.60	.50	1.52	.51
115	Guilty sleep late	1.50	.57	1.44	.50	1.64	.49
116	Waste time	1.30	.70	1.52	.71	1.48	.51
117	Anxious uncertain of time	1.70	.47	1.68	.48	1.64	.49
118	Written timetables	1.97	.56	1.80	.65	1.99	.03
119	Guilty when late	1.30	.54	1.04	.20	1.32	.48

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
120	Spare time	1.60	.81	1.72	.46	1.56	.51
121	Often early	1.33	.48	1.28	.46	1.24	.44
122	Extent test retest diff. A 2 Time	.52	.47	.48	.39	.38	.37
123	Extent test retest diff. A 4 Time	.73	.69	.56	.44	.62	.61
124	Extent test retest diff. A 2 Dist.	8.15	7.26	4.59	3.52	4.98	3.09
125	Extent test retest diff. A 4 Dist.	15.38	13.72	6.29	5.38	6.65	4.71
126	Extent test retest diff. B 2 Time	2.09	2.08	1.02	1.01	.78	.18
127	Extent test retest diff. B 4 Time	1.97	1.57	.93	.18	1.29	1.24
128	Extent test retest diff. B 2 Dist.	13.03	7.54	9.07	7.57	5.50	2.27
129	Extent test retest diff. B 4 Dist.	17.78	14.23	16.79	14.98	6.62	2.61
130	Extent test retest diff. Verbal 2	2.26	1.76	2.04	1.43	1.20	1.19

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
131	Extent test retest Verbal 4	13.67	13.11	3.46	3.07	3.40	3.28
132	Extent test retest Verbal 9	6.42	4.55	4.02	3.72	6.60	3.47
133	Extent test retest diff. Body Tempo Tapping	26.80	25.92	16.68	15.29	16.16	14.84
134	Extent test retest diff. Body Tempo Circles	10.83	8.53	9.32	6.57	5.92	5.02
135	Verbal 22 mins. error direction	-3.03	2.04	1.80	.62	-.72	.70
136	Verbal 22 mins. error extent	5.73	3.66	5.56	3.04	5.84	3.87
137	Speed A 2 inches per sec.	12.89	6.40	12.95	5.33	10.85	5.09
138	Speed A 2 R inches per sec.	14.90	7.65	14.97	6.92	12.79	7.15
139	Speed A 4	11.48	5.89	12.58	5.46	9.83	5.63
140	Speed A 4 Retest	13.68	7.93	15.32	7.57	11.61	7.25
141	Speed B 2	13.46	9.54	10.14	4.41	10.71	5.85

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
142	Speed B 2 Retest	13.45	7.93	12.07	5.95	10.55	5.22
143	Speed B 4	11.85	8.70	11.18	5.66	9.84	5.11
144	Speed B 4 Retest	13.16	10.78	10.08	5.17	9.95	5.88
145	Accuracy A 2"	1.01	.40	.18	.08	.09	.06
146	Accuracy A 2" R	.09	.06	-.09	.06	-.09	.06
147	Accuracy A 4"	.26	.10	.04	.03	.04	.01
148	Accuracy A 4" R	-.14	.11	-.35	.14	-.32	.11
149	Accuracy B 2	.58	.29	.12	.03	-.10	.02
150	Accuracy B 2 R	.11	.10	-.33	.12	-.31	.10
151	Accuracy B 4	.59	.50	-.99	.35	-.21	.04
152	Accuracy B 4 R	.19	.03	-1.24	.21	-.62	.21
153	Speed differences between A 2 & A 4	1.72	1.57	.36	.34	.97	.25
154	Speed differences between A 2 R & A 4 R	.95	.31	-.34	.29	1.14	.22
155	Speed differences between A 2 & A 2 R	2.11	1.43	2.03	1.47	1.89	1.31

Item No.	Description	Neurotic M.	Neurotic S.D.	Medical M.	Medical S.D.	Normal M.	Normal S.D.
156	Speed differences between A 4 & A 4 R	2.45	2.38	2.73	2.40	1.79	1.48
157	Speed differences between B 2 & B 4	1.35	1.01	-1.04	.70	.75	.36
158	Speed differences between B 2 & B 4 R	2.02	1.48	2.10	1.48	1.00	.30
159	Speed differences between B 2 & B 2 R	-.34	.09	1.93	.78	-.16	.03
160	Speed differences between B 4 & B 4 R	1.06	.64	-1.17	.79	-.29	.12
161	Speed differences between A 2 & B 2	.28	.10	3.47	2.83	.18	.07
162	Speed differences between A 2 R & B 2 R	1.59	.64	2.90	2.74	2.47	2.37
163	Speed differences between A 4 & B 4	-.40	-.06	1.40	.64	.26	.20
164	Speed differences between A 4 R & B 4 R	.93	.68	5.24	4.71	2.34	1.44

APPENDIX B

BRIEF DESCRIPTION OF SUBJECTS IN THE NEUROTIC GROUP

Subject One

27 year old, unmarried female. Went as far as Std. 7 at school. The fifth of six children all brought up in an institution. Has held the same job as a typist and switchboard operator for ten years and presently on temporary leave. Living alone. Anxious and depressed.

Subject Two

19 year old, unmarried male. Went as far as Std. 8 at school. Only child of mother's first marriage. Has railway job as clerk and also on temporary leave. Living at home with mother who has remarried. Anxious and depressed.

Subject Three

19 year old, unmarried male. Went as far as Std. 10 at school and just finished. Eldest of two children and living at home with parents. Not occupied at present but thinking of doing medicine. Did well at school. Had hysterical paralysis of leg previously. Anxiety state, particularly concerned about the future.

Subject Four

36 year old married childless female. Husband blind telephonist. Went as far as matric at school. The youngest in a family of three. Resigned from job of own accord. Typist bookkeeper with a good work record at a funeral parlour, but wants to do other kind of work. Married 11 years. Living with husband and managing own home. Depression and anxiety with obsessional features and kleptomania.

Subject Five

32 year old married female with two children. Husband a doctor. Patient also a doctor. Youngest in family of three. Father died when patient seven years old. Mother died two years ago. Resigned from hospital post recently as unable to function at work. Living at home with husband and family. Married seven years. Severe depressive reaction to mother's death and very anxious.

Subject Six

32 year old married female with two children. Went as far as matric and did well at school. Worked only for a short while in office. Now a housewife. The youngest in a family of three. Husband small business owner. Married nine years.

Living at home with husband and children, cannot manage household. Depression in a basically hysterical personality.

Subject Seven

21 year old unmarried male. Honours student and part time demonstrator. Excellent academic record. Not able to attend university, now on sick leave. Will return to studies. Elder of two children. Father lawyer and politician. Patient living at home with parents and sister. Acute anxiety state and depression. Father also confirmed alcoholic.

Subject Eight

37 year old unmarried female. Father living, mother died six years ago. Failed Std. 9 at school but then went to technical college and completed Std. 9 there plus commercial course and shorthand typing. Has worked in same job for 17 years and regarded as highly efficient, very devoted to employers. Lives on own in a flat. Depression which has built up very gradually over the last number of years.

Subject Nine

19 year old unmarried male. Went as far as Std. 8 at school and then left in middle of Std. 9 because of difficulties

concentrating. Has poor work record over last two years. Mother had just died after lengthy illness. Patient living at home with father, a chemist, and 24 year old brother, a doctor. Patient the younger of two boys. Depression and anxiety state.

Subject Ten

31 year old female, married to an accountant and has one child. Been doing clerical work but no longer working and has just taken unpaid leave. Patient the fourth in a family of five. Father worked on railways all his life now retired. Parents live near patient. Patient living at home with husband and son. Depression and anxiety.

Subject 11

24 year old unmarried male. Went as far as Std. 8 at school. Would like to go back now. Working as a clerk in the police force for the last five years but never liked it. Now left and has no job. Mother died when patient was 12. Patient the second of four children. Father now remarried and patient living with this family. Stepmother has three children of her own. Anxiety state and depression.

Subject 12

27 year old unmarried male. Highly qualified in physics, lecturing at university. On sick leave from department. Only child, until recently living with parents but now sharing a house with friends. Father civil engineer. Patient used to love work until suddenly found he could no longer cope because of extreme anxiety. depression and many psychosomatic complaints.

Subject 13

Married 33 year old female. Separated from husband, has an only child who is brain damaged. Went as far as matric at school and then to college. Always enjoyed working until before pregnancy three years ago. Patient youngest of three children. Father died when patient 3½ years old. Patient now living with mother who is an executive in a large business organisation. Depressive reaction in response to traumatic experience of birth of brain damaged child and husband's disinterest.

Subject 14

26 year old unmarried female. Lecturer at university on sick leave from department. The eldest of four children.

Parents living overseas, patient only been here two years. Father a representative for large firm selling business systems. Patient sharing a flat with older colleague. Anxiety and depression.

Subject 15

24 year old unmarried male. Technician--engineering tool maker. Educated overseas. Working for S.A. Navy but recently dismissed because of poor participation at work. Been back in the country just over a year. The eldest of three children. Parents had emigrated to S.A. again and patient came to visit and remained. Had good job before but liked it here initially. Father is an engineer. Patient lives on own. Very anxious and recently very depressed.

Subject 16

19 year old unmarried male. Went as far as Std. 10. Now on sick leave from council. Never liked school or work, wants to join merchant navy. Eldest of five children. Father clerk in city council. Mother used to work in the bank but had a baby nine months ago so is now at home. Patient living with own family. Depressed, anxious and very restless.

Subject 17

24 year old unmarried female. Went as far as Std. 7 at school. Did nursing and then went to Europe. Both parents dead many years and patient the second youngest of four children. Two elder brothers married. Had a part time job when became ill but since given it up. Went to Europe and came straight back. Boarding with a family. Depression in a basically hysterical personality.

Subject 18

21 year old unmarried female. Qualified junior school teacher recently dismissed from her post at a school away from her Cape Town home. First year of teaching but always worked hard at school and college. The eldest of four children. Now living at home with parents. Father a commercial traveler. Patient says she is going back to teaching. Hysteric in an acute anxiety state.

Subject 19

37 year old married female who has two children. Been in S.A. since 1947. Took Std. 10 in S.A. and became comptometer operator. Still working on Saturdays and one afternoon during the week. Patient the youngest of five children. Lives at

home with husband and children. Married 20 years. Goes to work enthusiastically but has to have someone take her and fetch her. Depression and phobic reaction since mother's death 1½ years ago.

Subject 20

19 year old male. Went as far as Std. 10 at school. Now a motor mechanic apprentice on sick leave. Away from home town and boarding with family. Two in family and patient the eldest. Parents are not in Cape Town and the patient is very lonely here. Anxiety state and depression.

Subject 21

26 year old unmarried male. Matriculated and then took a B.Sc. Became a school teacher but found responsibility too much and lost control. Was a good scholar. Living at home with parents and brother. Patient is the older of the two in family. Father retired radio shop owner. Depressed, phobic and anxious.

Subject 22

22 year old unmarried male. Matriculated and then went to work in bank and has been there since leaving school, but has suddenly lost interest in it. Second eldest in family

of four. Father has always worked on railways. Living at home with family. Depressed and anxious about the future.

Subject 23

28 year old unmarried male. Teacher in primary church school where father is the principal. Still living with father although had been teaching at other church schools and was highly thought of. Now on sick leave from school. Patient is the second eldest of six children. Very strict family, rigid upbringing. Obsessive neurosis with depression.

Subject 24

34 year old divorced female medical student in final year of study. Has one child who lives with her. She used to teach for the Methodist Church before deciding to do matric and then medicine. Patient is the fourth of five children. Parents both dead for many years. Living in a flat now and the rest of her family are overseas. The father had been considered a very unreliable individual. Depressed and anxious but improving rapidly. Had made a suicide attempt but the consequences were not serious.

Subject 25

40 year old married female. Had matriculated and was just

B 1 >

two subjects short of a Social Science degree. Left to get married and had always found study very easy and was anxious to finish her degree. But husband, a civil engineer, worked too far away from any university for her to complete the course. Father a butcher in the country and the patient was the eldest of four children. Living at home with husband and three children. Had taken part time late afternoon job as cashier in supermarket, while attending the day hospital. Had been depressed for a few years and then recently made a suicide attempt. Now physically recovered and fit but still depressed and filled with feelings of inferiority.

Subject 26

38 year old divorced female. No children and born in Europe but came to S.A. as an infant. Has a degree in Languages and has always held good responsible jobs until the onset of her recent illness. Now quite unable to work. The youngest of a family of three. Now living at home with parents. Father a manufacturer's representative who had formal schooling until what could be considered an equivalent of Std. 8. Father however considered to be a highly knowledgable well read individual. Patient depressed had attempted

suicide recently but had been depressed for two years previously. Now also looking for a new job and somewhat improved.

Subject 27

25 year old unmarried female. Matriculated and then took shorthand typist's course. Always did well at school but found working more difficult. Had had "a nervous breakdown" four years previously after unfortunate love affair and then left home and came to live in Cape Town. Very dependent on mother till she left home four years ago after breakdown. Youngest of three children and father had died when the patient was 15 years old. Resigned from job to attend day hospital. Anxiety state with obsessional features.

Subject 28

42 year old unmarried male. Had gone as far as matric at school and then into the army and been troubled ever since. Presently registered as a student in a librarianship course but he is considering giving it up altogether. Seven children in the family and he was the fourth. Father had owned a general dealer's shop but had been dead seven years already. Mother also died long before that. Now living on

own but near to sister. Has had many different kinds of jobs since the army. Has many varied intellectual interests. Depressed and anxious, passive dependent personality.

Subject 29

41year old unmarried female. Matriculated and did publicity work for safety first organisation for 20 years. Then spent three years working for an insurance firm but was dismissed for taking extended sick leave. Company would however be prepared to take her back should her health improve as she had been considered most efficient. Youngest in a family of six children. Living with invalid mother. Had attempted suicide after a hysterectomy. Father had been a barman and died when he was 41 years old. The patient is now considered physically fit but is still suffering a reactive depression and is basically a hysterical personality.

Subject 30

20 year old unmarried female. Went as far as Std. 9 at school and then became a hairdresser. Much in demand in her trade. Parents living in country and father in police force. Patient very worried about what is happening to parents all the time, although living on own away from them. The youngest

APPENDIX C

DETAILED DESCRIPTION OF DATA SUBJECTED TO STATISTICAL ANALYSIS, INDICATING SOURCE OF MATERIAL, CODING, SCORING, AND RATING SYSTEMS WHERE RELEVANT.

Personal Social Data Items 1-12 and 16-17

1. Age - Age taken to the nearest year.

2. Sex - Male or female F = 1 M = 2.

3. Marital status - Single 1
   Married 2
   Divorced 3
   Widowed 4

4. Number in family i.e. how many siblings in their own family.

5. Position in family i.e. subject's position in his own family.

6. School standard achieved - Highest standard passed at school.

7. Occupation - Implicit in the rating scale applied here is a reflection of the extent of schooling and post school

training the subject had received. All subjects were rated on a 7 point scale according to the system suggested by Hollingshead and Redlich (1958). As this is an American system based on American culture patterns it could not be directly applied here and the following adaptation was made:

Rating	Explanation
1	Post-graduate professional training
2	Matriculation plus a university degree
3	Stds. 9 and 10 and a college diploma
4	Stds. 9 and 10 and skill acquired while working on the "job"
5	Std. 8 and skill acquired by taking a college course or apprenticeship where Std. 8 was a minimum requirement
6	Std. 6 or 7 and a trade skill
7	Std. 6 and no skill or trade

8. Parents living or divorced

1 Living together

2 Divorced

3 Mother dead

4 Father dead

5 Both dead

9. Diagnosis

The neurotic patients were rated on a 5 point scale for the severity of their illness as compared with the other members of the group. On the basis of consultation with the doctor treating the patiants the most severely ill patient was given a rating of 5 while the least ill in the group was given a rating of 1. In this way a scale of severity of illness was built up for the Neurotic Group.

The medical patients were rated in the same way. As the neurotic group of patients were all seen at a relatively more acute stage of their illness it was a little easier to evaluate them in this way. Many of the medical patients were well beyond the acute stage of their illnesses (they could not have been tested during the acute episodes). But they were all in the need of regular medical treatment. They were however rated in the same way according to the present level of severity of illness.

11. Living conditions - 2 point rating scale

1 Living at home with parents or with own family, or in family group

2 Living alone

12. How the subjects were brought up

1 At home of parents

2 In an institution or foster home

16. Parents Social Economic Status

The parents were rated according to the Hollingshead Index of Social Position (Hollingshead and Redlich 1958 pp. 387-397) adapted to make it relevant to the appropriate South African cultural pattern.

Rating	Explanation
1	Executive and proprietors of large concerns and major professionals
2	Managers and proprietors of medium sized businesses and lesser professionals
3	Administrative personnel of large concerns, owners of small independent businesses and semi-professionals
4	Owners of little businesses, clerical and sales workers and technicians
5	Skilled workers
6	Semi-skilled workers
7	Unskilled workers

17. The groups were all rated for intensity of religious belief in an intra-group member comparison. From the most deeply religious subject who would have a rating of 1 to the most non-religious member who would have a rating of 5. Scale from 1-5.

Attitudes Towards School Work and Time

13. Attitude toward school - rated on a 2 point scale

1 Favourable attitude towards school

2 Unfavourable attitude towards school

14. Attitude towards time - rated on a 2 point scale

1 Time important

2 Time not important

Don't care attitude was always given zero

15. Speed of time passing - rated on a 3 point scale

1 Fast

2 Slow

3. Don't care attitude or do not see time as fast or slow

18. Attitude towards work - rated on a 3 point scale

1 Favourable

2 Unfavourable

3 Don't care about work

10. Word record - rated on a 3 point sclae

1 Good (consistent)

2 Fair

3 Poor

19. Knowledge of the days date - rated on a 2 point scale

1 Date correct

2 Date incorrect

Orientation for the day and date - both had to be correct to rate 1 on 2 occasions

20. Ravens Matrices

All subjects were given the National Institute for Personnel Research Air Force Version of the Ravens Progressive Matrices. Subject's score was the number of items he answered correctly and the raw scores were used in the statistical criteria. It was not timed.

Time Perspective Items 21-26

21. Time Words

A list of 20 words was read to the subjects in the following order: 1 school, 2 minute, 3 door, 4 yesterday, 5 house, 6 week, 7 sand, 8 tomorrow, 9 window, 10 second, 11 shoe, 12 hour, 13 day, 14 room, 15 month, 16 chair, 17 time, 18 dog, 19 year, 20 sweet. The subject was then instructed to recall only 10 of the words on this list choosing the words he liked. The number of words associated with time was then recorded.

22-25. These items were the Future Time Perspective scores based on the data elicited from the story completion tasks. This was one story completion technique originally used by Wallace (1956). The following instructions were read to the subject:-

"I want to see what kind of story you can tell. I am going to start a story for you and then you can finish it in any way you wish. You will have 4 stories to complete in this way."

Story No. I

"At three o'clock one bright sunny afternoon in November, (May was the month used by Wallace) two men were walking near the edge of town . . . ."

Story No. II

"Ten o'clock one morning, Al met his friend Jerry near the centre of town . . . ."

Story No. III

"Joe is having a cup of coffee in a restaurant. He is thinking of the time to come when . . . ."

Story No. IV

"After awakening, Bill began to think about his future: In general he expected . . . ."

The subjects were required to verbalise their stories out aloud and the experimentor recorded them verbatim.

Scoring

Each of the stories was then rated according to the following 10 point scale:

Score	Period Covered
1	Under 1 hour
2	1 hour to under 5 hours
3	5 hours to under 12 hours
4	12 hours to under 1 week
5	1 week to under 3 months
6	3 months to under 1 year
7	1 year to under 3 years
8	3 years to under 10 years
9	10 years to 20 years
10	The end of life

After all 4 stories were rated in this way a total score was obtained for the first 2 stories which gave an Extension into the future score - item 22. The other two stories (3 and 4) were also summed to give an Extension into the future score - item 23. These 2 scores were then combined and an additional rating on a

5 point scale was given for Cohesion. 5 reflected the most well organised approach and 1 the least. This rating was then added to the combined extension scores for all 4 stories to give an Extension and Coherence Score for item 24.

The subject was then requested to give the Experimentor a list of 10 major events which he could expect might happen to him in his life time. Many subjects were quite unable to name as many as 10 events and thus the total number of events produced was considered important. Item 25 was therefore the number of future events the subject was able to list and this was regarded as a Density score of Future Time Perspective as suggested by Kastenbaum (1961)

Each event listed by the subject was then rated according to the following scale:

Score	Period Extended
1	To take place immediately or within the following few months, such as changing residence, or finding a job or health improving.
2	To take place within a few years--up to 5 years such as attaining specific qualifications or getting married.

Score	Period Extended
3	Major reorganisation in one's life from 5 to 15 years. Such as attaining high job status, children growing up and considering careers.
4	Period extending to about 20 years such as children getting married and having grandchildren.
5	Long term possibilities such as retirement, old age and being able to look back over one's life.

For each event the subject was asked to state in how many years time he thought the event might occur. This facilitated the scoring according to the system just stated above.

Item 26 was the sum of these ratings plus an additional score which was given for the coherent organisation of the events specified. This took into account the logical sequential order of possible events. 5 was the rating for the most logical and 1 for the least logical.

27. Here a subject was required to give a verbal estimate of a 22 minute filled time period. 22 minutes after subject had come into the room he was asked to estimate how long he thought he had been in the room. During

this time the experimentor had been gathering personal and historical data from the subject.

28. The subject was required to listen to the experimentor read a rather uninteresting passage of prose for 90 seconds. The subject was instructed to listen attentively and record, on a piece of paper, the number of times the word "the" appeared in the passage. This task was included in order to have some indication of the level of concentration and attention at the time of the experiment. The passage read to the subject was headed, "The Men Lyndon Likes" (Time Magazine, Dec. 6, 1963). This is what was read to the subjects:-

> "The new President of the U.S. received his Washington rearing under the New and Fair Deals, not The New Frontier--and he counts among his most valued advisers some who have been considered rather old hat during the past three years. Among these are such elder statesmen as Dean Acheson, 70, to whose acerbic tongue Kennedy liked to listen--but whose advice he did not often accept. Then there are Benjamin Cohen, 69, Thomas ("Tommy the Cork") Corcoran, 62, legal-eagle wheeler-dealers, of the early New Deal days, and James H. Rowe, 54, now a Washington law partner of Corcoran's and a longtime Johnson political adviser. Spanning the Truman and Kennedy administrations is Washington lawyer Clark Clifford, 56, a peerless behind-the-scenes political trouble shooter who is as close to Johnson as he was to Truman and a bit closer than he was to Kennedy. And then there is lawyer Abe

Fortas, 53, a New Deal brain-truster who served as F.D.R.'s Under Secretary of the Interior, and more recently has been retained as an attorney for a Johnson protege, ousted Senate Majority Secretary Bobby Gene Baker.

"President Johnson can certainly be expected to consult with these old associates--although not necessarily to appoint any of them to the high office. Who are the men Lyndon may reasonably be expected to bring into his official family, at whatever level?

29. Verbal Estimation Method

This was a verbal estimate of an empty time interval of 2 seconds. The subject was required to listen to the continuous sound of the buzzer for 2 seconds and to give his estimate of how long he thought it had lasted, immediately on cessation of the stimulus buzzer. The stimuli 2 seconds, 4 seconds and 9 seconds were presented in 5 random order series and the subject's estimate was the mean for each time interval. Therefore item 29 is the mean verbal estimate for 2 seconds on initial test session.

30. Item 30 is the mean verbal estimate for 2 seconds on retest.

31. Item 31 is the mean verbal estimate for 4 seconds on initial test.

32. Item 32 is the mean verbal estimate for 4 seconds on retest.

33. Item 33 is the mean verbal estimate for 9 seconds on initial test.

34. Item 34 is the mean verbal estimate for 9 seconds on retest.

The next series of estimations involved the reproduction of the 2 seconds and 4 seconds time intervals by means of the linear movement apparatus. The subject was again required to listen attentively to the continuous sound of the buzzer and then reproduce the sound for as long as he thought it had lasted. The auditory stimuli were presented in randomised order with 5 trials of the 2 second stimuli and 5 trials of the 4 second stimuli--10 in all. The means for 2 seconds and 4 seconds respectively were calculated and taken as the subject's estimates. This applied to the time taken to move the handle on the apparatus, and the actual measure of the distance moved.

35. Item 35 was the mean time taken to reproduce the 2 second buzzer on initial test.

36. Item 36 was the mean time taken to reproduce the 2 second stimulus on retest.

37. Item 37 was the mean time taken to reproduce the 4 second buzzer stimulus on initial test.

38. Item 38 was the mean time taken to reproduce the 4 second buzzer stimulus on retest.

39. Item 39 was the mean distance moved on initial test to reproduce the 2 second buzzer.

40. Item 40 was the mean distance moved on retest, to reproduce the 2 second buzzer.

41. Item 41 was the mean distance moved on initial test to reproduce the 4 second buzzer.

42. Item 42 was the mean distance moved on retest to reproduce the 4 second buzzer.

In this way 2 simultaneous measures were derived for each 2 second and 4 second stimulus, one for time taken and the second for the distance moved. The Reproduction method of estimating short time intervals is designated the A method.

The Production method of measuring time estimation of the same length auditory stimuli was also applied. Here a verbal stimulus was given. The subject was requested to move the handle of the linear movement apparatus for what he felt was 2 seconds and later 4 seconds. Time and distance measures were recorded in the same way as for the Reproduction method.

43. Item 43 is the time taken to produce the 2 second interval.

44. Item 44 is the time taken to produce the 2 second interval on retest.

45. Item 45 is the time taken to produce the 4 second interval.

46. Item 46 is the time taken to produce the 4 second interval on retest.

47. Item 47 is the distance moved during the production of the 2 second interval.

48. Item 48 is the distance moved during the production of the 2 second interval on retest.

49. Item 49 is the distance moved during the production of the 4 second interval on initial test.

50. Item 50 is the distance moved during the production of the 4 second interval on retest.

This method of Production of short time intervals is designated the B method.

Body Tempo

The subject was requested to tap with a sharply pointed pencil on a blank sheet of paper for 30 seconds. The subject was told to tap at a spontaneous speed comfortable to him. He was told when to start and when to stop but not informed of the actual time period. On a separate trial he was requested to draw circles in the same way and for the same time period.

51. Item 51 was the number of taps made on the paper. These were counted while the subject was tapping and checked against the number of pencil marks on the paper.

52. This was the same task as 51 but on retest.

53. The subject was requested to draw circles at a comfortable speed and size. The number of circles drawn was recorded from the paper.

54. This was the same task as 53 on retest.

Consistency and Reliability

Test retest differences for Verbal estimates, Reproduction method estimates and Production method estimates, and also Body Tempo measures were considered. The differences were calculated by subtracting mean initial test estimates from retest estimates. From this it could be seen whether retest estimates were more or less than the initial test estimates. Negative means indicate that they were less. Here we then have a measure of the direction of the test differences. Items 55-67.

55. A 2 seconds time test retest difference

56. A 4 seconds time test retest difference

57. A 2 seconds distance test retest difference

58. A 4 seconds distance test retest difference

59. B 2 seconds time test retest difference

60. B 4 seconds time test retest difference

61. B 2 seconds distance test retest difference

62. B 4 seconds distance test retest difference

63. Verbal 2 seconds test retest difference

64. Verbal 4 seconds test retest difference

65. Verbal 9 seconds test retest difference

66. Body Tempo - tapping test retest difference

67. Body Tempo - circle drawing test retest difference

It was felt that the actual range of estimates from the highest estimate to the lowest estimate for a particular individual might reveal some useful information. This was therefore calculated by taking the raw data and subtracting the shortest estimate for 2 seconds for example, from the longest estimate for 2 seconds, and this was regarded as the range of the subject's responses, for that particular interval. This measure was only calculated for the Reproduction intervals of

2 and 4 seconds but both for time and distance on this method.

68. Range of time for 2 second Reproduction estimates on initial test.

69. Range of time for 2 second Reproduction estimates on retest.

70. Range of time for 4 second Reproduction estimates on initial test.

71. Range of time for 4 second Reproduction estimates on retest.

72. Range of distance moved for 2 second Reproduction estimates on initial test.

73. Range of distance moved for 2 second Reproduction estimates on retest.

74. Range of distance moved for 4 second Reproduction estimates on initial test.

75. Range of distance moved for 4 second Reproduction estimates on retest.

A number of cards were administered from the Thematic Apperception Test. 1, 2, 3, 5, 6, 7, and 12 (7 cards altogether). The stories given in response to these cards were then rated for Achievement, Abasement, Aggression, Sex, Nurturance and Narcissism on each card. The scoring system used by Lindzey and Goldberg (1954) was applied in the following manner:- A 5 point rating scale ranging from 1 which indicated a complete absence of any of the variables to 5 which indicated intense signs of the variable throughout the story. All the stories to a particular card were considered at the same time. The total score for each subject on any variable was determined by adding the ratings assigned to this variable to each of the subject's stories.

76. Need Achievement

Defined as the desire or tendency to do things as rapidly as possible and/or as well as possible.

77. Aggression

Defined as the wish or attempt to attack, harm or kill. Or to fight, injure, revenge or overcome opposition forcefully.

78. Sex

Any male-female heterosexual relationship i.e. husband and wife, girl friend and boy friend situations.

79. Abasement

The desire for or a tendency to enjoy pain, punishment, illness and misfortune. Also to submit passively to external force and to accept injury, blame, criticism and punishment.

80. Nurturance

The tendency to give sympathy and gratify the needs of a helpless object. Also to be moved by the distress of others. To assist an object in danger.

81. Narcissism

The tendency to focus or centre on oneself, to the relative exclusion of others. Self love often accompanied by obliviousness or disrespect to others.

Items 82-121 were the subjects' responses to whether they agreed or disagreed that the following statements described them. They were rated on a 2 point scale.

1 Agree

2 Disagree

0 Don't know

82. Do you get up at the same time every morning whether it's necessary or not? D

83. Do you wear a watch? D

84. Do you keep your watch set fast? D

85. Do you often wish that you lived in a world without time? C

86. Do you have difficulty remembering what day or date is is?

87. Did you have a happy childhood? B

88. Would you like to relive your childhood? B

89. Do you think that you have a one tracked mind? (I.e. are you inclined to be obsessional so that once you get onto a particular line of thought you cannot get off it.) E

90. Are you more pressed for time than most people? C

91. Do you have a poor memory for past events in your life? A

92. Do you often find it hard to get started on things? D

93. Do you often find that although the days go slowly, the weeks and the months fly? C

94. Do you feel that you haven't enough time to do the things you really want to do? C

95. Do you feel that the future is too uncertain to plan far ahead? E

96. Do you often feel in a trance? (in dwaal) E

97. Do you have a hard time remembering the dates things have happened? A

98. Does a period of a few minutes often seem like a few hours to you? C

99. Are you often in a hurry? C

100. Do you day dream a lot? E

101. Do you have many memories of childhood events which seem as though they might have taken place only yesterday? A

102. When you wake up in the morning does it usually seem as though you had just gone to sleep a few minutes ago? C

103. Do your childhood days seem unreal to you? B

104. Is your father a very dominant person? (unpleasantly so) B

105. Is your mother a rather dominant person? (unpleasantly so) B

106. Do you sometimes think we would have been better off if clocks had never been invented? C

107. Do you usually have a pretty accurate idea of what the time is? D

108. Are you easily bored? D

109. Do you have a fairly definite idea of what you will be doing next summer? E

110. Are you good at saving time? D

111. Do you become very impatient if you have to wait 5 minutes for someone? C

112. Do you have great faith in the future? E

113. Do you have a hard time getting things done without deadlines? D

114. Does it annoy you to find that your watch has stopped or is not running properly? D

115. Do you feel guilty if you sleep late in the morning? C

116. Do you feel you waste time a lot or spend it uselessly? C

117. Do you feel anxious when you are uncertain of the time? C

118. Do you ever make out written timetables? D

119 Do you feel particularly guilty when late for an appointment? C (just a little late)

120. Do you feel you have lots of spare time? D

121. Are you often early for appointments? D

The alphabetical letters A B C D E denote the following broad categories into which the responses could be divided:-

A - Memory for time

B - Feelings about childhood

C - Pressure of time

D - Organisation of time

E - Future - feelings about the future and feelings of unreality

Consistency

Items 122-134 are the calculated differences between the initial test session estimates and retest estimates. The direction of the differences i.e. whether they are positive or negative is not taken into account, only the extent of the difference. These items have been labelled as extent of test retest differences therefore. They are regarded as indicators of the consistency of the subject's performance and therefore his estimates.

122. A Reproduction 2 seconds Time Extent test retest difference.

123. A Reproduction 4 seconds Time Extent test retest difference.

124. A Reproduction 2 seconds Distance Extent test retest difference.

125. A Reproduction 4 seconds Distance Extent test retest difference.

126. B Production 2 seconds Time Extent test retest difference.

127. B Production 4 seconds Time Extent test retest difference.

128. B Production 2 seconds Distance Extent test retest difference.

129. B Production 4 seconds Distance Extent test retest difference.

130. Verbal 2 seconds Extent test retest difference.

131. Verbal 4 seconds Extent test retest difference.

132. Verbal 9 seconds Extent test retest difference.

Body Tempo Consistency

133. Tapping 30 seconds Extent test retest difference.

134. Circle drawing 30 seconds Extent test retest difference.

Long Verbal Interval Accuracy

135. Verbal 22 minutes direction of error i.e. whether positive or negative error in estimate.

136. Verbal 22 minutes Extent of error disregarding direction.

Speed measures for A-Reproduction and B-Production tasks. R = retest.

137. A 2 Speed

138. A 2 R Speed

139. A 4 Speed

140. A 4 R Speed

141. B 2 Speed

142. B 2 R Speed

143. B 4 Speed

144. B 4 R Speed

Speed per second was calculated for each trial and the mean speed for each time interval was derived.

Accuracy Items 145-152

Accuracy was established by calculating the actual amount of deviation of the estimate from the stimulus interval in each case. Whether the deviation was negative or positive is included in the error in these instances.

145. Accuracy Reproduction A 2 seconds

146. Accuracy Reproduction A 2 R seconds

147. Accuracy Reproduction A 4 seconds

148. Accuracy Reproduction A 4 R seconds

149. Accuracy Production B 2 seconds

150. Accuracy Production B 2 R seconds

151. Accuracy Production B 4 seconds

152. Accuracy Production B 4 R seconds

Speed Differences

Differences between speed per second for the different intervals was calculated by subtracting the one from the other as indicated.

153. A 2 and A 4 (A 2 - A 4)

154. A 2 R and A 4 R (A 2 R - A 4 R)

155. A 2 and A 2 R (A 2 - A 2 R)

156. A 4 and A 4 R (A 4 - A 4 R)

157. B 2 and B 4 (B 2 - B 4)

158. B 2 and B 4 R (B 2 - B 4 R)

159. B 2 and B 2 R (B 2 R - B 2)

160. B 4 and B 4 R (B 4 R - B 4)

161. A 2 and B 2 (A 2 - B 2)

162. A 2 R and B 2 R (A 2 R - B 2 R)

163. A 4 and B 4 (A 4 - B 4)

164. A 4 R and B 4 R (A 4 R - B 4 R)