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A STUDY OF CERTAIN CORRELATES OF INTROVERSION-EXTRAVERSION AMONG INDIAN HIGH SCHOOL AND UNIVERSITY STUDENTS

A Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy in the Department of Psychology in the Faculty of Science at the University of Durban-Westville

by

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SPECIAL NOTE

In view of the copyright on the Survey of Study Habits and Attitudes (SSHA), Interest Questionnaire for Indian Pupils (IQIP) and the Eysenck Personality Inventory (EPI), it has not been possible to reproduce these tests in this thesis. Information pertaining to the SSHA and IQIP may be obtained by writing to The Human Sciences Research Council, Private Bag 41, Pretoria, 0001. Correspondence regarding the EPI may be directed to The University of London Press, Ltd., Warwick Square, London E.C. 4.

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[1] The Department of Engineering has subsequently become a faculty.

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CHAPTER ONE

INTRODUCTION

This is a dissertation on the correlates of introversion-extraversion among Indian high school and university students. It is not only the first of its kind among a non-Western group in South Africa, but also the largest single study investigating so many correlates of introversion-extraversion among any ethnic group anywhere in the world. Some aspects of the investigation have not been researched before among any ethnic group.

It is necessary, in a report such as this, to present some historical and background information on the main theme of the study. Hence, some of the sections of this chapter will be devoted to the history of both the concept and the measurement of introversion-extraversion and the learning and inheritance theories of introversion-extraversion. Other sections of this chapter will define terms, describe the relationships between extraversion, neuroticism and lie scores, motivate the study and outline the problems, hypotheses and the plan of the research.

The review of the literature concerning the specific projects will be given in the relevant chapters.

(A) HISTORY OF THE CONCEPT AND MEASUREMENT OF INTROVERSION-EXTRAVERSION

(a) The Origins of the Introversion-Extraversion Concept

No personality characteristic has been so widely studied as introversion-extraversion (Zoberi, 1960, p. 34). Although this typology is associated with Carl Jung, he did not originate the terms introversion-extraversion; they had been in use in Europe for several years before he popularized them (Eysenck and Eysenck, 1969a, p.22). In Germany, Stern advocated a distinction between "objective" and "subjective" types which he found differing on simple-reaction-time and aussage tests as early as 1900, and, in 1902, Otto

Gross proposed the "deep-narrow" and "shallow-broad" types in the course of his studies of pathology (Guilford and Braly, 1930). In the United States, William James was distinguishing between the "obstructed" and "explosive" wills as early as 1890 (James, 1890). Later, in 1907, he described "tender-minded" and "tough-minded" types.

However, in developing the variant form of psychoanalytic theory that came to be known as Jungian psychology, it was Jung who first suggested a dichotomy of psychological types on the basis of the "flow of libido" (Jung, 1916).

All personalities were thought of as falling into two major categories which he termed general attitude types. These two general attitude types were distinguished by the direction of libidinal movement. That type whose libidinal movement was directed inwardly toward the self, he termed introvert; the second type whose libidinal movement was directed toward the external world and external objects, he termed extravert. Both types were determined by constitutional, hereditary factors and were dispositions of normal personality not determined by pathology as Freud had argued. The following quotation provides an explicit definition of Jungian extravert and introvert types:

"Now when the orientation to the object and the objective facts is so predominant that the most frequent and essential decisions and actions are determined, not by subjective values, but by objective relations; one speaks of an extraverted attitude. When this is habitual, one speaks of an extraverted 'type'. Unlike the extraverted type, the introverted type is prevailingly oriented by subjective factors. Introverted consciousness doubtlessly views the external conditions, but it selects the subjective determinants as the decisive ones" (Jung, 1923, p. 412).

Although the concept of introversion-extraversion is a part of current Jungian theory, it has failed to gain scientific status or theoretical usage outside this system. Rather, the terms "introvert" and "extravert" have been vitiated by widespread popular usage which has applied the superficial connotations of "unsociable" and "sociable" to "introvert" and "extravert", respectively. Dowdy (1959), however, noted one important exception to the above-mentioned statement. Herman Rorschach, a disciple and associate of Jung, made important use of the concept in his interpretation of the Ink-Blot-Test.

It was difficult to give descriptions of the behaviour of typical introverts and extraverts because Jung was concerned with attitudes, values and unconscious mental processes. His account was also complicated by his claims that people who were consciously extraverted may have been unconsciously introverted, and that those tendencies may have found expression according to four main mental functions. Jung regarded introversion and extraversion as the two major attitudes or orientations of personality, but these found expression in the functions of thinking, feeling, sensing and intuiting. He called thinking and feeling rational functions because they made use of reason, judgement, abstraction and generalization. Sensation and intuition were considered irrational functions. No modern psychologist has adopted Jung's system in its entirety. His system also seems difficult to apply in a rational manner.

In spite of these complications, Jung's extravert emerged as a person who valued the outer world both in its material and non-material aspects (possessions, riches, power, prestige); he sought social approval and tended to conform to the mores of his society; he was sociable, made friends easily and trusted other people. He showed outward physical activity, while the introvert's activity was mainly in the mental and intellectual sphere. The extravert was changeable, liked new things,

new people and new impressions. His emotions were easily aroused but never very deeply; he was relatively insensitive, impersonal, experimental, materialistic and tough-minded. He tended to be free from inhibitions, care-free and ascendant. Jung's introvert may be conceived as manifesting characteristics directly opposite to those of the extravert.

By linking his notions of introversion and extraversion with a distinction between the main neurotic disorders of psychasthenia and hysteria, respectively, Jung made an important addition to the ancient system of typology. He believed that the extravert, in case of neurotic breakdown, was predisposed to hysteria, the introvert, to psychasthenia (at present the terms anxiety state, reactive depression, phobia or obsession are used instead of psychasthenia).

Jung did not elaborate this part of his hypothesis, but implicit in his scheme was a second dimension or factor additional to, and independent of, introversion-extraversion called emotionality or instability or neuroticism. It was identified as that particular quality which hysterics and psychoasthenics had in common as compared with normal persons. In stressing the independence of introversion and neuroticism, Jung indicated that it was a mistake to believe that introversion was more or less the same as neurosis, and as concepts the two had not the slightest connection with each other.

Kretschmer (1948), unlike Jung, turned to the psychotic forms of disorder rather than the neurotic. He distinguished two main psychotic syndromes: the schizophrenic, on the one hand, and the manic-depressive or cyclic type of psychotic, on the other. He did not consider these disorders to be qualitatively different from normal mental states, but merely as extremes on a continuum, as exaggerated forms of behaviour patterns characteristic of normal persons.

Kretschmer described, among other personality types, the cyclothyme and the schizothyme. Like the extravert, and the broad-shallow type, the cyclothyme was objective, realistic, sociable, optimistic, trustful, co-operative and frank; he was also subject to mood changes without apparent cause. The schizothyme, like the introvert and the narrow-deep type, showed characteristics opposite to those of the cyclothyme. Kretschmer's approach was more experimental than that of any of his predecessors. There is evidence to indicate that his dimension coincides with introversion-extraversion. Shagass and Kerenyi (1958), for example, have shown that patients suffering from manic-depressive insanity had low sedation thresholds, whereas reactive depressives, i.e., dysthymic neurotics, had high thresholds, putting the latter at the introverted end and the former at the extraverted end. Similarly, Kretschmer has shown that schizothymes tended to be relatively narrow in body build, whereas cyclothymes were relatively broad; on the other hand, there is much evidence, reviewed, for example by Rees (1960), which showed that introverts were lean and extraverts more broadly built. However, this whole area is still being investigated and it would be premature to have any firm opinion on this point.

(b) The Origins of the Measurement of Introversion-Extraversion

The work of Gross, Jung and Kretschmer did not add much to the scientific description of personality, and introversion-extraversion in particular. They relied on argument and intuition instead of on measurement and calculation. The first to use these more modern approaches were Heymans and Wiersma (1909). They conducted a rating study in which about 3000 doctors in the Netherlands were each asked to pick one family and rate each member of it according to a number of traits. Heymans and Wiersma considered the replies in terms of a three-dimensional system: (a) emotionality, or emotional instability; (b) activity, or general

drive; and (c) a primary function-secondary function factor, i.e., what is now called introversion-extraversion. When Eysenck (1960a) analyzed the data statistically, he found that these three factors were not independent. Emotionality was relatively orthogonal to the other two, but activity and extraversion were quite highly correlated, indicating two independent factors or dimensions. Eysenck and Eysenck (1969a) indicated that they may be labelled emotionality or neuroticism, and introversion-extraversion.

Subsequently, there came a number of correlational studies of questionnaires. Attempts were made to use correlations between existing scales which were assumed to be separate measures of neuroticism, extraversion, ascendence, self-sufficiency, depression, etc., in order to discover more parsimonious ways of arranging and scoring the tests or more meaningful psychological variables. These efforts ended in almost complete failure. Vernon (1938) pointed out that, on the one hand, it was found that tests of supposedly different traits intercorrelated very highly; on the other hand, different tests of nominally the same trait tended to give low correlations with one another.

These early failures disappointed many psychologists because the questionnaire approach had held much promise. The terms introversion and extraversion were dropped from polite conversation in psychological circles. The existence of any such trait was considered disproved. It was the naive assumptions underlying the tests and the lack of systematic study of their construction which were responsible for the failure of the researches to support the hypothesis. The theory of introversion-extraversion was not being properly tested and consequently the results should not have been used in evidence against it. What did become clear, however, was that the <u>a priori</u> construction of questionnaires and the naive notion that because

a questionnaire was given a particular label, therefore, it measured a particular trait or type, had to be abandoned. It became clear that what was needed was a more detailed approach in which very homogeneous questionnaires had to be constructed and intercorrelated in order to study the dimensionality of the whole field of personality. It also became necessary to intercorrelate individual items in order to achieve greater homogeneity in the measuring instruments. This was done by factor-analytic studies.

(c) Factor-analytic Studies of Personality

Spearman (1927) conducted the first factor-analytic studies of personality. He intercorrelated the factor-analyzed ratings made of students and discovered a factor which he called (w), using the initial of the word "will". He, and later writers, interpreted this as the opposite of the factor of emotionality, i.e., a tendency not to over-react emotionally but to have a stable type of personality. Additional analyses of this material were conducted by McClay (1936), Reyburn and Taylor (1939) and others, and they agreed that another factor rather similar to introversion-extraversion was contained in the data. Work by Burt (1937; 1939; 1940) contained further support for this factor of emotionality, which he considered a factor of introversion-extraversion. The work of all these researchers suggests the existence of two personality dimensions closely resembling emotionality or neuroticism, on the one hand, and introversion-extraversion, on the other.

J.P. and R.B. Guilford (1934) administered 36 typical introversion-extraversion questions to 930 students, intercorrelated them and factor-analyzed the results. Three main factors were found and identified. They labelled them S for social shyness, E for emotional immaturity or emotional dependency, and M for masculinity. They labelled a fourth factor R, freedom from care. A fifth factor labelled T, seemed to emphasize the

R = Freedom from care S = Shy
T = Thinker E = Emot[illegible] of ED

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liking for thinking and tackling problems requiring thought, versus a liking for prompt overt action. These factors were not independent. S and E, for example, were intercorrelated to the extent of 0,46 and S and M to the extent of 0,40.

The factors R and T were later investigated more fully by the same authors (1939a). Nine factors were extracted from the intercorrelations between 30 items administered to 1000 students. The first factor was depression (D). S, R and T were found again and an alertness factor (A) was also discovered. Two further factors were isolated in another study in which 600 subjects were given a questionnaire of 24 items (1939b). One of these was factor N (nervousness or jumpiness), the other factor was GE (general drive, characterized chiefly by pleasure in action).

The Guilfords showed that there were high correlations between factors D, S and T ranging from 0,5 to 0,7. These relationships had a distinct bearing on the question as to the nature of introversion-extraversion. There was some basis for grouping together some characteristics which bordered on seclusiveness with some which implied a thinking person and still others that indicated depressed emotional tendencies and for calling the resultant picture the "introvert". The opposite composite of sociability, cheerfulness and lack of meditative thinking was the extravert picture. The use of the term "introvert" to represent the person who was simultaneously shy, depressed and thinking, for the dimension S, D and T, seemed to be justified by this statistical analysis.

Eysenck and Eysenck (1969a)indicated that J.P. Guilford isolated further factors which were again not independent of each other or of those isolated previously. Those added to his previous factors were: C (for cycloid disposition or stability of emotional reactions as opposed to instability; A (ascendance - submission); I (inferiority feelings as opposed to self

confidence); O (for objectivity as opposed to hypersensitiveness); Co (for co-operativeness); and Ag (for agreeableness as opposed to quarrelsomeness). Factor analyses done on the intercorrelations between scales by Lovell (1945) and North (1949) resulted in a fairly clear-cut picture which featured mainly two very strong orthogonal factors identified as emotional stability versus emotional instability, and introversion-extraversion (Eysenck, 1960, pp. 184-188). The scales characterizing introversion were inactivity, inhibited disposition, submission and social shyness. Those characteristics of neuroticism or emotional instability were nervousness, hypersensitivity, depression, over-criticalness, quarrelsomeness and inferiority feelings.

The finding of so many traits did not contradict the possibility of the existence of a factor of introversion-extraversion. The fairly high correlations existing between the Guilfords' primary traits demonstrated that higher order concepts such as extraversion and neuroticism were by no means ruled out.

Cattell conducted a number of factor-analytic studies of questionnaires and supplemented these by analyses of ratings. The results of both the rating and questionnaire studies were surprisingly similar and he emerged with the following list of primary factors: A (cyclothymia vs. schizothymia), B (intelligence), C (ego strength vs. neuroticism), D (excitability vs. insecurity), E (dominance vs. submissiveness), F (surgency vs. desurgency), G (superego strength), H (parmia, i.e., parasympathetic immunity vs. threctia, i.e., threat reactivity), I (premsia vs. harria), J (coasthenia, i.e., thinking neurasthenia vs. zeppia); K (comention vs. abcultion), L (protension, i.e., paranoid trend vs. inner relaxation), M (autia vs. praxernia), N (shrewdness vs. naivety), O (guilt proneness vs. confidence) (Eysenck, 1960a). Cattell mentioned that although he isolated 15 L factors (i.e., data derived from life situations), it should not be assumed that the list was exhaustive.

Cattell's 15 factors were not too independent, and the intercorrelations in turn required to be factor-analyzed. These were undertaken by Cattell (1957) and they yielded two very striking findings - the general integration factor, and the introversion-extraversion factor. It appeared, therefore, that Cattell's studies, like the others reviewed, defined the same two fundamental dimensions of personality.

Introversion-extraversion or invia-exvia as Cattell preferred to call it, and neuroticism, or anxiety, as he preferred to call it, were labelled Q1 and Q2 in his system. In addition, he had two further second-order factors, labelled Q3 and Q4. Q3 he called pathemia, or emotional immaturity vs. corticalertia, while Q4 he called promethean will vs. religious resignation or subduedness.

Eysenck also made significant contributions to the factor-analytic studies of personality. His first factorial study (Eysenck, 1947) obtained ratings on 39 items from 700 neurotics and he submitted these intercorrelations to a factor analysis. He stated: "The first factor, characterized by items such as badly organized personality, abnormal before illness, little energy, narrow interests, abnormality in parents, etc., is clearly one of emotional instability or neuroticism; the second factor opposes the introvert to the extravert group of traits, thus giving, in combination with the first factor, a typical picture, on the one hand, of the hysteric (conversion symptoms, sex anomalies, unskilled, hysterical attitude, degraded work history, low I.Q., narrow interests, little energy) and, on the other, of the dysthymic (anxiety, depression, obsessional traits, apathy, irritability, somatic anxiety, tremor and effort intolerance)" (Eysenck and Eysenck, 1969a, pp. 36 - 37).

Eysenck (1947) also attempted to verify another hypothesis, namely, that the distributions of people on these two factors were continuous and similar to a normal curve rather than bimodal. Distributions were plotted for

1000 male and 1000 female neurotics by a weighted combination of ratings for the various traits which made up these two factors. Distributions for both factors were closely similar to the normal curve of distribution, a result which was in good agreement with a similar demonstration by Burt on normal subjects (1940).

The Eysencks' later works (1956c; 1959a; Eysenck and Eysenck, 1964b) have been concerned with the development of personality questionnaires along factorial lines, particularly the Maudsley Medical Questionnaire (MMQ)[1], the Maudsley Personality Inventory (MPI)[1] and the Eysenck Personality Inventory (EPI)[1].

Largely as a result of the work of Cattell and Eysenck the concept of introversion-extraversion has been revived in a significant and important manner which has provided it with scientific utility. Eysenck (1947; 1952) and Cattell (1957) agreed in general as to the descriptive behaviours that characterize the introvert and extravert personality, but took widely divergent theoretical viewpoints as to their explanations of introversion-extraversion. Cattell expounded the learning view while Eysenck espoused the inheritance theory. These divergent theoretical viewpoints will now be considered.

(B) THE LEARNING AND INHERITANCE THEORIES OF INTROVERSION-EXTRAVERSION

Cattell (1957) stressed the role of learning and experience in the genesis of introverted and extraverted personalities. According to this view, introverts developed introverted patterns from frustrations which resulted from reacting outwardly and in attending to external stimuli. Such frustrating and painful experiences repeated over and over conditioned the introvert to prefer attending to his internal subjective states, ideas, images, memories and fantasies. At length, his behaviour and perceptions will be guided predominantly by internal stimuli as opposed to external stimuli.

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[1]See Appendix A for a list of all abbreviations appearing in this report.

Cattell presented his theoretical viewpoint in the following quotation:

"Our own hypothesis on the essence of this second-order factor (i.e., introversion-extraversion is more comprehensive, though speed and strength of reactive inhibition (to certain classes of stimuli) is a part of it. If we look at the separate factors in the second-order factor, we see that the schizothyme individual is more at home with inner symbols, the desurgent more discouraged from experiences of reacting outwardly, the threctic more easily inhibited, and the autious personality constitutionally addicted to giving greater importance to inner stimuli. The only formula that seems to cover them all is a dual one: greater inhibition of external reactivity (in terms mainly of past discouragement and present timidity), and greater attention (by reason of 'intensity' or felt immediate 'importance') to inner stimuli and ideas" (p. 268).

Cattell (1957) summarized his view with this comment:

"The more basic conception required is one of a ratio of internal to external reactivity ... namely: ratio of guidance by memories to guidance by external cues in solving a problem" (p. 268).

In making such a statement, Cattell was obviously concerned primarily with the introversion pole of the introversion-extraversion continuum; he left the reader with the assumption that the extraversion pole was diametrically opposite in character. His theoretical account was seen to be rather close to that of Jung; however, he appeared to regard his viewpoint as based directly upon the interpretation of the second-order factor arrived at through factor analysis.

The associations demonstrated between parent-child relations and introversion-extraversion support the role of learning and experience, emphasized

by Cattell, in the development of the particular personality type. The most widely supported association is that rejecting, cold, negative mothers and fathers tend to have introverted children, while accepting, loving, positive parents frequently have extraverted sons and daughters (Baldwin et al., 1949; Bayley and Schaefer, 1960; Becker, 1960; Hoffman, 1963; Murray, 1938; Siegelman, 1965; Siegelman, 1966; Slater, 1962). Murray (1938) indicated that the behaviour of the "sensitive, avoidant introvert" arose from" ... fear of insupport, danger, rejection, ridicule, punishment and so forth ..." by parents (p. 240). Baldwin et al. (1949) found that children who came from homes that were characterized by warm parental behaviour were more socially outgoing in both friendly and hostile manners. Hoffman reported that "... parental acceptance, as reflected in pleasurable non-disciplinary interaction with the child, contributed to a generally positive orientation toward others, as expressed in nonconflict situations with peers" (1963, p. 577).

In a series of studies which used adults as well as children, and self-report questionnaires along with sociometric devices, the above-mentioned relationship between parental behaviour and introversion-extraversion was generally supported (Porter, 1967; Roe and Siegelman, 1964; Siegelman, 1965; Siegelman, 1966). An underlying theory suggested by Roe (1957) was that the enjoyable experiences of a child with a loving and attentive parent instilled in him the desire to seek interpersonal contacts as an adult. The social learning theory of Bandura and Walters (1963) which stressed reinforcement and imitation was applicable in interpreting the foregoing results.

Social learning theory suggested that loving parents, in contrast to rejecting parents, served as models of more accepting, extraverted behaviour, and these orientations were learned through incidental imitation by their children. Roe and Siegelman (1964), for example, found that more extraverted

students had parents who had participated more extensively in social activities when they were growing up, than did introverted students. Perhaps the students' imitation of their outgoing parents led to more extraverted activity. Another speculation was that loving and socially oriented parents probably rewarded the outgoing and accepting behaviour of their children more than did rejecting parents. In support of this idea were the findings of Gall (1960), who reported that the need for affiliation was high for children whose mothers encouraged them to maintain extensive interpersonal relationships.

A few animal studies also suggested an association between early parent-like experiences and social development. Harlow (1962), for example, demonstrated that the absence of interactions with other monkeys, especially real parents, during infancy produced almost totally asocial adult monkeys. Scott (1958) described critical periods in the life of young puppies where the presence, absence, and type of contacts with the human experimenter were important determiners of later social development.

Eysenck's (1957) theoretical explanation of introversion-extraversion minimized the role of learning and experience and emphasized the importance of constitutional factors as crucial for the development of these two personality types. He hypothesized differences in cortical excitation and inhibition in introverts and extraverts; introverts were characterized by cortical excitation, slowness in developing reactive inhibition and quick dissipation of reactive inhibition. Extraverts displayed opposite tendencies, being characterized by cortical inhibition, strong reactive inhibition, fast development of reactive inhibition and slow dissipation of reactive inhibition. Presumably these constitutional differences and resulting cortical processes disposed the introvert and extravert to develop their respective patterns of behaviour.

The following two postulates summarized Eysenck's conception of introversion and extraversion (Eysenck, 1955, p. 29):

"I. Human beings differ with respect to the speed with which reactive inhibition is produced and the speed with which reactive inhibition is

dissipated. These differences themselves are properties of the physical structures involved in the evocation of the responses.

"II. Individuals in whom reactive inhibition is generated quickly, in whom strong reactive inhibitions are generated, and in whom reactive inhibition is dissipated slowly are thereby predisposed to develop extraverted patterns of behaviour and to develop hysterico-psychopathic disorders in cases of neurotic breakdown; conversely, individuals in whom reactive inhibition has developed slowly, in whom weak reactive inhibitions are generated, and in whom reactive inhibition is dissipated quickly, are thereby predisposed to develop introverted patterns of behaviour and to develop dysthymic disorders in cases of neurotic breakdown."

Eysenck 1956a ; 1956b) undertook a study of 13 pairs of each of male identical, female identical, male fraternal, and female fraternal twins in an attempt to provide empirical evidence for his theory. He concluded that, with respect to extraversion, intelligence, and autonomic lability, identical twins were more like each other than fraternal twins. All differences were statistically significant. It is interesting to note that the greatest difference between identical and fraternal twins was observed with respect to the extraversion factor; this suggested that extraversion is determined by heredity to at least as large an extent as is intelligence. The large sampling errors attaching to both means and correlations in a study such as this where relatively small numbers were used make it impossible to regard this conclusion as definitive, and a repetition of this study would seem highly desirable. Even so, it seems reasonable to conclude that extraverted behaviour is determined to a significant extent by genetic factors (Eysenck, 1956a, p. 25).

There has been support for Eysenck's heredity theory from various investigators. Gottesman (1963) ascertained that the correlation for

identical twins on introversion was significantly higher than for fraternal twins. The study was of special importance in that Gottesman used a precise measure of blood groups to diagnose dyzygotic and monozygotic twins. Scarr (1964) also used this blood group method in comparing 28 pairs of fraternal with 24 pairs of identical twin grade - school girls. She observed that the genetic contribution to sociability was considerable. Using a variety of instruments and covering a wide age range, Vandenberg (1962) and Freedman (1963) found high indices of heritability for social, extraverted behaviour. Several longitudinal studies also suggested a genetic component by demonstrating the consistency of introversion-extraversion tendencies (Honzik, 1964; Kagan and Moss, 1962; McKee and Turner, 1961; Schaefer and Bayley, 1963; Tuddenham, 1959). Highly significant genetic variations in the sociability of mice were discovered by Lindzey, Winston and Roberts (1965), who bred five different homozygotic strains of mice beyond 30 generations. Hereditary predispositions also play a central role in several personality theories which consider introversion-extraversion characteristics (Erikson, 1961; Maslow, 1954).

As part of a larger study, Perry (1973) used the twin-study method to establish whether the personality characteristic of introversion-extraversion, measured by Eysenck's questionnaire (1958), was inherited. A total of 84 pairs of twins, 46 monozygotic (MZ) and 38 dyzygotic (DZ) twins, age range=16-31 years, participated in the study. Of the MZ twins, 25 pairs were female and 21 pairs male; of the DZ twins, 20 pairs were female and 18 pairs male. The twins were not separated by sex because of the limited sample size.

Perry found no significant relationship between introversion-extraversion and heredity.

The literature indicates that there is much support for both Cattell's and Eysenck's points of view. A limitation, in view of the fact that nature and nurture (heredity and environment) contribute jointly to the determination of behaviour, is that researchers support one point of view to the exclusion of the other. A better approach would be to avoid choosing between nature and nurture, but rather, to recognize the contributions made by each in determining introversion-extraversion. In accordance with this, it will be accepted that introversion-extraversion in itself is not inherited. Rather, physical material which, under given conditions, is able to determine or influence introversion-extraversion, is inherited.

(C) DEFINITIONS OF TERMS

Since the terms "introvert", "extravert", "neuroticism" and "lying" will be used fairly often in this report, it is considered necessary to define these terms in the context in which they will be used.

(a) Introvert: The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, looks before he leaps, does not like excitement, is pessimistic and distrusts the impulse of the moment (Eysenck and Eysenck, 1970, p. 8).

The tendency to be like the introvert is referred to as introversion.

(b) Extravert: The typical extravert is sociable, likes parties and practical jokes, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment, is easy going, carefree, optimistic and is generally an impulsive individual (Eysenck and Eysenck, 1970, p. 8).

The tendency to be like the extravert is referred to as extraversion.

(c) Neuroticism: Eysenck and Eysenck (1964a)have provided no definition of neuroticism other than referring to it as the general emotional ability of a person, his emotional over-responsiveness, and his ability to break down under stress (Eysenck, 1959a). They had indicated that it is similar to the description of anxiety given by Taylor in her Manifest Anxiety Scale (Taylor, 1953). Thus, in the present study, the investigator has regarded anxiety and neuroticism as the same characteristic.

(d) Lying: Power and MacRae (1971) defined lying as pretending to be a very stable, non-neurotic person. This definition was adopted for the present investigation.

(D) THE RELATIONSHIPS BETWEEN EXTRAVERSION, NEUROTICISM AND LIE SCORES

Eysenck and Eysenck (1969a,p. xiii) concluded from all their analyses that two main factors, introversion/extraversion and neuroticism/stability, emerged from the work of J.P. Guilford, Cattell and H.J. Eysenck. Therefore, the EPI, like its predecessor, the MPI, was constructed to measure these two dimensions of personality which they claimed were uncorrelated and independent.

The EPI also has a lie scale which is useful in detecting individuals who "fake good" or give favourable and socially acceptable answers. Throughout this report use will be made of the L scale. Where EPI scores will be involved, two sets of results will be presented and discussed. One set will include subjects with high lie scores (total group), that is, subjects who "fake good" or give favourable and socially acceptable answers. The other set will exclude high lie scorers (selected group). This latter set of results will be accepted as "valid". In this sense, the word "valid", whenever used within inverted commas in this report, will indicate that those results were regarded as acceptable.

It must be pointed out that throughout the present writer's reading for the preparation of this dissertation, he came across no report which gave two sets of results (one set including the responses of high lie scorers and the other excluding them) and only one (that by McCormick and Baer, 1975) which categorically stated that the responses of high lie scorers had been excluded. In fact, Pryke and Harper (1977) pointed out that most reports did not even include L data. This is indeed surprising when one considers that the tendency to have high L scores may in itself be an interesting personality trait (Eysenck and Eysenck, 1963a) and that the L score is itself a personality variable rather than an extraneous factor to be ignored (Kline, 1967).

In view of the present researcher's discovery that all previous studies gave only the results of samples which included high lie scorers, in spite of the fact that these subjects are purported to "fake good" (Eysenck, 1964a,p. 14) or give favourable and socially acceptable answers, the present report will be unique in that it will make available two sets of results.

Eysenck and Eysenck have said: "The correlation between extraversion and neuroticism on the MPI was small but nevertheless marginally significant; suitable item selection has caused it to disappear in the EPI" (1964, p. 5). In order to substantiate this claim they have provided the following r's derived from a sample of 2 000 normals (1970, p. 12).

	r	p[1]
E and N (Forms A and B combined)	- 0,062	< 0,01
E and N (Form A)	- 0,013	> 0,05
E and N (Form B)	- 0,116	< 0,001

The present researcher retested the Eysencks' r values for significance and found that the relationships between the extraversion and neuroticism scales were significant at the 0,01 level for Forms A and B combined, and at the 0,001 level for Form B. (Therefore, he cannot agree with the claim that the "marginally significant" relationship between extraversion and neuroticism on the MPI had disappeared in the EPI.)

Further support for a significant relationship between extraversion and neuroticism on the EPI was given by Behr (1974) whose study is described on page 150 . She examined the relationships between the extraversion, neuroticism and lie scales. Her results are presented below. Because the significance levels that she gave were inaccurate, the present author has presented the correct figures in parentheses.

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[1] Calculated by the present researcher.

Below are given the values of r required for statistical significance at the various probability levels for N = 2000 (df = 1998). These values are not easily obtainable directly from the available tables. They were, therefore, computed by use of the "large sample" formula, $r = z/\sqrt{N - 1}$, which was derived from the formulae provided by Downie and Heath, 1965, p. 155).

p :	0,05	0,01	0,001
r :	0,044	0,058	0,074

These calculations were verified by the Head, Department of Statistics, University of Durban-Westville.

Form A (n = 443)

	r	p[1]
E and N	- 0,165	< 0,1 (< 0,001)
E and L	- 0,099	> 0,1 (< 0,05)
N and L	- 0,267	< 0,01 (< 0,001)

Form B (n = 415)

	r	p[1]
E and N	- 0,159	> 0,1 (< 0,01)
E and L	- 0,107	> 0,1 (< 0,05)
N and L	- 0,294	< 0,01 (< 0,001)

Behr concluded: "The intercorrelations among the three subscales of the EPI are distinctly higher than the zero levels claimed in the test manual, and are derived from samples large enough to suggest that statistically significant co-variations do exist" (1974, p. 14). In view of the higher significance levels calculated by the present author, this statement must have greater impact.

The extraversion score and its relationships to a number of variables in an Indian sample are the focus of the present investigation. In view of this and the statistically significant and consistently negative relationships demonstrated above between the extraversion, neuroticism and lie scales, the author has also, throughout this report, always given the relationships between neuroticism and lie scores, on the one hand, and the variables chosen for investigation, on the other. No attempt at discussing these relationships was made because such a discussion would have shifted attention

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[1] The following probability levels have been computed by the method described in the footnote on page 46:

p :	0,05	0,01	0,001
r (n = 443):	0,093	0,123	0,157
r (n = 415):	0,096	0,127	0,162

from the main theme of the report.

Eysenck (1970) indicated that while personality inventories suggested that extraversion and neuroticism were uncorrelated, quite marked negative correlations were found in samples characterized by high neuroticism scores. This substantiated the view that, in high N subjects, high E (low arousal) was almost unattainable (Eysenck, 1961). Eysenck indicated that such complexities suggested the use of some form of zone analysis, that is, a splitting of the total universe of the subjects into four strata, namely, high N, high E; low N, high E; high N, low E; low N, low E; or even nine groups (including medium-high E and N scorers as additional strata in all combinations with high and low E and N scorers). This, he said, would make possible the discovery of interaction effects between E and N as well as the possibility of non-linear trends in one or both variables (1970, p. 436).

In the current project, the testing of all the hypotheses, with one exception, could not be done with a zonal analysis. In order to test the hypothesis that, at university level, there is a significant difference in attainment between neurotic introverted students and other personality types, namely, neurotic extraverts, stable extraverts, and stable introverts, a zonal analysis was necessary. For this type of analysis, the details of which will be given in Chapter Eleven, N scores were used in addition to E scores.

(E) MOTIVATION FOR THE PRESENT INVESTIGATION

This project, using a South African Indian sample, was intended to serve partly as a cross-cultural validation of relationships between the

personality trait of introversion-extraversion and certain other variables, noted in western cultures. Most of the relationships that the present study investigated had hitherto not been studied among Indian South Africans.

The research was also motivated by the fact that investigations into relationships between introversion-extraversion and certain aspects of occupational membership and linguistic affiliation within the same ethnic and religious groups, and between introversion-extraversion and different religious sections within the same ethnic group had not been previously investigated.

According to the literature, only two of the relationships that this study undertook, namely, introversion-extraversion as related to study habits (Entwistle and Entwistle, 1970) and introversion-extraversion as related to academic discipline chosen (Hudson, 1966),had been established for British university students. Because of differences in cultural background, the investigator wanted to investigate whether the results obtained on British university students would hold for Indian university students.

With regard to cultural differences, this study was further stimulated by contradictory statements concerning the present cultural position of Indians in South Africa. On the one hand, it has been claimed that Indian South Africans have retained their traditions and culture. For example, Pather commented: "In a western milieu, the Indian people (have) proved that their culture and tradition can be maintained without embellishments" (1961, p. 8).

On the other hand, there have been frequent references to the possibility that Indian South Africans have changed, with a shift in standards and values

(Kuper, 1960, p. 17; Ramasar, 1966, p. 9). In support of this view, Hey commented: "In one generation the Indian has moved from the traditional to the western" (1961, p. 9).

There has been a third point of view which has implied that the Indian is partly eastern and partly western. For example, Dickie-Clark, remarking on the Indians' adjustment to the western South African milieu, stated that Indians have been selective in their acceptance of western ways of life (1966, p. 95). Cooppan commented: "Culturally they are partly eastern and partly western, having achieved a fairly successful blend" (1960, p. 6).

As the foregoing statements indicate, views concerning the cultural position of Indian South Africans are equivocal. Therefore, one cannot be sure as to whether or not the correlates of introversion-extraversion, as revealed among western subjects, would hold among Indian South Africans; hence the need for the present study.

The literature indicated that only one study (Johansson, 1970) has been conducted on occupational choice in relation to introversion-extraversion. The present study was partly motivated by the fact that no study on occupational choice in relation to introversion-extraversion had been conducted (a) on an Indian sample, (b) on females and (c) in relation to occupations concerned with the production or use of written language, arts, social service, science, mechanics, business and office work.

An additional impetus was the discovery that only one study investigating the relationship between introversion-extraversion and linguistic affiliation, within the same ethnic group, could be traced. The investigator wanted to ascertain whether there were differences in introversion-extraversion

between Hindi- and Tamil- speaking subjects as a result of what van den Berghe terms their "wide cultural difference" (1964, p. 39).

The relationships between introversion-extraversion and sex, religion, family background and academic performance have been established for British and American school children (Child, 1964*; Eysenck and Cookson, 1969*; 1970). Different results could issue from the present study since these relationships were to be examined among Indian high school and university students who are different from the subjects used in other studies with regard to cultural and academic background and age.

The present study was not only motivated by the fact that the relationships between introversion-extraversion and most of the research variables had not been investigated for Indian South Africans, but also by the fact that, in at least three previous South African projects where the EPI was administered to Indian subjects (Karani, 1979*; Behr, 1974*; Balkisson, 1973), the reliability and validity of the EPI were not established for their samples. Hence, the relationships between introversion-extraversion and the few variables, which previous studies had "established" for Indians, remained equivocal. Also, the South African SSHA[1] had not been used for research with Indians. This project, then, was also motivated by the fact that it afforded the researcher an opportunity to determine the reliability and validity of the EPI and the South African adaptation of the SSHA for an Indian South African sample.

Almost all the previous studies concerned with the variables that the present study investigated, attempted, albeit without much scientific rigour, to control for the effects of age (following the statement by Eysenck and Eysenck (1964a,p. 18) that there is a significant trend for

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[1] See Appendix A for a list of all abbreviations appearing in this report.

N and E to decline with advancing age), but not for the effects of socio-economic status, in spite of the claim by Eysenck and Eysenck that there has been a general tendency for working-class groups to be characterized by higher N scores than middle-class groups. No differences have been observed with regard to E (Eysenck and Eysenck, 1964a, p. 18). The present investigation was spurred on by the fact that it was expected to improve on previous research designs utilized in investigating introversion-extraversion, by controlling the influence of age and socio-economic status.

The literature has implied a positive relationship between extraversion and occupations which involve dealing with people, on the one hand, and between introversion and occupations which deal with things, on the other (Hilgard, 1962, p. 470; Whittaker, 1970, p. 463; Furneaux, 1962, p. 39). The literature has also indicated certain relationships between introversion-extraversion and academic performance (Child, 1964; Eysenck and Cookson, 1969; 1970), study habits (Entwistle and Entwistle, 1970) and choice of academic discipline (Hudson, 1966). The present researcher was motivated by the consideration that if his study yielded relationships of sufficiently large magnitude, then the results would serve a useful purpose in both vocational and educational counselling of Indian students at high school and university.

In South Africa there is a general dearth of research using Indians as subjects. There is an even greater dearth of research investigating personality characteristics of Indians. It was hoped that this project would make a modest contribution to general research, and, in particular, provide information on personality characteristics of Indian South Africans.

(F) THE PROBLEMS OF THE RESEARCH

A review of the relevant literature on introversion-extraversion and a consideration of the foregoing points that motivated the research raised the following questions:

Among Indian students, are there significant correlations between introversion-extraversion, on the one hand, and the following variables, on the other:-

(a) Linguistic affiliation.
(b) Religious affiliation.
(c) Sex.
(d) Intelligence.
(e) Socio-economic status.
(f) Size of family.
(g) Parental interest in children's academic standing.
(h) Birth order.
(i) Vocational interest.
(j) Academic performance.
(k) Study habits and attitudes.
(l) Choice of academic discipline.

It was proposed to obtain the background information on linguistic and religious affiliation, sex, socio-economic status, family size, parental interest in children's academic standing, birth order and choice of academic discipline from a biographical questionnaire. Intelligence scores were to be obtained from school records, while the matriculation examination and class year marks were to provide a measure of academic performance for high school and university students, respectively. It was proposed to measure introversion-extraversion, vocational interest and study habits

and attitudes by appropriate questionnaires.

Further details regarding the above-mentioned aspects will be given in subsequent chapters.

(G) THE HYPOTHESES

On the basis of a survey of the relevant literature and corresponding to the problems formulated above, the following hypotheses, set up as tentative answers to the problems, were formulated:

(a) Project One

(1) There are significant differences in introversion-extraversion between linguistic groups. This hypothesis was tested on a sample of Hindi and Tamil high school boys and girls and is reported in Chapter Five.

(2) The religious groups differ significantly in introversion-extraversion. As will be described in Chapter Six, high school boys and girls from each of the Christian, Hindu and Muslim religious groups formed the sample on which this hypothesis was tested.

(3) There is a significant difference between males and females in introversion-extraversion. Males and females from high school and first-year university students from the Departments of Chemistry, English and Psychology, comprised the samples. The results are presented in Chapter Seven.

(4) There is a significant correlation between introversion-extraversion and IQ. As will be seen in Chapter Eight, this hypothesis was tested on the same sample of high school subjects referred to in 2 above.

(5) There is a significant difference in introversion-extraversion between subjects of high and low socio-economic status. First-year male and female university students from the Departments of Chemistry, English and Psychology, males from the Department of Engineering[1] and Faculty of Education and the same group of high school subjects mentioned in 2 above, formed the samples on which this hypothesis was tested. This is the topic of Chapter Nine.

(6) There is a significant difference in introversion-extraversion between subjects from large and small families. This hypothesis, as well as hypotheses 7 and 8 below, was tested on the same sample of high school and university students mentioned in 3 above. Chapter Nine describes the testing of these three hypotheses.

(7) There is a significant difference in the amount of parental interest shown in the academic standing of introverted and extraverted children.

(8) There is a significant relationship between introversion-extraversion and birth order.

(9) There are significant differences between introverts and extraverts with regard to interest expressed in occupations involving language, the arts, social service and business. The sample for testing this and the next hypothesis, was the same as mentioned in 2 above. Chapter Ten deals with these two hypotheses.

(10) There are significant differences between introverts and extraverts with regard to interest in occupations involving science, mechanics and office work.

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[1] At the time of testing it was still a department.

(b) Project Two

(1) There is a significant difference between introverts and extraverts with regard to academic performance. A sample of first-year English, Chemistry and Psychology university students and 549 high school students (246 males and 303 females) were chosen to test this hypothesis. The investigation of this, as well as the next three hypotheses, is described in Chapter Eleven.

(2) At university level, there is a significant difference in academic performance between neurotic introverted students and other personality types, namely, neurotic extraverts, stable extraverts and stable introverts. This hypothesis was tested on a sample of first-year psychology university students.

(3) There is a significant difference between the academic performance of introverted and extraverted students in the language subjects. The performance in English, of a sample of English I university students, and the attainment in English and Afrikaans, of a sample of high school students, was used to test this hypothesis.

(4) Introverted science students differ significantly from extraverted science students in performance in the science subjects. The performance in Chemistry, of a sample of Chemistry I university students, and the achievement in physical science and biology, of a sample of high school students, were utilized in testing this hypothesis.

(5) There is a significant difference between introverts and extraverts with regard to study habits and attitudes. The sample for testing this hypothesis was the same as for 2, Project One, above. Chapter Twelve presents a discussion on the testing of this hypothesis, as well as the one that follows.

(6) Introverts and extraverts differ significantly in the amount of time that they spend studying. This hypothesis was tested on a university sample selected from Chemistry I, English I and Psychology I students, and the high school sample mentioned in 2, Project One above.

(7) Student teachers and engineering students differ significantly in introversion-extraversion. First-year students selected from the Faculty of Education and the Department of Engineering formed the sample on which this hypothesis was tested. Chapter Thirteen presents details regarding the testing of this hypothesis, as well as the one that follows.

(8) Students of the language subjects differ significantly from students of the science subjects in introversion-extraversion. The sample used in testing this hypothesis was selected from English I and Chemistry I university students.

(H) THE PLAN OF THE RESEARCH

The present investigation, the plan of which is presented below, was expected to provide the answers to the problems formulated above.

The study comprised two projects, each of which investigated certain correlates of introversion-extraversion among Indian high school and university students.

Project One was planned to investigate the relationships between introversion-extraversion and the following variables:

(a) Linguistic affiliation.

(b) Religious affiliation.

(c) Sex.

(d) Intelligence.

(e) Socio-economic status.

(f) Size of family.

(g) Parental interest in children's academic standing.

(h) Birth order.

(i) Vocational interest.

Project Two was planned to investigate the relationships between introversion-extraversion and the following variables:

(a) Academic performance.

(b) Study habits and attitudes.

(c) Academic discipline followed.

The next chapter deals with preparations for the field work.

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CHAPTER TWO

PREPARATION FOR THE MAIN STUDY

(A) INTRODUCTION

Since the present research project involved introversion-extraversion, study habits and vocational interest, instruments measuring these variables needed to be chosen. In making a choice, the researcher took into account the purpose of the instrument, the volume of research information available on it, particularly with regard to reliability, validity (both of which will be fully discussed in the two subsequent chapters) and the standardization sample. The project also required the subjects to furnish certain personal details of a factual nature. To obtain these, the researcher prepared a biographical inventory.

(B) BIOGRAPHICAL INVENTORY

The biographical inventory (Appendix B) was so constructed that it could be used both with high school and university students. It elicited information additional to that contained in the school record cards.

(C) EYSENCK PERSONALITY INVENTORY (EPI)

(a) Nature

The EPI, like the Maudsley Personality Inventory (MPI), from which it was developed, is an instrument to measure two major dimensions of personality, extraversion and neuroticism or emotionality (Eysenck and Eysenck, 1964a, p. 5). It also contains an inbuilt lie scale.

There are two parallel forms of the test (Form A and Form B). Each form contains 24 E scale (extraversion) items, 24 N scale (neuroticism) items and 9 L scale (lie) items. The 9 L items on each form of the

questionnaire are adapted from the lie scale of the Minnesota Multiphasic Personality Inventory (MMPI) and are designed to indicate whether or not the respondent is faking on the test. Separate E, N and L scores are obtained from the scales. On each scale, the higher the score, the greater the degree of the particular characteristic.

(b) Comparison Groups

Since the extraversion scores vary with sex (e.g., Hosseini et al., 1973), age (e.g., Mehryar, 1970), education (e.g., Entwistle and Cunningham, 1968) and ethnic group (e.g., Lowe and Hildman, 1972), and in view of the fact that the samples in the present research differed from the Eysenck's samples in one or more of the foregoing variables, the norms given by Eysenck and Eysenck (1964a) were not used in this study. Instead, group means were used to create contrasting groups for comparisons.

Subjects scoring on and above the mean on E were classified "extraverts" while those scoring below the mean were classified "introverts". Similarly, on neuroticism, those scoring on and above the mean were classified "neurotic" (emotional) while those scoring below the mean were classified "stable".

(c) Reasons for Choice

Since the EPI measures the two dimensions of personality, extraversion and neuroticism or emotionality (Eysenck and Eysenck, 1964a, p.5), the former of which was the focus of the investigation, it was chosen for the present research.

The EPI was preferred to the MPI because it has many advantages over the latter. The availability of two parallel forms permits retesting for experimental purposes. The inclusion in each form of nine different items

adapted from the lie scale of the MMPI taps one kind of test-taking attitude, viz., creation of a socially favourable impression. It has carefully chosen items which minimize the correlation between extraversion and neuroticism which Eysenck and Eysenck claim to be uncorrelated and independent dimensions of personality (1964a,p. 13). The items are carefully worded so that even subjects of low intelligence and/or education are able to comprehend them. The test-retest reliability of the EPI is somewhat higher than that of the MPI. Even after intervals of several months between test and re-test, it is still in excess of 0,85 (p. 5). A further advantage of the EPI is that, "for experimental studies,one form alone may be sufficient" (Eysenck and Eysenck, 1964a,p. 11). Form A was used in the present investigation.

(D) SURVEY OF STUDY HABITS AND ATTITUDES (SSHA): FORM H

(a) Nature

The SSHA measures study habits and study attitudes. It comprises one hundred statements to each of which the subject has to respond with N (rarely or never), S (sometimes), D (frequently or often), G (generally) or A (almost always),as applicable to him. The SSHA comprises the following seven scales:

(1) Delay avoidance (VU/DA)[1]: This indicates to what extent a pupil promptly completes his assignments, avoids delay and is not inclined to waste time.

(2) Work methods (WM/WM): This gives an indication of a pupil's use of effective study methods, his efficiency in doing assignments and the extent to which he sets about his school work in the most effective way.

(3) Study habits (SG/SH): This is a total of the scores on the VU/DA and WM/WM scales to provide a measure of academic behaviour.

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[1] The first two letters within brackets in scales 1 to 6 are the Afrikaans abbreviations of the respective names of the scales and the next two the English.

(4) Teacher approval (OG/TA): This provides a measure of a pupil's attitude towards a teacher's classroom behaviour and methods.

(5) Education acceptance (AO/EA): This indicates the extent of a pupil's acceptance of educational ideals, objectives, practices and requirements.

(6) Study attitudes (SH/SA): This is a total of the scores of OG/TA and AO/EA to provide a measure of the pupil's confidence in scholastic aims.

(7) Study orientation (SO): This is a combination of all the above-mentioned aspects and provides an overall measure of a pupil's study habits and attitudes.

High scores on the SSHA indicate favourable study habits and attitudes while low scores indicate unfavourable study habits and attitudes.

(b) Reasons for Choice

Part of this project investigates the relationship between introversion-extraversion and study habits and attitudes. Therefore, an instrument that measured study habits and attitudes was needed. Since the SSHA is a "measure for evaluating study methods, motivation for studying and certain attitudes towards scholastic activities which are important in the classroom" (du Toit, 1974, p. 1), it was chosen.

The du Toit version was preferred to the Brown-Holtzman American version because the former was adapted and standardized for use in South Africa.

(E) INTEREST QUESTIONNAIRE FOR INDIAN PUPILS (IQIP): STANDARDS 6 - 10

(a) Nature

The questionnaire consists of 210 items covering 7 main sections.

There are 30 items to each interest section, each of which can be divided into two subsections. The main sections are described below and, within brackets, next to the main sections, are given the relevant subsections.

(1) Language (appreciative, expressive)

The main aspect concerns the production or use of written language. Examples of vocations in this field are those of writer, journalist, poet.

(2) Arts (appreciative, expressive)

This area refers to activities which involve line, colour and sound. Creativity is an important aspect. The vocations include those of artist, sculptor, etc.

(3) Social service (personal assistance, group assistance)

This field concerns assistance to people, an important aspect of which is contact with them in order to render service. Vocations include those of social worker, public relations officer, etc.

(4) Science (research, nature)

This area involves applied research and cause and effect relationships in natural and human phenomena.

(5) Mechanics (manipulation, design)

Activities related to the use of tools and equipment as in most trades and theoretical aspects like the designing, production and repair of machinery are included in this section.

(6) Business (trade, persuasion)

This section refers to activities concerning trade and the ownership of business concerns. General dealer, manager and salesman are examples of vocations in this field.

(7) Office work (numerical, non-numercial)

Vocations in this area involve computation and correspondence activities of both a numerical and non-numerical kind. Typical vocations include those of correspondence clerk, accounts clerk, cashier, accountant, registration clerk, etc.

(b) Reasons for Choice

Part of the research project investigates the relationship between introversion-extraversion and vocational interest (choice). Therefore, an instrument to measure vocational interest was needed. The IQIP was chosen because it is "a reliable and valid instrument for the measurement of the interests of Indian pupils" (HSRC, 1969, p. 1). It is also the only vocational interest questionnaire standardized for Indian South African pupils.

(F) THE PILOT STUDY

A pilot study was necessary, and proved very useful, for testing the instruments, gauging the general attitude of the subjects towards the investigation and establishing procedures and times for the administration of each test.

For the pilot study with high school pupils, a standard 9 class of 34 children having boys and girls from each of the three religious groups, namely, Christians, Hindus and Muslims, was chosen. For the pilot study with university students, a group of 45 Psychology I students was tested during a practical class.

The pilot study indicated that the EPI, SSHA and IQIP needed no modification as they were clearly understood by the high school subjects.

However, important information was gained with regard to the biographical inventory, as a result of which, questions regarding marital status, race, subject's religion and one enquiring whether or not the subject was an adopted child, were added.

Since "father's occupation" was the sole factor that was used to dichotomize the subjects into high and low socio-economic status groups, it was absolutely necessary to gain an accurate indication of this variable. The pilot study indicated that there were ambiguities in this regard and, in order to remedy this, a comprehensive write-up giving examples of occupations and a section to indicate whether "father had his own business" or whether "father worked for someone else", were added.

(G) SAMPLE SELECTION

In selecting the high school sample, the researcher controlled for sex, socio-economic status, educational level, ethnicity, adoption and age by treating scores for males and females, and high and low socio-economic groups separately, and by using only standard 9, Indian, non-adopted pupils in the 15 to 18 year age group.

In conducting this investigation with high school children, the investigator decided against using pupils from standard 8 and below because it was felt that many of the subjects would not comprehend some items of the tests. Since there was doubt in this regard, the choice was between standard 9 and 10 subjects. The researcher opted for the standard 9 group for two reasons. Firstly, at all schools there were more standard 9 than standard 10 pupils. This meant that by using the former group there would be a larger number from which to choose the final sample. Secondly, from discussions with school principals, the author learnt that, in view of a very tight schedule with standard 10 pupils, it would be somewhat difficult to have them as subjects.

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The literature does indicate that age (e.g., Warburton, 1968 ; Eysenck and Eysenck, 1969b),ethnicity (e.g., Lowe and Hildman, 1972), sex (e.g., Eysenck and Eysenck, 1969b),socio-economic status (e.g. Eysenck and Eysenck, 1969b,and education (e.g., Entwistle and Cunningham, 1968) could influence extraversion and neuroticism scores. Although no report on the influence of adoption was traced, the present researcher, nevertheless, controlled for this variable in view of the fact that it could have an influence, and that it was very convenient to control.

Personal details contained in the pupils' school record cards assisted the researcher,to a large extent,in choosing the subjects for testing.

Only single, non-adopted, Indian, first-year,university students were eligible for the experiment. First-year students were used because of the large numbers from which a sample could be selected. Students who were too old, that is, 23 years and over, and students who had previously enrolled at any university were excluded from the sample. All students from the Departments of Chemistry, English, Psychology, Engineering as well as Bachelor of Paedagogics students from the Faculty of Education, who satisfied the foregoing criteria,were selected for the sample.

In the absence of a standardized scale for use with Indians, the socio-economic status of all subjects was determined by the occupational level of their fathers (or guardians). Occupational status has long been regarded as the best single measure of socio-economic status and was successfully used for the first time in Indian research in South Africa by Ramphal (1960, p. 213).

In the present investigation, those pupils whose fathers (guardians) were white-collar workers were classified into the "high" category and blue-

collar workers into the "low" category. In the "high" category were classified such occupations as doctor, lawyer, teacher, clerk, draughtsman, storeman, manager, furniture salesman, motor car salesman, director of companies, etc. In the "low" group were included such occupations as labourer, gardener, factory worker, shop assistant, builder, driver, etc.

Further sample details will be given in the relevant chapters which will outline specific aspects of the investigation.

(H) ADMINISTRATION OF THE INSTRUMENTS

The majority of high school subjects were tested in groups of up to 50 comfortably accommodated for psychological testing in the schools' lecture theatres. In a few schools where there were no lecture theatres or where a lecture theatre was not available, testing took place in the laboratory, library or school hall. Whatever the venue, the tester ensured that the general physical arrangement and atmosphere were, at all times, favourable for psychological testing.

Each session began at about 08h15 - the time from 08h00, when children normally entered the classrooms, to 08h15, being used to send the children selected for testing from their classrooms to the testing venue.

All tests were administered by the author in the following order: (a) Biographical Inventory; (b) EPI; (c) SSHA; (d) IQIP.

The biographical inventory was administered first because it was felt that the factual, non-emotional nature of the questions would smoothly and gradually initiate the subjects into being tested. The EPI was administered next, since, as already mentioned, it was the central instrument and the author wanted to tap the responses while the subjects were still fresh. The SSHA was administered next because the pilot study helped to determine that the time available between the completion of the EPI and the morning

school interval was sufficient for the administration of the SSHA which takes far less time to complete than the IQIP. This was advantageous also from the point of view that the subjects would then have the interval to rest before taking the IQIP, the longest test in the battery.

After the completion of the biographical inventory and the EPI, the subjects were given a five minute rest period during which time they were allowed to stand up and/or talk to those next to them. The specific directions for the administration of the tests were adhered to at all times. The foregoing procedure was followed at each school.

All university students were administered only the biographical inventory and the EPI (in that order) since it was not the intention to investigate study habits and attitudes and vocational interests in relation to introversion-extraversion among them.

University students in the Departments of Engineering and Psychology were tested during their practical classes while students in the Faculty of Education, Departments of English and Chemistry were tested during a double lecture period. Again, the author, who also did all the testing of university students himself, ensured that proper physical arrangements and an atmosphere conducive to psychological testing prevailed at all times.

In Chapter Three a major property of measuring instruments that is important to social scientists, namely, reliability, will be discussed.

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CHAPTER THREE

RELIABILITY OF THE INSTRUMENTS USED

Measuring instruments have at least two important porperties of interest to social scientists, namely, reliability and validity. The literature on these two properties of tests is vast. Therefore, only those aspects that are of direct relevance to the present research and to the measuring instruments used in the present study will be discussed in this and the next chapter, respectively.

Particular attention will be given to the reliability and validity of the EPI because of the facts that it was the central instrument of the study, its reliability has not been established previously with an Indian South African sample, it is not a South African test and it has not been standardized for use in South Africa.

Attention will also be devoted to the reliability and validity of the SSHA because it was standardized only for White South Africans.

There was no need to establish the reliability and validity of the IQIP since it is an instrument standardized for Indian pupils.

It was hoped that an investigation of the reliability and validity of the EPI for Indian South Africans would contribute toward the growing wealth of information on the test. In addition, if the EPI were found to be reliable and valid for Indian South Africans, it would enable the researcher to proceed with the project without doubts or misgivings about the reliability and/or validity of the results.

It must be pointed out that this part of the present investigation set out to determine the reliability and validity of only the E scale of Form A

of the EPI since E, and its relationships to a number of other variables, was the subject of the investigation, and, only Form A was used in the present study. However, within the overall results of the project, comments will also be made about N and L and their relationships to a number of variables. For this reason, the reliability and validity studies of the N and L scales contained in the literature will also be reported. On the other hand, because N and L were not the focus of the present investigation, the researcher did not consider it necessary to determine the reliability and validity of these scales.

(A) DEFINITION OF RELIABILITY

The term "reliability" has two closely related but somewhat different connotations in psychological testing. Firstly, it refers to the extent to which a test is internally consistent; that is, free of such internal defects as will produce errors of measurement due to the quality of the items rather than to the instability of performances of testees themselves. The question here is: "How is the test measuring at a particular time?" Secondly, reliability refers to the extent to which an instrument yields consistent results on testing and retesting. The question here is: "How dependable is the test for predictive purposes?" These two aspects of reliability are intimately related, for, if a test is not highly reliable on any particular occasion, it can have little predictive value (Freeman, 1960, pp. 10 - 11).

(B) METHODS OF ESTIMATING RELIABILITY

There are two methods, in general, of expressing the consistency, or dependability, of test results, viz., relative reliability and absolute reliability. The first of these refers to the ability of the test to yield scores which place examinees in the same position relative to each other

when a single test is administered twice to them, or when two equivalent forms of a test are applied to all members of the group. Relative reliability provides an index of over-all dependability of scores in the form of a correlation coefficient, known as a coefficient of reliability. The second method of expressing reliability is in terms of a statistic known as the standard error of measurement. This type is not of relevance to the present argument and will not be described any further.

Estimating Relative Reliability

Freeman (1963, p. 68) mentions the following methods that are used to derive relative reliability coefficients:

(1) The same form of the test may be administered twice to the same group of individuals (test - retest reliability).

(2) Two separate but equivalent forms of the test may be administered to the same individuals (parallel- or alternate-form reliability).

(3) The items of a single test are subdivided into two presumably equivalent and separately scored sets; the two sets of scores are correlated as though they were obtained from two equivalent forms or from two testings with the same form (split-half reliability).

When persons are tested and retested a number of times, they may undergo some change as a result of repeated measurements, e.g., by way of practice effects, improvement in the skill of taking tests, and in the "set" or attitude toward a test. In estimating reliability, therefore, it is necessary to limit the number of times an individual is tested with the same device. Hence, instead of frequent retesting of the same persons, dependable results for a given psychological instrument are obtained by increasing the number of persons tested rather than by increasing the

number of measures of each person. Therefore, the techniques mentioned above are used only once or twice with the same individuals.

Administering the same test twice has many limitations. It is held by some investigators that there is recall of answers to specific items of a test when the identical test form is given a second time. However, other investigators claim that although there can be some recall, it is unlikely that this possibility will be an important consideration, for the number of items in any given test is too large for the retention of many (Freeman, 1960, p. 13). Practice will probably produce varying amounts of improvement in the retest scores of different individuals. The nature of the test itself may also change with repetition. This is especially true of problems involving reasoning or ingenuity. Once the subject has grasped the principle involved in the problem, or once he has worked out a solution, he can reproduce the correct response in the future without going through the intervening steps. Only tests that are not appreciably affected by repetition lend themselves to the retest technique. A number of sensory discrimination and motor tests would fall into this category. For the large majority of psychological tests, however, the retest technique is inappropriate (Anastasi, 1968, p. 80).

Alternate-form reliability also has certain limitations. Administering two equivalent tests is more time consuming than administering a single one. The two forms might vary somewhat in content, thus underestimating reliability of either form.

If the behaviour functions under consideration are subject to a large practice effect, the use of alternate forms will reduce, but not eliminate, such an effect. If all subjects were to show the same improvement with repetition, the correlation between their scores would remain unaffected,

since adding a constant amount to each score does not alter the correlation coefficient. It is much more likely, however, that individuals will differ in amount of improvement, owing to the extent of previous practice with similar material, motivation in taking the test, and other factors. Under these conditions, the practice effect represents a source of variance that will tend to reduce the correlation between the two test forms. If the practice effect is small, reduction will be negligible.

Another related question is the degree to which the nature of the test will change with repetition. In certain types of ingenuity problems, for example, any item involving the same principle can be readily solved by most subjects once they have worked out a solution to the first. In such a case, changing the specific content of the items in the second form would not suffice to eliminate this carry-over from the first form. It must also be added that alternate forms are unavailable for many tests, because of the practical difficulties of constructing comparable forms (Anastasi, 1968, pp. 81 - 82).

The split-half method provides, essentially, a measure of the test's internal consistency. It is a useful first check on the suitability of a test and could save unnecessary labour that might be expended on using an unreliable device. The method tells if the test is a reliable representation of an individual's traits at a given time. It does not describe completely the reliability of a test which is to be used periodically for predictive purposes. For periodic and predictive testing, the test-retest method of establishing reliability is better (Freeman, 1960, pp. 13 - 14).

The split-half method of determining reliability may yield a coefficient of correlation that is too high. In calculating reliability, an assumption is that the operations of chance factors are uncorrelated and hence will cancel out one another. But, in using the split-half method, both obtained

measures are determined at the same sitting and any chance fluctuations due to temporary conditions within testees and to conditions in the external situation will operate in the same direction and thus yield a somewhat higher correlation coefficient than might be found by other methods.

When computing split-half reliability the subdivision is usually made by taking the odd-numbered items as one part of the test and the even-numbered items as the other. The score is then found for each person, for each of the subdivisions after which the correlation is computed. However, this coefficient is an underestimate of the reliability of the whole test because longer tests tend to be more reliable than shorter ones and, by the split-half method, two half-length tests have been correlated. A correction formula, known as the Spearman-Brown formula, is used to estimate what the reliability of the whole test would be. It is

$$r_n = \frac{nr}{1 + (n - 1)\, r}$$

where r_n is the estimated coefficient of reliability of the whole test, r is the obtained coefficient of reliability between parts of the divided test and n is the number of times the test is lengthened or shortened. In the method of odd-even reliability, n = 2, since the original test has been divided into two equal parts.

(C) FACTORS AFFECTING RELIABILITY

Lyman (1963, pp. 34 - 36) lists the following factors that affect reliability:

(a) Length of the Test

The longer the test, the more reliable it will be - provided other factors are held constant, for example, that the group tested is the same, that the new items are as good as those on the shorter test and that the test does not become so long that fatigue sets in.

(b) Homogeneity/Heterogeneity

Other things equal, higher reliability coefficients will be found for groups which vary more in ability, i.e.,for heterogenous groups.

(c) Time Interval

When two testings are involved the reliability coefficient is higher when the time interval between the two testings is short. This is why IQ's change most when there is a long period of time between testings.

(d) Testing Conditions

Irregular testing conditions tend to lower reliability coefficients, e.g., failure to follow directions for giving the test, unfavourable physical conditions, illness, change in motivation, etc.

(D) THE RELIABILITY OF THE INSTRUMENTS USED IN THE PRESENT RESEARCH

(a) Survey of Study Habits and Attitudes (SSHA) (Adapted and Standardized for use in South Africa)[1]

Du Toit (1974) tested 2790 Afrikaans-speaking and English-speaking boys and girls from standards 6 to 10 and obtained the following split-half reliabilities for the four primary scales of the SSHA:

VU/DA (Delay avoidance)	:	0,833
WM/WM (Work methods)	:	0,835
OG/TA (Teacher approval)	:	0,873
AO/EA (Education acceptance)	:	0,805

Using a sample of 229 boys and 223 girls, of whom 210 were English speaking and 242 Afrikaans speaking, du Toit (1974) obtained test-retest reliabilities, after a fourteen-day interval,ranging from 0,811 for girls on the WM/WM scale, to 0,900 for boys on the SG/SH (Study Habits) scale. On the SO (Study Orientation) scale,he obtained a test-retest reliability coefficient of

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[1] American studies have not been reviewed here because of changes that have been made in the South African SSHA.

0,923 for boys, 0,901 for girls, 0,914 for Afrikaans-speaking pupils, and 0,914 for English-speaking pupils. In all cases the test-retest interval was 14 days.

From the above-mentioned data, du Toit (1974, p. 10) concluded that the SSHA was a very reliable instrument. A survey of the literature from 1974 to date indicated that no subsequent literature on the reliability of the SSHA was available.

(1) The Test-Retest Reliability of the SSHA with Indian Subjects

Since the test-retest method of establishing reliability offers the greatest degree of control over extraneous factors that may otherwise contaminate the results (Black and Champion, 1976), this method was chosen to determine the reliability of the SSHA.

Fifty three Indian standard 9 high school girls (mean age = 16,495 years) and 57 standard 9 high school boys (mean age = 16,456 years) from the Burnwood State High School in Durban were administered the SSHA twice. The interval between test and retest was 15 days.

Mean scores and standard deviations were calculated separately for the boys and girls for each of the 7 scales of the SSHA. Reliability coefficients (Pearson r)[1] were then computed for each of the scales separately for boys and girls and then for the sexes combined. The results are presented in the table below.

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[1] Pearson r was calculated by the following formula:

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

(Downie and Heath, 1974, Formula 7.5, p. 92)

TABLE I

MEAN SCALE SCORES, STANDARD DEVIATIONS AND TEST-RETEST RELIABILITY COEFFICIENTS OF THE SSHA WITH INDIAN SUBJECTS

			First Testing		Second Testing		
Scale	Sex	Number of Subjects	Mean	S.D.	Mean	S.D.	r
VU/DA	Boys	57	16,702	8,555	18,316	10,388	0,850
WM/WM	Boys	57	19,649	7,902	18,842	9,564	0,827
SG/SH	Boys	57	36,351	14,556	37,158	18,581	0,861
OG/TA	Boys	57	19,158	9,575	18,368	10,716	0,835
AO/EA	Boys	57	22,386	8,687	22,053	9,465	0,884
SH/SA	Boys	57	41,544	16,490	40,421	18,941	0,882
SO	Boys	57	77,895	28,701	77,579	34,565	0,900
VU/DA	Girls	53	19,660	7,943	19,019	9,279	0,860
WM/WM	Girls	53	22,000	7,758	21,623	8,949	0,868
SG/SH	Girls	53	41,660	14,127	40,642	17,058	0,893
OG/TA	Girls	53	22,887	9,102	23,189	10,349	0,906
AO/EA	Girls	53	23,604	7,370	23,434	7,634	0,856
SH/SA	Girls	53	46,491	15,093	46,623	16,509	0,890
SO	Girls	53	88,151	26,077	87,264	30,133	0,911
VU/DA	Boys and Girls	110	18,127	8,397	18,654	9,875	0,846
WM/WM	Boys and Girls	110	20,782	7,920	20,182	9,376	0,849
SG/SH	Boys and Girls	110	38,909	14,594	38,836	17,948	0,874
OG/TA	Boys and Girls	110	82,836	27,942	82,245	32,865	0,906
AO/EA	Boys and Girls	110	20,954	9,534	20,691	10,812	0,873
SH/SA	Boys and Girls	110	22,973	8,102	22,718	8,659	0,874
SO	Boys and Girls	110	43,927	16,024	43,409	18,078	0,888

In general, the reliability coefficients presented in the table above are high (all significant beyond the 0,001 confidence level) and compare very favourably with those obtained by du Toit (1974). Therefore, the reliability coefficients obtained in the present study indicated that the SSHA was a reliable instrument for use with Indian South African standard 9 pupils in the 15-18 age range.

(b) Interest Questionnaire for Indian Pupils (IQIP) in Standards 6 - 10

The manual for the IQIP gives standard error of measurement figures and internal consistency coefficients calculated by use of the Kuder-Richardson Formula 20 (HSRC, 1969). Apart from educational standard, the manual does not give any other details of the sample on which these figures were obtained.

K-R 20 coefficients range from 0,816 for social service in standard 6, to 0,973 for mechanics in standard 10. For the standard error of measurement the range is from 1,763 for mechanics in standard 10, to 2,529 for social service in standard 6.

The correlation coefficients and standard errors of measurement for the seven sections covering the main categories of interest are given below for standard 9 pupils (HSRC, 1969, p. 6). The standard 9 figures are given here because the sample of the present project was drawn from standard 9 pupils.

TABLE II

RELIABILITY COEFFICIENTS AND STANDARD ERRORS OF MEASUREMENT OF STANDARD 9 INDIAN PUPILS ON THE IQIP

Section	K-R 20 Reliability Coefficient	Standard Error of Measurement
1 : Language	0,948	2,153
2 : Arts	0,928	2,287
3 : Social Service	0,885	2,331
4 : Science	0,905	2,368
5 : Mechanics	0,968	1,784
6 : Business	0,906	2,025
7 : Office Work	0,908	2,212

In order to determine the reliability of the IQIP, Oosthuizen (1973) administered the test to a general group of 562 standard 7 and 557 standard 8 pupils from Natal and Transvaal. The test was also administered to 54 standard 7 and 21 standard 8 pupils studying building and 74 standard 7 and 45 standard 8 pupils studying electronics (electrical group) and mechanics. There were two further groups: 24 standard 7 pupils following a technical course and 26 standard 7 pupils in a commercial course. Apart from the pupils in the general group, the pupils in all the other groups were from a technical college.

Oosthuizen found that, for standard 7 pupils, the K-R 21 index ranged from 0,878 for business to 0,961 for mechanics in the general group, from 0,758 for office work to 0,946 for business in the building group, and from 0,880 for arts to 0,918 for language in the electrical group. For

standard 8 pupils, the K-R 21 index ranged from 0,873 for social service to 0,966 for mechanics in the general group, from 0,884 for office work to 0,942 for language in the building group, and from 0,873 for mechanics to 0,952 for language in the electrical group.

Oosthuizen noted that the reliability indices were generally high and they were higher for the general groups than for the selected groups.

A survey of the literature from 1969 to the present indicated that there was no other report on the reliability of the IQIP.

(c) Eysenck Personality Inventory (EPI)

Test-retest reliability coefficients for the EPI have been reported by Eysenck and Eysenck (1964a,p. 11) for two groups of normal English subjects who have not been identified by age, sex, socio-economic status etc. There were 92 subjects in one group and 72 subjects in the other. The test-retest interval was approximately 1 year for the former and 9 months for the latter. For the group of 92 subjects, the investigators obtained test-retest coefficients for the E scale of 0,82 on Form A, 0,85 on Form B, and 0,88 on the total test. The corresponding figures for N were 0,84, 0,81 and 0,84, respectively. For the group with 72 subjects, the investigators obtained test-retest coefficients for E of 0,97 on Form A, 0,80 on Form B and 0,94 on the total test. The corresponding figures for N were 0,88, 0,91 and 0,92, respectively.

Referring to the above-mentioned results, the authors commented: "Considering the long time that elapsed between test and retest, this is encouragingly high" (Eysenck and Eysenck, 1964a,p. 11).

Eysenck and Eysenck (1964a,p. 10) have also given separate test-retest reliability coefficients for the L scale on an unidentified group of 50 subjects with no information on the duration of the test-retest interval. The reliability coefficients obtained from this group of 50 subjects were 0,81 for the total L scale (L scales of Form A and Form B combined), 0,78 for the L scale of Form A and 0,74 for the L scale of Form B.

Eysenck and Eysenck (1964a,p. 11) have also provided split-half[1] reliabilities, i.e.,Form A scores correlated with Form B scores, and reliabilities for the whole scales for 1655 normals, 210 neurotics and 90 psychotics. They obtained split-half reliability coefficients on the E scale of 0,757 for the normals, 0,750 for the neurotics and 0,741 for the psychotics. On the N scale they obtained split-half reliability coefficients of 0,811 for normals, 0,873 for neurotics and 0,906 for psychotics. Using the Spearman-Brown prophecy formula they obtained (i) E scale (Form A + Form B) reliabilities of 0,862 for normals, 0,857 for neurotics and 0,851 for psychotics, and (ii) N scale (Form A + Form B) reliabilities of 0,896 for normals, 0,932 for neurotics and 0,951 for psychotics.

Salas and Richardson (1968) used a sample of 371 twenty-year-old Australian National Servicemen. Approximately half, selected at random, completed Form A first, the remainder completed Form B first. The investigators reported that the correlation between the Form A and Form B E scale scores for the group was 0,71; between the two sets of N scale scores it was 0,79 (p. 12). These results were comparable with the split-half reliabilities reported by Eysenck and Eysenck (1964a,p. 11).

Lunghi and Ryle (1969) administered the EPI to the 1964 undergraduate intake at Sussex University (n = 551) during the first week of that academic year and retesting was carried out two years later on two sub-samples of this original population. One sample (n = 44) consisted of those who had

[1] They used Form A scores to represent one half of the test and Form B scores to represent the other half and they called the procedure "split-half reliability".

become psychiatric patients (defined as any student consulting with a psychological problem warranting at least four treatment sessions at the University Health Centre, or admission to a hospital) during the two-year period. The other sample comprised 37 students who did not become psychiatric patients.

An identical test-retest study was conducted on a sample (n = 31) of non-patients drawn from the 1965 intake. This sample was matched, as far as possible, with the 1964 sample, for initial N and E scores.

For the 1964 non-patient group (n = 37), Lunghi and Ryle obtained E and N scale correlation coefficients of 0,66 and 0,54, respectively, while the corresponding figures for the 1964 patient group (n = 44) were 0,59 and 0,48, respectively. For the non-patient 1965 group (n = 31), the obtained E and N scale correlation coefficients were 0,67 and 0,61, respectively (p. 1201).

These reliability coefficients are obviously far lower than those presented by Eysenck and Eysenck (1964a) and by Salas and Richardson (1968). The stability coefficients of Lunghi and Ryle (1969) may have been reduced by the fact that the test-retest interval was two years during which time there most likely would have occurred function fluctuation in the traits being measured.

Mehryar (1970) investigated the reliability of Form A of a verbatim Persian translation of the EPI by calculating the correlation coefficient between the first and second half of the test for a group of 100 students (50 males, 50 females) randomly chosen from 150 Pahlavi University students who volunteered for the experiment. Reliability coefficients corrected by the Spearman-Brown formula were 0,70, 0,80 and 0,50 for the E, N and L scales, respectively (p. 260).

Farley (1971) twice administered Form A of the EPI to 40 male and 40 female American university students with four weeks intervening between test administrations. He found no significant mean shifts from the first to the second testing on the E, N, and L scales for both sexes.

The test-retest stability coefficients for the 40 male university students was 0,78 for E and 0,78 for N, while, for the 40 female students, they were 0,87 for E and 0,87 for N (p. 365). These figures are high and in most cases higher than the alternate form reliabilities obtained by Eysenck and Eysenck (1964a, and by Salas and Richardson (1968). Farley (1971) reported stability coefficients for the L scale of 0,50 and 0,74 for males and females, respectively (p. 366).

Farley's study suggested that the reliability coefficients for the EPI are generally as high as can be expected for personality inventories, except, perhaps, where the L scale is concerned.

Orpen (1972) administered the EPI to a group of 90 White Afrikaans-speaking final-year high school boys and girls (mean age = 17,2 years). He obtained a split-half reliability coefficient of 0,74 on the N scale and 0,67 on the E scale (p. 246).

Thakur and Thakur (1973) administered Forms A and B of the EPI twice to 35 male and 35 female Indian university students in India. Their age range was 16-19 years with a mean of 16,94 years. There was a six-week interval between testing and retesting.

For the 35 male students, on Form A of the EPI, Thakur and Thakur obtained test-retest reliability coefficients of 0,83 for E, 0,82 for N and 0,68 for L; on Form B the corresponding figures were 0,81, 0,82 and 0,60, respectively. Alternate-forms reliability coefficients were 0,78 for E, 0,80 for N and 0,59 for L (p. 373).

For the 35 female students on Form A of the EPI, they obtained test - retest coefficients of 0,89 for E, 0,89 for N and 0,72 for L; on Form B the corresponding figures were 0,92, 0,91 and 0,70, respectively. Alternate-forms reliability coefficients were 0,76 for E, 0,78 for N and 0,56 for L (p. 373).

These figures indicated that test-retest and alternate forms reliabilities were high in the case of Indian subjects. The data also confirmed the observations of Farley (1971) that "alternate-forms reliability coefficients for E are generally lower than those for N, suggesting that alternate forms A and B may be somewhat more equivalent for N than for E" (p. 366).

It may also be noted that the coefficients of test - retest reliability were higher than those for alternate-forms. As far as the L scale was concerned, stability coefficients ranged between 0,60 and 0,72 for both forms and for both sexes. Alternate-forms reliability coefficients for males and females obtained on the L scale were 0,59 and 0,56, respectively (p. 373).

In view of the relatively high reliability coefficients obtained in the measurement of introversion-extraversion and neuroticism, Thakur and Thakur concluded that the EPI was suitable for personality assessment among Indians in India (p. 374).

Honess and Kline (1974) administered the EPI to 103 male (mean age=18 years; S.D.=1,5) and 66 female (mean age=17 years; S.D.=0,50) Ugandan students attending two rural co-educational boarding schools in the Buganda District. The tests were readministered three-and-half to four months later to determine test - retest reliability.

They reported a coefficient of 0,485 for E and 0,635 for N (with n = 55). No reason was given for using the scores of only 55 of the original 169 subjects. Separate figures for each sex group were not given and the test-retest reliability coefficients obtained by Honess and Kline were lower than desirable.

The foregoing review of the more significant findings on the reliability of the EPI clearly reveals that the results are equivocal. Some researchers reported satisfactory test-retest reliability coefficients (Eysenck and Eysenck, 1964a; Farley, 1971; Thakur and Thakur, 1973) while others have obtained unsatisfactory figures (Lunghi and Ryle, 1969; Honess and Kline, 1974). Further, in every study reviewed, where both test-retest and parallel-form reliabilities were tested, the former gave higher correlation coefficients. On this issue Salas and Richardson (1968, p. 11) have commented: "Comparisons indicated that the disparate trends evident between the results from Forms A and B in the English data were echoed in the Australian (and Indian) results to a degree which suggests that the two forms, whilst comparable,are not parallel.

"In consequence, the claim made by the constructors of the EPI, that the existence of '... two parallel forms (makes) possible retesting after experimental treatment ...' (Eysenck and Eysenck, 1964a,p. 5), must be treated with considerable reserve".

In view of the foregoing conclusions from previous studies and the claim by Black and Champion (1976) that the test-retest method offers the greatest degree of control over extraneous factors that would otherwise operate to contaminate the measure (p. 242), the present researcher decided to use only one form of the EPI as recommended by Eysenck and Eysenck (1964a,p. 11) and Salas and Richardson (1968 p. 12), and the test-retest method to establish its reliability for his sample of standard 9 high school pupils.

(1) The Test-Retest Reliability of Form A of the EPI with Indian Subjects

Seventy two Indian standard 9 high school girls (mean age=16,928 years; S.D.=0,539) and 70 standard 9 high school boys (mean age =17,296 years; S.D.=0,649) from 8 high schools in the greater Durban area were administered Form A of the EPI twice. The average period between test and retest was 72 days for both boys and girls. The table below provides further details.

TABLE III

COMPOSITION OF THE SAMPLE OF INDIAN STANDARD 9 PUPILS AND TEST-RETEST INTERVALS DURING RELIABILITY STUDY OF THE EPI

High School	Interval Between Test and Retest (Days)	Number of Boys	Number of Girls
Reservoir Hills	109	11	11
Southlands	57	14	10
Apollo	52	12	10
Burnwood	57	5	9
Centenary	112	5	10
Chatsworth	41	8	11
Gandhi-Desai	93	12	7
Isipingo	41	3	4

Mean scores and standard deviations were calculated separately for boys and girls for the three scales of the EPI. Reliability coefficients (Pearson r) were then computed for each of the scales for boys and girls separately and then for the sexes combined. The results are given in the table below:

TABLE IV

MEAN SCALE SCORES, STANDARD DEVIATIONS AND TEST-RETEST RELIABILITY COEFFICIENTS OF THE EPI WITH INDIAN SUBJECTS (TOTAL GROUP)(INCLUDING L SCORES OF 5[1] AND ABOVE)

			First Testing		Second Testing		
Scale	Sex	Number of Subjects	Mean	S.D.	Mean	S.D.	r
E	Boys	70	13,700	3,922	13,114	3,604	0,718
N	Boys	70	10,500	5,229	11,086	4,774	0,843
L	Boys	70	3,557	2,129	3,657	1,804	0,779
E	Girls	72	12,625	4,033	13,417	3,781	0,814
N	Girls	72	12,708	4,395	13,000	4,017	0,772
L	Girls	72	3,681	1,640	3,542	1,724	0,715
E	Boys and Girls	142	13,155	4,015	13,268	3,633	0,755
N	Boys and Girls	142	11,620	4,986	12,056	4,509	0,822
L	Boys and Girls	142	3,620	1,898	3,599	1,765	0,745

After establishing that all the r values given above were significant beyond the 0,001 confidence level, the high lie scorers (5 and above) were excluded and then reliability coefficients were re-calculated. These results are given in Table V below.

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[1] Eysenck and Eysenck have this to say about the L score: "No absolute guidance can be given for its use, as different groups differ from each other, but in general it may be said that there is considerable evidence to show that a score of 10 or above on the scale shows that "faking good" is likely to have occurred, and that the E and particularly the N scores should be regarded with considerable scepticism. If only scale A or B is employed, an L score of 4 or 5 would be considered to constitute the cutting point where inventory answers ceased to be acceptable" (1964a, p. 14). In the present project only Form A was used. Throughout this report, when a relatively small number of subjects was involved, an L score of 5, and whenever a relatively large number of subjects was involved, an L score of 4, was used as the cutting point where inventory answers ceased to

TABLE V

MEAN SCALE SCORES, STANDARD DEVIATIONS AND TEST-RETEST RELIABILITY COEFFICIENTS OF THE EPI WITH INDIAN SUBJECTS (SELECTED GROUP) (EXCLUDING L SCORES OF 5 AND ABOVE)

			First Testing		Second Testing		
Scale	Sex	Number of Subjects	Mean	S.D.	Mean	S.D.	r[1]
E	Boys	40	14,025	4,150	13,550	3,866	0,816
N	Boys	40	12,700	5,066	12,950	4,171	0,861
L	Boys	40	2,100	1,261	2,450	1,182	0,423
E	Girls	40	13,050	4,105	14,325	3,888	0,842
N	Girls	40	12,500	4,062	13,400	3,618	0,735
L	Girls	40	2,725	1,049	2,200	1,030	0,533
E	Boys and Girls	80	13,538	4,156	13,938	3,897	0,807
N	Boys and Girls	80	12,575	4,623	13,062	4,069	0,802
L	Boys and Girls	80	2,412	1,201	2,350	1,108	0,427

On an average, the reliability coefficients contained in Tables IV and V compare favourably with those obtained in most of the other studies that have been reviewed earlier and in which the investigators claim a high degree of reliability. It must be pointed out that some of the investigators report slightly higher coefficients. This may be due to the fact that their test-retest interval was considerably shorter than in the current study. In this regard, Freeman says: "... longer intervals between repeated tests will result in lowering the reliability coefficient; that is, reliability is in part a function of time" (1963, p. 70). He quotes a number of studies to substantiate the point.

[1] The reliability coefficients of the E and N scales for the boys, girls and boys and girls combined are significant beyond the 0,001 level. Comments about the significance levels of the L scale for each of the groups are made on p. 90.

While Freeman (p. 69) suggests that the first and second testings should take place within a week or two, in order to minimize the possible influences of intervening factors of developmental and chance changes, he also points out that some psychologists hold that the brief interval of a week or two does not sufficiently reduce the possible effects of recall. The view of Black and Champion (1976 p. 242), that a test-retest interval of two to four weeks is considered reasonable to counteract partially the problem of subjects recalling how they responded to the measuring instrument originally, seems to be the happy medium between Freeman's suggestion and the criticism of other psychologists mentioned by Freeman. The average time interval in the current study exceeded ten weeks so as to adequately cope with the problem of recall.

Coefficients for E and N presented in Table IV compare very favourably with those presented in Table V. However, the coefficients for L reflected in Table V are much smaller than the coefficients for L reflected in Table IV. Runyon and Haber explain this phenomenon when they point out that a "situation giving rise to spuriously low correlation coefficients results from restricting the range of values of one of the variables" (1976, p. 133). In this case, the range of L scores was restricted by the fact that high lie scorers were excluded. In spite of the reduced coefficients for L, they were highly significant beyond the 0,001 level for girls, and boys and girls combined, and beyond the 0,01 level for boys. In Guilford's terminology, the coefficients for L still reflect a "moderate correlation" and a "substantial relationship" (1950, p. 165).

The reliability coefficients obtained in the current study indicated that the EPI is a reliable instrument for use with Indian South African standard 9 pupils in the 15-18 year age range.

(E) CONCLUSION

The review of literature relating to the SSHA (du Toit, 1974) and the EPI (Eysenck and Eysenck, 1964a; Salas and Richardson, 1968; Lunghi and Ryle, 1969; Mehryar, 1970; Farley, 1971; Orpen, 1972; Thakur and Thakur, 1973; Honess and Kline, 1974) suggests that these instruments are reliable for the populations on which they were administered. In view of the fact that the subjects in the current project were Indian South Africans and no previous reliability studies of these instruments had been conducted on this group, the researcher conducted his own studies. The results indicated that the SSHA and EPI are reliable psychological instruments that would be useful in measuring some of the chosen research psychological characteristics among Indian subjects.

The IQIP is designed for, and was standardized on, an Indian South African sample. The figures given by the HSRC and Oosthuizen (1973) indicate that this test is reliable and this was accepted by the current researcher without further ado.

In Chapter Four the other major property of a measuring instrument important to social scientists, namely, validity, will be discussed.

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CHAPTER FOUR

VALIDITY OF THE INSTRUMENTS USED

(A) DEFINITION OF VALIDITY

An index of validity shows the degree to which a test measures what it purports to measure, when compared with accepted criteria (Selltiz et al., 1959; HSRC, 1969, p. 7; Freeman, 1963, p. 88). The problem here is to select an appropriate outside criterion (which may be an already established test) against which to measure the validity of the test in hand.

(B) FORMS OF VALIDITY

In the Monograph of the American Psychological Association (APA, 1966) and the Standards for Educational and Psychological Tests (APA, 1974), the many types of validity have been reduced to three general forms, namely, content, criterion-related and construct validity.

The following discussion of the different kinds of validity follows the outline given by the American Psychological Association (1974).

(a) Content Validity

Content validity refers to whether a test covers a representative sample of the behaviour domain being measured (Anastasi, 1976, p. 134). It is a non-statistical technique and is also known as logical validity, course validity or textbook validity (Lyman 1963, p. 27).

By this approach the test content is examined in detail, e.g., an aptitude test may be checked to see whether each item covers an important skill related to a particular training programme. Content validity is most important in aptitude and achievement testing.

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The American Psychological Association (1974) lists face validity as a type of content validity. It refers to whether test items appear to measure that which the author of the test desires to measure. It is a non-statistical concept. Freeman (1960, p. 31) indicates that the term "validity" in this instance is hardly warranted, for the test items have not been objectively analyzed for validity. When this method of establishing validity is employed, the author and those using the test simply assert in effect that the content of the test appears to be appropriate for the purpose in hand. Face validity is used most often with personality inventories, certain projective tests, e.g., the Szondi, and some methods used in the selection of industrial personnel. By itself, it is an unsatisfactory approach to validity and should not be resorted to unless an objective approach is not possible.

(b) Criterion-Related Validity

Criterion-related validity indicates the effectiveness of a test in predicting an individual's behaviour in specified situations. For this purpose, performance on the test is checked against a criterion, i.e., a direct and independent measure of that which the test is designed to predict.

The American Psychological Association (1974) mentions two types of criterion-related validity, viz., (1) concurrent and predictive validity and (2) synthetic validity, both of which will be described below.

(1) Concurrent and Predictive Validity

The criterion measure against which test scores are validated may be obtained at approximately the same time as the test scores (concurrent validity) or after a stated interval (predictive validity). The American Psychological Association (1974), differentiated between concurrent and predictive validity on the basis of these time relations between criterion and test. However,

Anastasi (1976, p. 141) indicated that the logical distinction between predictive and concurrent validity was based, not on time, but on the objectives of testing. Concurrent validity is relevant to tests employed for diagnosis of existing status, rather than prediction of future outcomes. The difference can be illustrated by asking: "Is Smith neurotic?" (concurrent validity) and "Is Smith likely to become neurotic?" (predictive validity).

(2) Synthetic Validity

The evaluation of a test or combination of tests for effectiveness in predicting a complex criterion, such as success at a given job, necessitates the conducting of a separate validation study in each local situation and repeating it at frequent intervals. This is a desirable procedure but in many situations it is not feasible because of almost insurmountable practical obstables.

In order to resolve such a problem, increasing interest has been shown in a technique known as synthetic validity. First introduced by Lawshe (1952), the concept of synthetic validity has been defined by Balma (1959, p. 395) as "the inferring of validity in a specific situation from systematic analysis of job elements, a determination of test validity for these elements, and a combination of elemental validities into a whole".

(c) Construct Validity

The construct validity of a test is the extent to which the test may be said to measure a theoretical construct or trait. Illustrations of specific techniques suitable for construct validation are considered below.

(1) Developmental Changes

Since abilities are expected to increase with age during childhood, it is argued that test scores should likewise show such an increase, if the test is valid.

(2) Correlations with Other Tests

Correlations between a new test and similar earlier tests are sometimes cited as evidence that the new test measures approximately the same general area of behaviour as other tests designated by the same name, such as "intelligence tests" or "mechanical aptitude tests".

(3) Factor Analysis

Of particular relevance to construct validity is factor analysis, a statistical procedure for the identification of psychological traits. A major purpose of factor analysis is to simplify the description of behaviour by reducing the number of categories from an initial multiplicity of test variables to a few common factors or traits.

(4) Internal Consistency

The essential characteristic of this method is that the criterion is the total score of the test itself. Sometimes extreme groups are selected on the basis of the total test score. The performance of the upper criterion group on each test item is then compared with that of the lower criterion group. Items that fail to show a significantly greater proportion of "passes" in the upper, than in the lower, criterion group are considered invalid, and are either eliminated or revised.

Another application of the criterion of internal consistency involves the correlation of subtest scores with total score.

(5) Effect of Experimental Variables on Test Scores

A further source of data for construct validation is provided by experiments on the effect of selected variables on test scores. In checking the validity of a criterion-referenced test for use in an individualized programme, for example, one approach is through a comparison of pre-test and post-test scores. The rationale of such a test calls for low scores on the pre-test and high scores on the post-test. For example, whether pitch discrimination as measured by a particular test is, or is not, susceptible to practice, for instance, can be checked by administering the test to the same subjects before and after a period of intensive practice. A test designed to measure anxiety-proneness can be administered to subjects who are subsequently put through a situation designed to arouse anxiety, such as taking an examination under distracting and stressful conditions. The initial anxiety test scores can then be correlated with physiological and other indices of anxiety expression before and after the examination. A different hypothesis regarding an anxiety test could be evaluated by administering the test before and after an anxiety-arousing experience and seeing whether test scores rise significantly on the re-test. Positive findings from such an experiment would indicate that the test scores reflect current anxiety levels. In a similar way, experiments can be designed to test any other hypothesis regarding the trait measured by a given test.

Another approach to construct validation is to check individual items in the test (Popham, 1971). Ideally, the largest proportion of examinees should fail an item on the pre-test and pass it on the post-test. Items that are commonly failed on both tests are too difficult, and those passed on both tests too easy, for the purposes of such a test.

If a sizeable proportion of examinees passes an item on the pre-test and fails it on the post-test, there is something obviously wrong with the item, or the instruction, or both.

(6) Convergent and Discriminant Validation

Campbell (1960) points out that in order to demonstrate construct validity, it must be shown that not only does the test correlate highly with other variables with which it should theoretically correlate, but also that it does not correlate significantly with variables from which it should differ. Campbell and Fiske (1959) describe the former process as convergent validation and the latter as discriminant validation.

(C) CRITERIA COMMONLY USED TO VALIDATE TESTS

(a) Intelligence Tests

In constructing intelligence tests, a common practice is to use some or all of the following criteria: scholastic marks, teachers' judgements of individuals' abilities, cumulative scholastic averages over a period of years, number of school grades completed, chronological age, established tests and known groups.

(b) Aptitude Tests

The principal criteria in standardizing tests of specific aptitudes (e.g., mechanical, musical) are marks in training courses, differentiation of known groups possessing the aptitude in varying degrees and actual performance on the job.

(c) Selection Tests for Specified Jobs

In personnel work, in business and industry, where specialized tests are used to select individuals for specific jobs, it is essential to use

actual production records or performance ratings as criteria of test validity.

(d) Educational Achievement Tests

Tests of educational achievement are validated against school marks and teachers' ratings. Frequently, also, the criterion is "content validity".

(e) Personality Tests

Tests of personality traits present an especially difficult problem in validation. Often the author of the test uses "face validity". Whenever an author bases his test upon his own analysis of what is to be evaluated or measured, without reference to prescribed content, as in textbooks, or without subjecting his device to comparison with other external standards, he is using "face validity" as his criterion. At times, the traits presumably being measured by a particular test of personality have been included only by fiat. The sounder tests in this category, however, are validated against actual behaviour of the subjects and against clinical diagnoses. But, even these criteria present difficulties because they are themselves affected to an appreciable degree by the subjective judgements of the persons making the evaluations of behaviour or the clinical diagnoses.

(D) THE VALIDITY OF THE INSTRUMENTS USED IN THE PRESENT RESEARCH

(a) Survey of Study Habits and Attitudes (SSHA)[1]

Du Toit (1974) claimed that the SSHA had predictive validity with regard to academic achievement.

In order to establish the relationship between school achievement and SSHA scores, du Toit tested 2631 pupils from standards 6 - 10. The correlations between school achievement and scores in the seven SSHA fields ranged from 0,239 for VU/DA in standard 6, to 0,435 for SO in standard 7.

[1] American studies have not been reviewed here because of changes that have been made in the South African SSHA.

From the data presented, he concluded that there was a relatively high, statistically significant relationship between study habits and attitudes and school achievement - thereby claiming criterion-related validity (pp. 9 - 10).

As part of a larger study, Bhana (1979) used the American version of the SSHA to determine its usefulness as a predictor of academic success. She tested 150 Indian male and 150 female entrants to the University of Durban-Westville. She correlated the SSHA scores of the subjects with their senior certificate examination performance and found that only the correlations with EA ($p < 0,01$), SO ($p < 0,05$), DA and SH ($p < 0,01$) were significant and that within the males only. She concluded that the SSHA does achieve some measure of prediction for males but not for females (p. 47).

(1) <u>The Validity of the SSHA (South African) with Indian Subjects</u>

It must be pointed out that when this project was initiated, the author had no intention of testing the validity of the SSHA for Indian pupils. He intended to take validity for granted on the limited South African findings and in view of the "culture-free", "facial" appearance of the test. However, since the matriculation examination marks of those pupils whom he had tested in standard 9 became available at the end of their standard 10 course while the report was being written, he decided to use the marks to check the validity of the test. Such an undertaking was not feasible while the pupils were in standard 9 because there was no examination common to all the students since they wrote internal school examinations at that grade.

The number of pupils by sex, age and academic subjects who were involved in the validation study are reflected in the relevant tables presented below.

Both du Toit (1974) and Bhana (1979), in testing the predictive validity of the SSHA correlated the test scores with academic performance. But it is a well known fact that academic performance is significantly influenced by IQ. Therefore, in the present study, the investigator partialled out the effects of IQ in testing the relationship between study habits and attitudes, on the one hand, and academic performance, on the other, by the method of partial correlation.

In testing the validity of the SSHA, the writer used the SG/SH (study habits), the SH/SA (study attitudes) and the SO scales. The SG/SH scale is the total of the VU/DA and WM/WM scales, the SH/SA scale the total of the OG/TA and AO/EA scales, and the SO scale the total of all four scales viz., VU/DA, WM/WM, OG/TA and AO/EA. Further information about these scales has already been given in Chapter Two.

Table VI presents the zero-order correlations between academic performance, on the one hand, and study habits and attitudes on the other, and those between academic (matriculation) performance and IQ for standard 9 boys.

TABLE VI

ZERO-ORDER CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND STUDY HABITS AND ATTITUDES, AND ACADEMIC PERFORMANCE AND IQ (BOYS)

School Subjects	Number	$\bar{X}$ Age (Years)	S.D.	SG/SH	SH/SA	SO	IQ
English (HG)[1]	199	16.916	0.579	0.193	0.102	0.072	0.493
English (SG)[2]	46	17.018	0.665	-0.094	0.159	0.258	0.271
Afrikaans (HG)	197	16.911	0.573	0.207	0.138	0.018	0.452
Afrikaans (SG)	49	17.027	0.677	0.096	0.345	0.239	0.487
Mathematics (HG)	90	16.708	0.490	0.241	0.119	0.200	0.227
Mathematics (SG)	132	17.012	0.599	-0.026	0.024	-0.100	0.252
Physical Science (HG)	79	16.754	0.443	0.452	0.308	0.417	0.288
Biology (HG)	151	16.853	0.559	0.226	0.165	0.214	0.443
Biology (SG)	60	17.143	0.660	-0.250	-0.175	-0.092	-0.016
History (HG)	54	17.139	0.664	0.219	0.090	-0.142	0.250
Geography (HG)	27	16.957	0.545	0.140	-0.066	0.050	0.340
Accountancy (HG)	170	16.873	0.560	0.207	0.129	-0.020	0.380
Accountancy (SG)	58	17.145	0.666	-0.116	-0.018	-0.079	0.370
Business Economics (SG)	33	17.035	0.632	-0.128	-0.134	0.017	0.503
Typing (SG)	32	17.193	0.560	0.254	0.297	0.302	0.108

KEY

SG/SH : Study habits
SH/SA : Study attitudes
SO : Study orientation
HG : Higher grade
SG : Standard grade

The key also applies to Tables VI - X, inclusive

[1], [2] Determined by the student's academic performance, subjects at secondary school may be taken at a higher level (HG - higher grade) or at a lower level (SG - standard grade).

Table VII gives the correlations between IQ,on the one hand, and study habits and attitudes,on the other, for the standard 9 boys by school subjects.

TABLE VII

CORRELATIONS BETWEEN IQ AND STUDY HABITS AND ATTITUDES BY SCHOOL SUBJECTS

(BOYS)

Variable	Number	SG/SH	SH/SA	SO	School Subjects
IQ	199	0,071	0,012	-0,034	English (HG)
IQ	46	-0,004	0,221	0,080	English (SG)
IQ	197	0,078	0,022	-0,054	Afrikaans (HG)
IQ	49	-0,005	0,179	0,094	Afrikaans (SG)
IQ	90	-0,053	-0,078	-0,071	Mathematics (HG)
IQ	132	0,068	0,069	-0,016	Mathematics (SG)
IQ	79	0,011	-0,101	-0,047	Physical Science (HG)
IQ	151	0,087	0,063	0,084	Biology (HG)
IQ	60	-0,071	0,041	-0,033	Biology (SG)
IQ	54	0,122	0,192	-0,027	History (HG)
IQ	27	-0,119	-0,154	-0,146	Geography (HG)
IQ	170	0,059	-0,001	-0,065	Accountancy (HG)
IQ	58	-0,029	0,107	0,039	Accountancy (SG)
IQ	33	0,150	0,079	0,010	Business Economics (SG)
IQ	32	0,067	-0,129	-0,040	Typing (SG)

Table VIII presents the partial correlations for the standard 9 boys between academic performance, on the one hand, and study habits and attitudes, on the other, with the effects of IQ partialled out.

TABLE VIII

PARTIAL CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND STUDY HABITS AND ATTITUDES WITH THE EFFECTS OF IQ PARTIALLED OUT[1] (BOYS)

School Subjects	Number	SG/SH	SH/SA	SO
English (HG)	199	0,182*[2]	0,110	0,102
English (SG)	46	-0,096	0,106	0,246
Afrikaans (HG)	197	0,193**	0,144*	0,048
Afrikaans (SG)	49	0,113	0,300*	0,222
Mathematics (HG)	90	0,260*	0,141	0,222*
Mathematics (SG)	132	-0,045	0,007	-0,099
Physical Science (HG)	79	0,469***	0,354**	0,450***
Biology (HG)	151	0,210*	0,153	0,198*
Biology (SG)	60	-0,250	-0,174	-0,093
History (HG)	54	0,196	0,044	-0,140
Geography (HG)	27	0,193	-0,015	0,107
Accountancy (HG)	170	0,200**	0,140	0,005
Accountancy (SG)	58	-0,113	-0,062	-0,101
Business Economics (SG)	33	-0,238	-0,202	0,014
Typing (SG)	32	0,249	0,315	0,308

[1] The formula used in the calculation of partial r was the one given by Downie and Heath (1974, p. 114, Formula 8.8): $r_{12,3} = \frac{r_{12} - (r_{13} - r_{23})}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$ where 1 = variable 1, 2 = variable 2, and 3 = variable 3.

[2] In this table, and all subsequent tables, the asterisks have the following meanings:

* significant at the 5 per cent level
** significant at the 1 per cent level
*** significant at the 0,1 per cent level

The absence of an asterisk (or asterisks) indicates that the coefficient is not significant.

From Table VIII it is evident that after the effects of IQ have been partialled out

(i) SG/SH correlates with academic performance in English (HG), Mathematics (HG) and Biology (HG); SH/SA with Afrikaans (HG and SG); SO with Mathematics (HG) and Biology (HG), all the correlations being significant at the 0,05 confidence level;

(ii) SG/SH correlates with academic performance in Afrikaans (HG) and Accountancy (HG) and SH/SA correlates with Physical Science (HG), all correlations being significant at the 0,01 confidence level;

(iii) SG/SH correlates with academic performance in physical science (HG) and SO correlates with physical Science (HG), both correlations being significant at the 0,001 confidence level.

Table IX presents the zero-order correlations between academic performance, on the one hand, and study habits and attitudes, on the other, and those between academic (matriculation) performance and IQ for standard 9 girls.

TABLE IX

ZERO-ORDER CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND STUDY HABITS AND ATTITUDES, AND ACADEMIC PERFORMANCE AND IQ (GIRLS)

School Subjects	Number	$\bar{X}$ Age (Years)	S.D.	SG/SH	SH/SA	SO	IQ
English (HG)	267	16,751	0,504	0,227	0,165	0,218	**0,602**
English (SG)	36	17,342	0,622	-0,004	-0,069	-0,042	-0,033
Afrikaans (HG)	263	16,728	0,475	0,183	0,223	0,229	0,545
Afrikaans (SG)	40	17,440	0,631	0,151	0,212	0,199	-0,121
Mathematics (HG)	76	16,545	0,438	0,049	-0,003	0,023	0,196
Mathematics (SG)	123	16,755	0,454	-0,038	-0,019	-0,031	0,235
Physical Science (HG)	65	16,534	0,423	0,201	0,260	0,252	0,537
Biology (HG)	211	16,684	0,472	0,150	0,128	0,155	0,475
Biology (SG)	73	17,243	0,604	0,031	0,069	0,056	0,182
History (HG)	108	16,861	0,585	0,122	-0,063	0,036	0,443
Geography (HG)	44	16,890	0,474	0,059	-0,057	-0,001	0,402
Accountancy (HG)	150	16,661	0,464	-0,008	0,088	0,049	0,485
Accountancy (SG)	112	17,021	0,610	-0,378	-0,182	-0,311	0,282
Business Economics (SG)	48	16,910	0,628	-0,046	-0,017	-0,034	0,387
Housecraft (SG)	34	17,088	0,505	-0,260	-0,347	-0,341	0,549
Typing (SG)	74	17,140	0,643	0,003	0,036	0,022	0,068

Table X gives the correlations between IQ, on the one hand, and study habits and attitudes, on the other, for standard 9 girls by school subjects.

TABLE X

CORRELATIONS BETWEEN IQ AND STUDY HABITS AND ATTITUDES BY SCHOOL SUBJECTS

(GIRLS)

Variable	Number	SG/SH	SO	SH/SA	School Subjects
IQ	267	0,176	0,146	0,088	English (HG)
IQ	36	-0,171	-0,036	0,097	English (SG)
IQ	263	0,202	0,164	0,092	Afrikaans (HG)
IQ	40	-0,234	-0,130	-0,015	Afrikaans (SG)
IQ	76	0,316	0,262	0,164	Mathematics (HG)
IQ	123	0,116	0,096	0,058	Mathematics (SG)
IQ	65	0,250	0,195	0,111	Physical Science (HG)
IQ	211	0,238	0,197	0,116	Biology (HG)
IQ	73	-0,178	-0,173	-0,130	Biology (SG)
IQ	108	0,129	0,005	-0,127	History (HG)
IQ	44	0,232	0,207	0,136	Geography (HG)
IQ	150	0,118	0,132	0,117	Accountancy (HG)
IQ	112	0,002	-0,057	-0,105	Accountancy (SG)
IQ	48	0,030	-0,032	-0,081	Business Economics (SG)
IQ	34	-0,357	-0,288	-0,159	Housecraft (SG)
IQ	74	-0,085	-0,017	0,048	Typing (SG)

Table XI presents the partial correlations for the standard 9 girls between academic performance, on the one hand, and study habits and attitudes, on the other, with the effects of IQ partialled out.

TABLE XI

PARTIAL CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND STUDY HABITS AND ATTITUDES WITH THE EFFECTS OF IQ PARTIALLED OUT (GIRLS)

School Subjects	Number	SG/SH	SH/SA	SO
English (HG)	267	0,154*	0,141*	0,165**
English (SG)	36	0,010	-0,066	-0,043
Afrikaans (HG)	263	0,089	0,207***	0,169**
Afrikaans (SG)	40	0,127	0,212	0,186
Mathematics (HG)	76	0,014	-0,036	-0,030
Mathematics (SG)	123	0,068	-0,034	-0,055
Physical Science (HG)	65	0,082	0,239	0,178
Biology (HG)	211	0,043	0,083	0,071
Biology (SG)	73	0,066	0,095	0,090
History (HG)	108	0,073	-0,008	0,038
Geography (HG)	44	0,038	-0,123	-0,094
Accountancy (HG)	150	0,075	0,036	-0,017
Accountancy (SG)	112	0,395***	-0,160	-0,308**
Business Economics (SG)	48	0,062	0,016	-0,024
Housecraft (SG)	34	0,082	-0,315	-0,228
Typing (SG)	74	0,009	0,033	0,023

From Table XI it is evident that

(i) both SG/SH and SH/SA correlate with academic performance in English (HG) at the 0,05 confidence level;

(ii) SO correlates with academic performance in English (HG), Afrikaans (HG) and Accountancy (SG) at the 0,01 confidence level;

(iii) SG/SH correlates with Accountancy (SG) and SH/SA correlates with Afrikaans (HG), both at the 0,001 confidence level.

The results contained in Tables VIII and XI suggest that, for both sexes, most of the relationships between academic performance and study habits and attitudes are not significant. One may be inclined, on the basis of these results, to dismiss the SSHA as having doubtful validity for Indian South Africans. However, the present researcher would like to emphasize that the examinations upon which the academic performance was based were taken by the pupils about 18 months, on an average, after they had completed the SSHA. Study habits could have changed during this period and could be partially responsible for the lack of more significant correlations. In addition, other factors, for example, socio-economic status, interest and motivation, also influence academic performance. The influence of these factors was not controlled and they could, therefore, have contaminated the results. Further, as Bhana (1979) has pointed out and discussed, taking the senior certificate performance as an index of academic competency may not have been a sound decision. She explained: "This is not a school examination and may favour students from certain schools, the good spotters, etc., and may perhaps penalize those who become traumatized by the whole situation. A better index might have been a cumulative score of a candidate's performance throughout his senior secondary school years" (1979, p. 50).

All these points indicate that more rigorous research needs to be undertaken in testing the validity of the SSHA for Indians.

Based on the results presented in this report, it would be premature at this stage to dismiss the SSHA as not having any predictive validity.

(b) Interest Questionnaire for Indian Pupils (IQIP)

(1) Content Validity

In order to determine the content validity of the IQIP, the items were submitted by the HSRC to a committee whose members had made a special study of fields of interest and interest questionnaires. Comments from this committee led to certain items being eliminated and others being reclassified.

(2) Factorial Validity

Factorial validity was determined by means of factorizing the inter-correlations of the various sections of the IQIP. The loadings of the factors on the separate variables showed 7 distinct factors which corresponded completely with the 7 sections of the IQIP. The results of the factor analysis indicated that the communalities were all reasonably high, ranging from 0,649 for language (expressive), to 0,826 for mechanics (design), so that much of the variance could be accounted for by the extracted factors (HSRC, 1969).

(3) Construct Validity

The HSRC (1969) points out that if the construct, "interest", is measured in certain fields, then subjects should receive high marks in the fields that are of importance to their proposed vocations. Further, since this construct does not involve the higher mental processes, there need not be a high correlation between marks obtained on the IQIP and those obtained on an intelligence or achievement test. The HSRC (1969) indicates that this was confirmed by the low intercorrelations between interest questionnaire results and school results. However, no figures are given to substantiate this claim.

Using the sample described in Chapter Three, Oosthuizen (1973, pp. 8 - 9) found that at the standard 7 and 8 levels, the building group, when compared with the general group, was significantly more interested in the mechanical field ($p < 0,01$). Also, a comparison of the electrical group with the general group (p. 9) at the standard 7 and 8 levels indicated that the electrical group was significantly more interested in the mechanical field ($p < 0,01$). Further, a comparison of the results of the technical group with the general group (p. 10) showed the former to be significantly more interested in the mechanical field ($p < 0,01$).

The fact that, in the mechanical field, the building, electrical and technical groups scored significantly higher than the general group led Oosthuizen (1973) to conclude that the IQIP has construct validity for the mechanical field (p. 8). Oosthuizen also points out that the research yielded useful favourable information on the construct validity of the arts, language, office work and social service fields (p. 12).

(4) Predictive Validity

Oosthuizen (1973) had hypothesized that the building and electrical groups would express significantly greater interest in the mechanical field than the general group. The results presented in the foregoing section on "Construct Validity" indicate that this was indeed so. Hence, he concluded that the mechanical field of the IQIP has predictive validity with regard to certain mechanical occupations.

Oosthuizen also expected the general group to show significantly greater preference for certain fields than the building, electrical and technical groups. He found that, at the standard 7 level, the general group was significantly more interested, than the building group, in the language and social service fields ($p < 0,01$) (p.8). At the standard 8 level, the general group displayed significantly greater interest, than the building group, in the language and office work fields ($p < 0,01$) (p. 8). A comparison of the general group with the electrical group at the standard 7 level revealed that the general group displayed significantly more interest in the language, social service, science and office work fields ($p < 0,01$) and the arts field ($p < 0,05$) (p. 12). Results from standard 8 indicate that the general group was significantly more interested, than the electrical group, in the language, social service ($p < 0,01$) and arts ($p < 0,05$) fields (p. 12).

These results that Oosthuizen obtained were expected. Hence, it may be suggested that the IQIP seems to have predictive validity for the fields indicated in the foregoing discussion.

(c) Eysenck Personality Inventory

The validation of personality questionnaires presents the psychologist with problems. The reaction too often is to plead that, as it is difficult to find criteria for validating measures of personality, relying on face validity alone is justified. Fortunately, this has not been true of the EPI as the following studies will indicate.

Eysenck (1962) and Eysenck (1963) have used the method of nominated groups and have demonstrated that when independent judges were asked to nominate introverted and extraverted, or stable and unstable subjects and when these nominees were asked to fill in the EPI or sets of items from the EPI, the results indicated that ..."individuals who impress others as showing introverted or extraverted behaviour patterns or as being stable or unstable in their everyday behaviour, answer the EPI in a corresponding manner" (Eysenck and Eysenck, 1964a,p. 13).

Vingoe (1966) attempted to assess the validity of the E scale of the EPI by self-ratings of American subjects. His final sample comprised 49 subjects, 24 males (mean age=33,1 years; range=18 - 52 years), and 25 females (mean age= 32,4 years; range=18 - 55 years). All subjects were from adult psychology classes. The subjects were divided into introverts (those whose self-ratings on a 7 point scale were 3 and below) and extraverts (those whose self-ratings were 4 and above). Using this method, 24 subjects were classified as introverts and 25 as extraverts.

There was also a comparison made of introverts as determined by the EPI (those who obtained an E score below the median) and extraverts (those who obtained an E score at or above the median). Dichotomized on this basis there were 31 and 18 subjects, respectively, in the two groups.

The introvert (10,33) and extravert (15,04) group criterion means were significantly different from each other ($p<0,05$) and from the total mean (12,73; $p<0,05$). While the introvert (3,45) and extravert (4,61) EPI group means were significantly different from each other ($p<0,0005$), they were not significantly different from the total mean (Vingoe, 1966, p. 90).

These results generally support the validity of the EPI E scale.

In another study, Vingoe (1968) used 66 single freshmen women (mean age= 18 years) who lived in the same dormitory. As part of a larger study, subjects, provided with a description of the typical introvert and extravert, rated themselves and their dormitory peers on a seven-point introversion-extraversion scale. After the rating procedure, all subjects were asked to complete the EPI and the California Psychological Inventory (CPI) (Gough, 1964) according to the regular instructions. Subjects were divided into introverts (those whose self-ratings were 4 and below) and extraverts (those whose self-ratings were 5 and above). This procedure classified 37 subjects as introverts and 29 as extraverts. The total group was also divided into introverts and extraverts by dichotomizing subjects at the median of the extraversion scale. Subjects with an E score above the median were classified as extraverts while those with an E score at or below the median were classified as introverts. Dichotomized on this basis, there were 20 and 46 subjects in the respective groups.

The obtained mean extraversion score and standard deviation were 13,71 and 4,42 while the obtained mean neuroticism score and standard deviation were 10,56 and 4,68, respectively.

The self-rated introvert and extravert group means were significantly different from each other and from the E mean of the total group. While the value of t between the extravert and total group was significant beyond the 5 per cent point, the analogous value of t between the introvert and the total group was significant beyond the 2.5 per cent point (p. 707).

The results from the above study provided further support for the validity of the E scale in that self-rated criterion groups obtained significantly different mean scores on extraversion ($p < 0,005$). In addition, intercorrelations of scores on the EPI and the CPI supported the construct validity of both the extraversion and neuroticism scales of the EPI. For example, extraversion correlated 0,60 with social presence, 0,59 with self-acceptance, 0,53 with sociability, and 0,45 with dominance. Neuroticism correlated most highly with well-being, tolerance and intellectual efficiency ($r = -0,67$; $-0,64$ and $-0,62$, respectively). All of these relationships were significant($p < 0,01$) and would have been predicted on the basis of Eysenck's theory regarding extraversion and neuroticism (p. 708).

In order to measure the validity of the extraversion scale of the EPI, White et al. (1968) undertook three separate investigations. In the first, the EPI (E) scores of five groups of honours psychology students were obtained, and they were asked to rate each other on extraversion, using the method of paired comparisons.

The total number of choices for each student was used to rank each member of the group in terms of extraversion. These ranks were then compared with rankings derived from the test scores.

In all cases but one, the correlations were positive, though only two of them were significant at an acceptable level. The results suggest that concurrent assessments by friends and acquaintances are in general harmony with scores derived from the questionnaire, but the average correlation of 0,32 was less than might have been expected (p. 64).

In the second investigation, fifteen male first-year university students were selected on the basis of their scores on the introversion-extraversion scale of the EPI which was administered to the entire student intake at the beginning of the academic year 1965/66. The sample consisted of six "extraverts" who had scores of 19 and over on Form A of the scale and nine "introverts" who had scores of 3 and under. The subjects' mean scores were 19,83 and 2,44, respectively.

A series of predictions about the social behaviour of introverts and extraverts was drawn up on the basis of Eysenck and Eysenck's (1963b) descriptions of the typical introvert and extravert. It was hypothesized that extraverted subjects would tend to participate in social activities such as dances, parties and society meetings to a greater extent than introverts; that they would be less conscientious about attending lectures and handing in essays on time; that they would act on impulse in going away from the university at weekends, and that they would read less than introverts.

Three of the differences between the groups were found to be statistically significant. Extraverts reported having gone to more union dances and private parties than did introverts and also having "gatecrashed" more parties. Of the remaining 13 differences, none reached the 0,05 level of significance, although all but three, were in the expected direction (p. 65).

White et al. (1968) indicated that the data constituted evidence that the extraversion scale of the EPI was a valid measure of social behaviour since the

overall trend of the differences between the groups of introverts and extraverts was in the expected direction. However, few of the individual differences were statistically significant.

The third investigation set out to test the relationship between rule breaking and extraversion. White et al. (1968) pointed out that, from Eysenck's account of the process of socialization, a strong relationship between rule breaking and extraversion would be good evidence of the "construct validity" of the EPI (p. 66).

The EPI was given to all the new students. The highest female scorers, with scores of 15+ (n = 27) and the lowest female scorers (6 and below; n = 26) constituted the two groups of "introverts" and "extraverts" (mean E scores = 4,6 and 16,8, respectively).

A questionnaire was drawn up on the basis of written university regulations. The part to find out how often a subject had broken each rule during the autumn term, was made up of twenty questions presented in random order.

The hypothesis that more extraverts broke rules was amply supported. In every case more extraverts broke rules more frequently than introverts, and in eight cases the difference between the groups was statistically significant. White et al. (p.67) claimed that this provided evidence for the construct validity of the EPI.

Harrison and McLaughlin (1969) designed a study to investigate an individual's ability to estimate his position on the introversion-extraversion and neuroticism dimensions after being given descriptions of these personality traits. This was done so as to establish further the validity of the EPI.

They administered the EPI to 243 general psychology students who were then read descriptions of the "typical" introvert and extravert and the"typical"high- and low-anxious persons and asked to make a self-rating of these two dimensions. The self-ratings and EPI means and standard deviations were found to be equivalent. The subjects dichotomized into introverts and extraverts on the basis of the EPI scores were found to be significantly different on the self-rating scores ($p < 0,001$). Subjects dichotomized on the basis of self-ratings into introverts and extraverts also yielded significantly different EPI scores ($p < 0,001$). Similar analyses of the neuroticism dimension yielded significant differences ($p < 0,001$ in both instances). The correlation between self-ratings of extraversion and this scale of the EPI was 0,74, and between the self-ratings and neuroticism, 0,56 ($p < 0,01$ in both instances) (pp. 56-57).

Harrison and McLaughlin (1969) claimed that their study strongly confirmed the validity of the EPI.

Gibson (1971) used the method of nominated groups (Eysenck, 1962) in assessing the validity of the EPI. Form A of the EPI was administered in the normal manner to 38 undergraduate students, well known to each other, in a humanities department at the University of London. Each student was asked to make a list ranking his classmates in order of how well he knew them. On a later occasion, each student was given an EPI form and asked to complete it as though it were a rating inventory concerning another member of his class nominated by the experimenter ("projective"). The nominees were chosen so that each student was rating someone who appeared among the first three names he had listed, i.e., someone especially well known to him.

For each subject three sets of scores were obtained. "Subjective" Es, Ns, Ls: the ordinary scores obtained by self-rating. "Objective" Eo, No, Lo: the scores which the rater had awarded him. "Projective" Ep, Np, Lp : the scores which derived from his rating of a classmate.

The results showed significant correlations between self-ratings on the E and N scales and ratings given by their classmates. The strongest relationship obtained was between Es and Eo ($r = 0,614$; $p < 0,001$); in other words, the subjective scores of extraversion were very strongly validated by reports on individual items of behaviour made by a rater.

A correlation coefficient of 0,441 ($p < 0,01$) was obtained for the relationship between Ns and No. This indicated that the subjective scores of neuroticism (self-report) were validated by reports on individual items of behaviour made by a rater.

The major finding of this study was that rating a friend on the 48 items of behaviour which made up the E and N scales of the EPI, produced scores which were significantly correlated with the scores that person obtained by completing the inventory in the usual manner (p.218). It was found that the correlation between Eo and Es was rather higher than that between No and Ns. This may mean that it was easier to rate another person on the items of behaviour which make up the E scale than on those making up the N scale, since people naturally tend to conceal neurotic manifestations even from their close friends (p.219). The work of the Eysencks and others on the validity of the E and N scales by the use of nominated groups was supported by the results obtained by the technique used by Gibson (1971).

The results obtained with the L scale were different. The correlation between Lo and Ls was not significant ($r = 0,097$).

Orpen (1972) administered the EPI to 90 White final-year Afrikaans-speaking high school males and females (average age=17,2 years) taken from three classes. All the scales were in Afrikaans.

Both the method of nominated groups (Eysenck, 1962) and self-ratings (Vingoe, 1966) were employed as independent measures of the validity of the EPI.

After the EPI had been administered in the standard manner, the subjects were read descriptions of a "typical" extravert (taken from Eysenck and Eysenck, 1964a,p.8) and descriptions of persons typically high and low in neuroticism (taken from Harrison and McLaughlin, 1969 p.55) and asked to rate themselves on these two dimensions on two nine-point scales. Bearing the sets of descriptions in mind, each subject was asked to rate another member of the class on the two dimensions on the same sort of nine-point scale used for the self-ratings.

The E scores of the subjects on the EPI and their self-ratings of extraversion correlated significantly at the 0,01 level. The correlations between the E scores and other ratings of extraversion were also significant at this level. Orpen (1972) claimed that the fact that the E scale of the EPI was highly related to these two independent measures of extraversion constituted a strong argument in favour of the validity of the E scale (p. 246).

Orpen's evidence in favour of the validity of the N scale is not quite so impressive, although it is generally positive and within acceptable limits. The correlation between scores on the N scale of the EPI and self-ratings of neuroticism was significant at the 0,01 level and,that between scores on the N scale and other ratings,at the 0,05 level (p. 246).

The results indicated, as far as Orpen's sample was concerned, that the Afrikaans version of the EPI gave results not essentially different from that obtained with the original version in England,and,that the two personality dimensions can be found in much the same form and expression among Afrikaans-speaking White South Africans as among the various English samples on whom the scale was standardized, despite the fact that the two groups differ markedly in tradition and cultural background (p. 247).

Vingoe (1973) administered the EPI and the CPI to 66 freshmen women who lived in the University of Groningen dormitory. The subjects were seated in four groups according to the wing of the dormitory in which they resided. They rated themselves (SR) and each of their wing-mates on EPI E and CPI Dominance (Do), Sociability (Sy), Self-acceptance (Sa), Responsibility (Re) and Psychological-mindedness (Py).

Vingoe (1973, p.272) pointed out that his results strongly suggested that status (or how well a target person was felt to be known) was extremely important in how that person was rated on personality dimensions. Not only was the better known person rated more extravert; he was also rated more highly on many "positive" personality dimensions such as sociability, self-acceptance and psychological mindedness. He found that there may also be some tendency to associate a negative trait such as neuroticism with those people who were relatively unknown to the rater.

In many instances (for example, Power and MacRae, 1971; Stanley, 1969; Harrison and McLaughlin, 1969), the subjects employed in validity studies with the EPI were university students attending introductory psychology classes. To determine to what degree the findings were a function of this rather select and unrepresentative sample, Moore (1974) selected a sample representative of the population of the city of Regina, Canada.

The subjects were 67 men and women, part of the Select Panel for Opinion Sounding, selected by the University of Saskatchewan, to form a stratified sample of the city of Regina. There were 31 males and 36 females, mean age=40 years and an age range of 18-67 years. They were administered the EPI and three scales for the subject's self-ratings on E, N and L.

The subjects were tested in a group setting and were asked to complete the EPI under standard instructions.

After the subjects had completed the EPI, they were presented with the three self-rating scales along with descriptions of a "typical introvert", a "typical extravert" (Eysenck and Eysenck, 1968a)and a "person low on neuroticism" (Harrison and McLaughlin, 1969). Lying was defined as "pretending to be a very stable, non-neurotic person" (Power and MacRae, 1971). The subjects were instructed to read each description carefully and then to rate themselves on the dimension following by circling the appropriate mark on the scale.

The minimal differences found between the self-ratings and EPI means (E = 12,00 and 13,24; N = 10,67 and 11,60, respectively) and standard deviations (E = 5,79 and 3,95; N = 5,67 and 4,97, respectively) along with the significant correlations ($P < 0,001$) between the self-ratings of E and N and the subjects' scores on these two dimensions of the EPI (p. 576) supported the findings of Harrison and McLaughlin (1969). The authors give no results of, nor comment about, L.

The reasonably high correlations between the EPI and self-rating measures of E and N, and the essential equivalence of their means and standard deviations further validate the EPI along with lending support to the method of self-rating as an adequate assessment technique in the general population (Moore, 1974, p.577).

Wen (1976) designed a study to examine the item validity of the lie scale of the EPI by obtaining item-total correlations from samples of Whites and Blacks of both sexes.

The subjects were 640 undergraduates, 160 each of White males, White females, Black males, and Black females, respectively.

The corrected point-biserial correlations indicated that only two items were significantly valid across race and sex. In terms of the number of items valid for each of the four subject categories, the nine items of the EPI (Form A) lie scales were most valid for Black females, least valid for White males, and moderately valid for both Black males and White females.

These results support the assumption that social desirability varies from one ethnic group to another and from one race-sex combination to another as well. The findings generated an important implication in personality assessment. In the case of tests with the EPI, ethnic origins and sex should be considered when the lie scale score is being used to determine the validity of the extraversion and neuroticism scores of the inventory (pp. 881-882).

(1) The Validity of the EPI with Indian Subjects

In testing the validity of the EPI with his sample of standard 9 high school pupils, the investigator used the method of known or nominated groups (Eysenck, 1962). In effect, this method would establish criterion-related validity.

Form masters of standard 9 classes in the 8 high schools mentioned in Table III (p.87) were requested to furnish the names of "typical" introverts and "typical" extraverts on a form supplied for this purpose.
In order to assist the teachers with their selection and classification, the following hand-out, which provided descriptions of the behaviour of "typical" introverts and "typical" extraverts, was given to the teachers at least a week before the actual testing. (Maynard, 1970).

TO ALL FORM MASTERS OF STANDARD IX

"Your assistance is sought for this research project which is expected to yield information that could be used to assist high school pupils with their studies.

Below are tables in which you are kindly requested to list the names of up to 4 introverted and up to 4 extraverted boys, and up to 4 introverted and up to 4 extraverted girls from your class, born in 1960, 1961, 1962 or 1963. If there are only boys in your class, list only the names of boys (which may then be more than four) and similarly if you have only girls.

Please do not list the names of pupils whom you are doubtful about classifying as either obviously introverted or extraverted.

If you are uncertain about any pupil, please do not hesitate to consult colleagues who may know the child better or more intimately. You are not being asked to classify all the children in your class, only the more obvious male and female introverts and extraverts about whom you and/or your colleagues are relatively certain. Many children (and adults) are of a "mixed type" and cannot be easily classified one way or the other. These should be omitted from your list.

Your list will be compared against the results of a test of introversion-extraversion which the children listed will do, to check for validity, so kindly keep this matter confidential as far as your pupils are concerned.

Here are pen pictures of two children, one an extravert and the other an introvert, to guide you, although the children described are probably younger than your average standard 9 children:-

James Banda : An Extraverted Child

"James Banda is always happy when working or playing with others. He quickly tires of such individual activities as silent reading, though he enjoys and always takes part in reading aloud in chorus. He likes being noticed in the classroom, and when a question is asked he will bounce up and down in the seat with his hand high in the air, trying to attract attention. When he is allowed to answer, the words pour out rapidly and excitedly. He often makes mistakes by speaking without thinking out what he is going to say. He is fond of making jokes and laughing and you often wish you could get him to take his work more seriously, for he does not seem to worry if he gets his work wrong or gives wrong answers as long as he can make the class laugh. In the playground he is active and noisy in the middle of the largest and noisiest group. His favourite game is football. His favourite pastimes are acting and dancing, and he enjoys singing, too." (Maynard, 1970, p. 109).

Aaron Phiri : An Introverted Child

"Aaron Phiri, on the other hand, is a very quiet boy with a serious face, who seems to hide himself away behind his desk in the corner of the room. He does not often put his hand up to answer questions, and when he does, it is after some time and very slowly. He raises his hand so slightly, you might have to ask him whether his hand is meant to be up or down. Even when his hand is not up, he may give you a correct answer if you ask him for it by name. He speaks slowly and carefully, as if weighing the value of each word. He may not be unpopular, but he is not 'a good mixer'. He has one or two close friends and does not seem to want any more. However, he is deeply attached to his few friends and would suffer great sorrow if he were to lose one. Outside the school, you will find him talking quietly

with one of these special friends or walking quietly by himself. His ideas, when he expresses them, are often original or, at least, different from those of the other children. He does not often smile, and hardly ever laughs out loud. He enjoys athletics more than games. His pastimes are reading and drawing" (Maynard, 1970, p. 109).

Here is a table summarising the characteristics of introverts and extraverts, which are applicable to both children and adults[1]:-

EXTRAVERT	INTROVERT
1. Usually cheerful and lighthearted. Laughs often. Jokes. Optimistic.	1. Usually serious or solemn. Smiles infrequently, laughs rarely. Takes life seriously. Pessimistic.
2. Natural. Talks easily and freely to all kinds of people.	2. Formal. Always uses conventional language and manner.
3. Sociable. Mixes well. Enjoys meeting new faces.	3. Unsociable. Avoids meeting people, especially strangers.
4. Adaptable. Not upset by changes. Grows impatient with routine. Fickle. His likes and dislikes change frequently. Seeks excitement and adventure.	4. Conservative. Dislikes and avoids changes in routine. Knows what he likes and sticks to it.
5. Quick-thinking, quick-speaking, quick-acting. Jumps to conclusions often without sufficient thought. Lacking self-control. Aggressive.	5. Slow in thinking, speaking and acting. Weighs his opinions carefully. Sometimes unable to come to a final decision.
6. Talkative and confident.	6. Quiet and shy.
7. Accepts and obeys laws of the groups in which he lives.	7. Makes his own rules and sticks to them in all societies.
8. Tough-minded, unsympathetic.	8. Tender-hearted, sympathetic. "

(p.110)

[1] Extracted from Maynard, N.J. : Child Study : Some Practical Techniques for the Teacher. Oxford University Press, London. 1970.

With regard to the methodology, it is important to point out that there was no compulsion on a teacher to furnish a minimum number of names of pupils. This meant that he was free to give no names at all if he felt that there were, for example, no obviously extraverted girls in his class. The validity study was conducted during November so that the class teacher knew the pupils well as a result of at least a whole year's association with them.

Form A of the EPI was then administered by the investigator to all pupils classified by the teachers. The response of some subjects to question 25, "Can you usually let yourself go and enjoy yourself a lot at a gay party?" interested the researcher. He noticed that these subjects had underlined the word "gay". Upon questioning them about this when they had completed the test, he learnt that they were not quite sure as to whether "gay party" referred to a "homosexual party" or to a "happy, lively party". Since it was not possible to determine how many other subjects had had similar doubts but had not underlined the word "gay", the researcher was concerned about such a misinterpretation reducing the validity of the test. In this regard he wrote (vide Appendix C) to Professor H.J. Eysenck, the co-author of the test. Eysenck's reply is quoted below:-

".... We too have noticed the misinterpretation of the word 'gay', and accordingly this has been substituted by 'lively' in later editions of the EPI. Strictly speaking the possibility of misinterpretation produces some doubt about the interpretation of the score on the extraversion scale, but as only one item is affected, and as only a very small proportion of subjects are likely to make the wrong interpretation (even though this possibility is present in their minds) I do not think that for correlational purposes at least you need worry too much about this point."

Altogether, the teachers classified 364 pupils (mean age = 17,141 years; S.D. = 0,635), 175 boys (mean age = 17,263 years; S.D. = 0,649)

and 189 girls (mean age = 17,028 years; S.D. = 0,601). Their mean E scores of 13,463 and 12,995 were used to separate the total[1] group of 175 boys and 189 girls, respectively, into introverts (those scoring at or below the mean) and extraverts (those scoring above the mean). Similarly, their mean E score of 13,220 was used to separate the total group of 364 boys and girls combined into introverts and extraverts. The classification of the boys, girls and the sexes combined, on the basis of test results, were then compared, child by child, with the teachers' classifications of the same subjects into introverts and extraverts, the teachers' assessments being regarded as the criterion. The number of "agreements" and "disagreements" between test and teacher were noted for each pupil within each sample and the observed distributions were compared with those that would be expected on the basis of chance in chi-square goodness-of-fit tests. These are shown in Tables XII, XIV and XVI.

Similar comparisons were also undertaken with the groups after the high lie scorers (L scores of 5 and above) were excluded from the samples (labelled "selected groups")[1]. In Chapter One it was pointed out that when only one form of the EPI is used, an L score of 4 or 5 would be considered to constitute the cut-off point where inventory answers ceased to be acceptable. Such high lie scores would indicate that faking good was likely to have occurred and, therefore, the E, and particularly N scores of such subjects, should be regarded with considerable scepticism. For this reason results of the samples excluding the high lie scorers will also be given.

---

[1] Throughout this report the term "total group" will refer to the group that included the high lie scorers while the term "selected group" will refer to the group that excluded them.

When the high lie scorers were excluded, there remained 230 pupils (mean age=17,105 years; S.D.=0,596), 111 boys (mean age=17,216 years; S.D.=0,602) and 118 girls (mean age=17,000 years; S.D.=0,570). Their mean E scores of 14,045, 13,678 and 13,856, respectively, were used to separate the group of boys, girls and the sexes combined into introverts (those scoring at or below the mean) and extraverts (those scoring above the mean). Test and teachers' assessments of each pupil were again compared and the number of "agreements" and "disagreements" noted. These were then compared with chance occurrence in chi-square goodness-of-fit tests as indicated in Tables XIII, XV and XVII.

Validity was tested in terms of three statistical indices, namely, goodness-of-fit chi-square, the biserial and the point-biserial coefficients, the first being non-parametric and the latter two, parametric techniques.

(a) Goodness-of-Fit-Chi-Square

TABLE XII

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(TOTAL GROUP OF BOYS)

	Agreements	Disagreements	Totals
Observed	118	57	175
Expected	87,5	87,5	175

X^2 [1] = 21,262 df = 1 p < 0,001

---

[1] The formula used was the one given, for example, by Siegel (1956, p. 43):

$$X^2 = \sum \frac{(O - E)^2}{E}$$

where O = observed number of cases in each category,
E = expected number of cases in each category, and
$\sum$ = the sum of all the categories.

TABLE XIII

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(SELECTED GROUP OF BOYS)

	Agreements	Disagreements	Totals
Observed	76	35	111
Expected	55,5	55,5	111

$X^2 = 15,144$ df = 1 $p < 0,001$

TABLE XIV

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(TOTAL GROUP OF GIRLS)

	Agreements	Disagreements	Totals
Observed	133	56	189
Expected	94,5	94,5	189

$X^2 = 31,370$ df = 1 $p < 0,001$

TABLE XV

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(SELECTED GROUP OF GIRLS)

	Agreements	Disagreements	Totals
Observed	86	32	118
Expected	59	59	118

$X^2 = 24,712$ df = 1 $p < 0,001$

TABLE XVI

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(TOTAL GROUP OF BOYS AND GIRLS COMBINED)

	Agreements	Disagreements	Totals
Observed	251	113	364
Expected	182	182	364

$X^2 = 52,318$ df = 1 $p < 0,001$

TABLE XVII

COMPARISON OF AGREEMENTS AND DISAGREEMENTS BETWEEN EPI AND TEACHERS' CLASSIFICATIONS OF INTROVERTS AND EXTRAVERTS AGAINST CHANCE

(SELECTED GROUP OF BOYS AND GIRLS COMBINED)

	Agreements	Disagreements	Totals
Observed	163	66	229
Expected	114,5	114,5	229

$X^2 = 41,088$ $df = 1$ $p < 0,001$

It will be noted that, in all the six preceding tables, X^2 values are significant beyond the 0,001 level indicating that teacher-test agreements are significantly greater, and teacher-test disagreements correspondingly fewer, than would have occurred on the basis of chance. Validated against teacher judgements, the EPI must, therefore, be regarded as an acceptable test of introversion-extraversion among Indian high-school subjects.

(b) Biserial r

The biserial r (r_b)[1] is used when we have one continuous variable and another which is actually continuous but which has been forced into a dichotomy. Its disadvantages are that it is a less reliable statistic than either the point biserial or the Pearson r, its significance is not easy to assess, its size fluctuates more from sample to sample than the Pearson r, and it sometimes works out to larger than 1 (Guilford and Fruchter, 1978, pp. 310 - 311).

The variable, introversion-extraversion, is continuous and was measured as such by the EPI, but was forced into a dichotomy by the teachers' classification. For this reason, r_b was calculated and the results for the different groups[2] are given below:-

---

[1] The following formula was used to calculate r_b :

$$r_b = \frac{y_p}{\sqrt{n \sum Y^2 - (\sum Y)^2}} \left(\sum Y1 - \frac{n1}{n} \sum Y \right)$$

(Edwards, 1967, p. 129, Formula 7,9)

where

$\sum Y1$ = the sum of Y values for the n1 observations with X = 1

n1 = the number of observations with X = 1

n = the total number of observations

$\sum Y$ = the sum of Y values for all n observations

y_p = represents the ordinate of the standard normal curve at the point of division of the two groups on the dichotomous variable.

r_b = biserial r.

[2] See Appendix D for source data used in the computations of r_b.

TOTAL GROUP OF BOYS

r_b = 0,499 z^1 = 5,271 df = 175 p < 0,001

SELECTED GROUP OF BOYS

r_b = 0,516 z = 4,291 df = 111 p < 0,001

TOTAL GROUP OF GIRLS

r_b = 0,574 z = 6,295 df = 189 p < 0,001

SELECTED GROUP OF GIRLS

r_b = 0,636 z = 5,496 df = 118 p < 0,001

TOTAL GROUP OF BOYS AND GIRLS COMBINED

r_b = 0,540 z = 16,457 df = 364 p < 0,001

SELECTED GROUP OF BOYS AND GIRLS COMBINED

r_b = 0,580 z = 14,082 df = 229 p < 0,001

---

[1] In order to test for significance, r_b was converted to z employing the following formula given, for example, by Downie and Heath (1974):

$$z = \frac{r_b}{s_{rb}} \quad \text{(p.229)}$$

where s_{rb} $\frac{\sqrt{p1\ p2}}{y}\left(\frac{1}{\sqrt{N}}\right)$ (Formula 16,9, p. 229).

where p1 = proportion = 0

p2 = proportion = 1

y = ordinate of first proportion

n = total number in sample.

The biserial values indicate that there is a very significant degree of agreement ($p < 0,001$) between the EPI and the teachers' classifications of the subjects into introverts and extraverts in all the above-mentioned groups. The results obtained, using the biserial method, support those of the goodness-of-fit chi-square test.

(c) The Point-Biserial Coefficient

The point-biserial coefficient should be used when one of the variables is continuous and the other is conceived of as a dichotomy. Its advantages are that it is a Pearson product-moment r, its significance is easy to assess and it is not restricted to normal distributions in the dichotomous variable. Its disadvantages are that it is an underestimate as compared with the biserial and that it requires the dichotomy to be "genuine" (Guilford and Fruchter, 1978, pp. 308 - 311).

The point-biserial coefficient was calculated not only for the confirmation of previously obtained results, but also because Downie and Heath (1974) comment: "There is very little reason left for using the biserial r, a statistic which, no matter how it is evaluated, is inferior to the point biserial" (p. 107). The results for the six different groups[1] are given below:

---

[1] See Appendix D for source data used in the computations of r_{pb}.

TOTAL GROUP OF BOYS

r_{pb}[1] = 0,398 z[2] = 5,706 df = 173 p < 0,001

SELECTED GROUP OF BOYS

r_{pb} = 0,407 z = 4,654 df = 109 p < 0,001

TOTAL GROUP OF GIRLS

r_{pb} = 0,458 z = 7,045 df = 187 p < 0,001

SELECTED GROUP OF GIRLS

r_{pb} = 0,506 z = 6,318 df = 116 p < 0,001

---

[1] The following formula for the calculation of r_{pb} was used:

$$r_{pb} = \frac{n \sum Y_1 - n_1 \sum Y}{\sqrt{n_1 n_o \left[n \sum Y^2 - (\sum Y)^2 \right]}}$$

(Edwards, 1967, p. 126, Formula 7,5).

where

r_{pb} = the point biserial coefficient of correlation

$\sum Y_1$ = the sum of Y values for the n_1 observations with X = 1

$\sum Y$ = the sum of Y values for all n observations

n_1 = the number of observations with X = 1

n_o = the number of observations with X = 0

n = the total number of observations

[2] Downie and Heath (1974) indicate that the point biserial correlation is a product-moment correlation coefficient. The significance of this statistic was tested using the following formula:

$$z = \frac{r_{pb}\sqrt{N - 2}}{\sqrt{1 - r_{pb}^2}}$$

(Downie and Heath, 1974, p. 228, Formula 16.7).

TOTAL GROUP OF BOYS AND GIRLS COMBINED

r_{pb} = 0,431 z = 9,088 df = 362 p < 0,001

SELECTED GROUP OF BOYS AND GIRLS COMBINED

r_{pb} = 0,461 z = 7,827 df = 227 p < 0,001

It will be noted that, for all six groups mentioned above, the point-biserial values are significant beyond the 0,001 level indicating a very high level of agreement between the EPI and the teachers' classifications of the subjects into introverts and extraverts. The results obtained, using the point-biserial method, corroborate those derived from the goodness-of-fit chi-square and biserial techniques and reveal that, validated against teacher judgements, the EPI must be regarded as an acceptable test of introversion-extraversion among Indian high school subjects.

The results obtained from the present study, by use of three statistical methods with samples which included and excluded high lie scorers, strongly and unequivocally indicate that the EPI is a valid instrument for the measurement of introversion-extraversion among Indian South Africans in the 16 - 18 year age group.

(E) CONCLUSION

The SSHA has been adapted and standardized for use with Whites in South Africa. According to du Toit (1974), it has predictive and criterion-related validity. However, evidence obtained by Bhana (1979) and the current author are not as supportive of the predictive validity of the SSHA with Indians. These two authors point to various methodological issues which could account for their negative results. Therefore, in

spite of their findings, they concluded that the SSHA could not be dismissed as not having any predictive validity for Indians at this stage.

An examination of the items of the SSHA indicates that the test has content (face) validity.

The IQIP was designed for, and standardized on, an Indian South African sample. The content, factorial and construct validity of the test have been demonstrated by the HSRC (1969) and were accepted by the researcher without further ado.

Using different techniques, the validity of the E and N scales has been demonstrated unequivocally for their samples by Eysenck (1962; 1963), Vingoe (1968), Harrison and McLaughlin (1969), Gibson (1971), and Orpen (1972). On the other hand, there is a paucity of data regarding the validity of the L scale and the available data cannot be used to make any substantial claims for its validity (Gibson, 1971; Wen, 1976).

For the present research, the investigator was interested in the E scale only. Employing no less than three statistical indices, he succeeded in demonstrating unequivocally the validity of the E scale of the EPI, using Indian subjects.

The researcher considered the validity of the SSHA, IQIP and the E scale of the EPI adequate for his study.

Having concluded that the reliability and validity of the measuring instruments were acceptable for the present study, the researcher then turned to using the tests in the field work for the main study.

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The testing of the first hypothesis, viz., that there are significant differences in introversion-extraversion between linguistic groups (p. 54) is the subject of the next chapter.

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CHAPTER FIVE

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO LINGUISTIC AFFILIATION

(A) REVIEW OF THE LITERATURE

A survey of the literature indicated that only one study, that by Kanekar and Mukerjee (1971), compared different linguistic groups belonging to the same racial stock on introversion-extraversion.

They explored, among other personality characteristics, the possibility of differences in introversion-extraversion among the people of three Indian states - the Maharashtrians, Bengalis and Madrasis, who speak Marathi, Bengali and Tamil, respectively. There were 40 subjects in each of the three groups. All were males, ranging in age from 25-40 years, at least college graduates in educational level and holding white-collar office jobs. Kanekar and Mukerjee point out that the groups were comparable in terms of age, education and occupation. Form A of the EPI was administered to the subjects individually to measure extraversion and neuroticism.

The results indicated no significant differences among the three linguistic groups on neuroticism. On extraversion, the groups differed significantly ($F = 3,844$; $p < 0,05$). The Maharashtrians were found to be significantly more extraverted than the Bengalis ($p < 0,05$). The Madrasis were intermediate between the other groups and did not differ significantly from either of them (p.306). No comment about the lie scores is made by Kanekar and Mukerjee (1971).

Following the findings of Kanekar and Mukerjee, the present author tested the hypothesis that there was a significant difference in introversion-extraversion between the Hindi and Tamil Indian linguistic groups in South Africa.

(B) METHOD

Since many authors (Entwistle and Cunningham, 1968; Eysenck and Cookson, 1969; Entwistle and Welsh, 1969; Finlayson, 1970) indicate an age variation in neuroticism and extraversion, age was held constant in the present study. Further, in view of the indication of a positive relationship between extraversion and IQ (Mehryar et al., 1973; Ley et al., 1966) and both negative (Callard and Goodfellow, 1962; Ley et al., 1966) and positive (Ley et al., 1966) correlations between N and IQ, the study was designed to also hold IQ constant.

The present researcher tried to keep his sample as "pure" as possible by excluding subjects of mixed linguistic and/or religious parentage. Therefore, all the subjects used in this project were either Hindi-speaking Hindus with both parents also Hindi-speaking Hindus, or they were Tamil-speaking Hindus with both parents Tamil-speaking Hindus. It is, of course, evident from this that far more than the actual number of pupils selected for the sample were tested. Some subjects were rejected because they were adopted children or because of their parents' marriage across linguistic and/or religious groups. Most rejections were the result of the Tamil-Telegu inter-marriages.

All the subjects were standard nine urban Indian high school pupils. In both comparisons to be described below, between Hindi- and Tamil-speaking subjects, the groups were selected at random, using tables of random numbers where necessary, in such a way that balanced ANOVA factorial designs resulted for statistical analyses.

The sample (total group) comprised 80 Hindi boys, 80 Hindi girls, 80 Tamil boys and 80 Tamil girls. Their mean ages were 16,86, 16,87, 16,92 and 16,86 years, respectively. Each group of boys and girls was further subdivided into 40 high and 40 low socio-economic status pupils, using the method of classification already outlined in the previous chapter.

When the high lie scorers (above 4) were excluded, the sample (selected group) comprised 44 Hindi boys, 44 Hindi girls, 44 Tamil boys and 44 Tamil girls. Their mean ages were 16,88. 16,83, 16,87 and 16,75 years, respectively. Each group of boys and girls was further subdivided into 22 high and 22 low socio-economic status pupils.

All subjects completed the EPI and biographical inventory.

(C) RESULTS

For reasons already given (p. 45) results will be presented for the total and selected groups seperately.

ANOVA Tables XVIII and XIX indicate that, for the total and selected groups,respectively, there were no significant overall differences in age between the eight sub-groups that were to be compared on E, N and L.

TABLE XVIII

ANOVA OF AGES OF EIGHT SUB-GROUPS (TOTAL GROUP)[1]

Source of Variation	SS	df	MS	F	P
Between groups	1,789	7	0,256	0,759	> 0,05
Within groups	105,071	312	0,337		
Totals	106,860	319			

[1] The source data from which this table, and all other tables in Chapter Five were derived are given in Appendix E.

TABLE XIX

ANOVA OF AGES OF EIGHT SUB-GROUPS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	1,544	7	0,221	0,759	>0,05
Within groups	48,867	168	0,291		
Totals	50,411	175			

As pointed out earlier (p.139), the researcher also wanted to control for the possible influence of IQ. Since personnel from the School Psychological Services of the Department of Education had already administered the Group Test for Indian South Africans to the subjects and the results entered in the school record cards (I.E. 8), the IQ's were obtained from these cards.

Two 2 X 2 factorial designs for independent measures (adapted from Winer, 1971, pp. 452-463) indicated that there were no significant differences in IQ between the linguistic groups or between the sexes for the total group of subjects (Table XX), as well as for the selected group of subjects (Table XXI).

TABLE XX

ANOVA OF IQ'S BY LINGUISTIC AFFILIATION AND SEX (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	1,013	1	1,013	0,008	>0,05
B (Sex)	11,250	1	11,250	0,091	>0,05
AB	9,112	1	9,112	0,074	>0,05
Error	39020,175	316	123,482		
Totals	39041,550	319			

TABLE XXI

ANOVA OF IQ'S BY LINGUISTIC AFFILIATION AND SEX (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	32,818	1	32,818	0,296	>0,05
B (Sex)	227,273	1	227,273	2,047	>0,05
AB	71,273	1	71,273	0,642	>0,05
Error	19093,818	172	111,011		
Totals	19425,182				

It was, of course, not possible, on the basis of random sample selection, to equalize the IQ's of high and low socio-economic status subjects. It was not necessary to attempt this deliberately either. Differences in IQ between high- and low-status groups is a well-established finding in the field of mental measurement and has also been demonstrated among Indian children by Ramphal (1960) and Balkisson (1980). It has also been established that not only do adults of high and low class differ in intelligence, but that this difference , in favour of the higher, extends even to their children (Tyler, 1956, pp. 333-344; Anastasi, 1958, pp. 517-522). Therefore, an IQ difference between the two socio-economic groups was expected but regarded as irrelevant in the present context.

With age and IQ for the linguistic groups controlled, these groups were next investigated for differences in extraversion. A 2 X 2 X 2 ANOVA factorial design for independent measures (adapted from Winer, 1971, pp. 453-463) indicated that, for the total group, there was no significant difference between the Hindi- and Tamil-speaking subjects in extraversion, as reflected in Table XXII.

TABLE XXII

ANOVA OF EXTRAVERSION SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	2,278	1	2,278	0,191	> 0,05
B (Sex)	50,403	1	50,403	4,227	< 0,05
C (S-E S)[1]	71,253	1	71,253	5,976	< 0,05
A X B	44,254	1	44,254	3,712	> 0,05
A X C	5,779	1	5,779	0,485	> 0,05
B X C	18,529	1	18,529	1,554	> 0,05
A X B X C	10,151	1	10,151	0,851	> 0,05
Error	3720,075	312	11,923		
Totals	3922,722	319			

However, the results indicated that the main effect of sex was significant. The boys ($\bar{X}$ = 13,281) obtained significantly higher extraversion scores than the girls ($\bar{X}$ = 12,488). (Sex differences in extraversion will be discussed in Chapter Seven).

The main effect of socio-economic status was also significant with the subjects from the high-status group obtaining significantly higher extraversion scores ($\bar{X}$ = 13,356) than subjects from the low-status group ($\bar{X}$ = 12,413). (Socio-economic status differences in extraversion will be discussed in Chapter Nine).

The following table of a 2 X 2 X 2 ANOVA factorial design for independent measures indicates that, for the selected group also, there was no sigificant difference between the Hindi- and Tamil-speaking subjects in extraversion (Table XXIII).

---

[1] Throughout this report, S-E S is the abbreviation for socio-economic status.

TABLE XXIII

ANOVA OF EXTRAVERSION SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A(Linguistic group)	3,840	1	3,84	0,384	> 0,05
B (Sex)	1,840	1	1,84	0,184	> 0,05
C (S-E S)	56,817	1	56,817	5,676	< 0,05
A X B	13,092	1	13,092	1,308	> 0,05
A X C	0,206	1	0,206	0,021	> 0,05
B X C	1,842	1	1,842	0,184	> 0,05
A X B X C	0,080	1	0,080	0,008	> 0,05
Error	1681,910	168	10,011		
Totals	1759,636	175			

However, the main effect of socio-economic status was significant with the subjects from the high-status group obtaining significantly higher extraversion scores ($\overline{X}$ = 13,523) than subjects from the low-status groups ($\overline{X}$ = 12,386). As indicated previously, socio-economic status differences in extraversion will be discussed in Chapter Nine.

The following table of a 2 X 2 X 2 ANOVA factorial design for independent measures indicates that, for the total group, there was no significant difference between Hindi- and Tamil-speaking subjects in neuroticism.

TABLE XXIV

ANOVA OF NEUROTICISM SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	11,628	1	11,628	0,593	> 0,05
B (Sex)	155,403	1	155,403	7,928	< 0,01
C (S-E S)	0,378	1	0,378	0,019	> 0,05
A X B	1,654	1	1,654	0,084	> 0,05
A X C	18,529	1	18,529	0,945	> 0,05
B X C	56,954	1	56,954	2,906	> 0,05
A X B X C	3,401	1	3,401	0,174	> 0,05
Error	6115,525	312	19,601		
Totals	6363,472	319			

The table indicates, however, that there was a significant difference between the boys and girls in neuroticism. The girls ($\bar{X}$ = 12,438) scored significantly higher than the boys ($\bar{X}$ = 11,044) in neuroticism. (Sex differences in neuroticism will be discussed in Chapter Seven).

The results given below, of a 2 X 2 X 2 ANOVA factorial design for independent measures, indicate that, for the selected group, there was no significant difference between Hindi- and Tamil-speaking subjects in neuroticism.

TABLE XXV

ANOVA OF NEUROTICISM SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	0,687	1	0,687	0,041	> 0,05
B (Sex)	11,505	1	11,505	0,682	> 0,05
C (S-E S)	0,959	1	0,959	0,057	> 0,05
A X B	0,461	1	0,461	0,027	> 0,05
A X C	13,643	1	13,643	0,809	> 0,05
B X C	33,689	1	33,689	1,998	> 0,05
A X B X C	5,460	1	5,460	0,324	
Error	2832,591	168	16,861		
Totals	2898,994	175			

The table also indicates that there were no significant differences between boys and girls and between high- and low-status groups in neuroticism.

The results, given below in Tables XXVI and XXVII of two 2 X 2 X 2 ANOVA factorial designs for independent measures indicate that, for the total group as well as for the selected group, there were no significant differences between Hindi- and Tamil-speaking subjects in the lie scale scores.

TABLE XXVI

ANOVA OF LIE SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	0,703	1	0,703	0,206	>0,05
B (Sex)	8,128	1	8,128	2,385	>0,05
C (S-E S)	0,078	1	0,078	0,023	>0,05
A X B	2,628	1	2,628	0,771	>0,05
A X C	1,128	1	1,128	0,331	>0,05
B X C	0,528	1	0,528	0,155	>0,05
A X B X C	1,128	1	1,128	0,331	>0,05
Error	1063,225	312	3,408		
Totals	1077,547	319			

TABLE XXVII

ANOVA OF LIE SCORES BY LINGUISTIC AFFILIATION, SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Linguistic group)	0,364	1	0,364	0,269	>0,05
B (Sex)	1,841	1	1,841	1,363	>0,05
C (S-E S)	1,455	1	1,455	1,077	>0,05
A X B	0,364	1	0,364	0,269	>0,05
A X C	0,022	1	0,022	0,016	>0,05
B X C	0,091	1	0,091	0,067	>0,05
A X B X C	2,750	1	2,750	2,036	>0,05
Error	226,909	168	1,351		
Totals	233,796	175			

The tables also indicate that there were no significant differences between boys and girls and between high- and low-status groups in the lie scale scores.

(D) DISCUSSION OF RESULTS

This study revealed that the Hindi-speaking pupils did not differ significantly from the Tamil-speaking pupils in extraversion. This finding was consistent in both the groups which included and excluded high lie scorers. This suggests that, among Indian South Africans, linguistic affiliation *per se* does not have an influence on extraversion and this would be a reasonable conclusion in terms of Eysenck's theory of etiology which propounds the influence of genetic factors. However, as pointed out earlier, Kanekar and Mukerjee did find a significant difference in extraversion between the Maharashtrians and the Bengalis. In view of the evidence, presented in Chapter Eight, of both positive and negative relationships between IQ and extraversion, one wonders to what extent the difference that Kanekar and Mukerjee obtained was an artefact of differences in IQ between their groups. On the other hand, it must be conceded that the results obtained by Kanekar and Mukerjee are strictly not comparable with the results obtained in the present investigation since the groups differed in age and education.

Other Indian linguistic groups were not included in the present investigation for two reasons. Firstly, it would have extended the research beyond the self-imposed limits. The second, and more important reason, was that a quick survey of the field suggested that it was very doubtful whether a sufficiently large number of "pure" urban standard 9 subjects belonging to any of the other Indian linguistic groups and of the same religion could be easily obtained.

Kanekar and Mukerjee found no significant difference in neuroticism between their linguistic groups. In the present study also, no significant differences in neuroticism, as well as in the lie scale, were observed between the Hindi- and Tamil-speakers.

(E) CONCLUSION

From the results obtained in this study, it can be concluded that, with relevant extraneous variables controlled, Hindi- and Tamil-speaking Indian South Africans do not differ significantly in extraversion on the basis of linguistic differences. The hypothesis, stated on p. 54, that linguistic groups differ significantly in introversion-extraversion was not confirmed when the Hindi and Tamil linguistic groups in South Africa were compared.

The next chapter takes up the question of whether religious affiliation is a significant determinant of introversion-extraversion and secondarily of neuroticism and lie scores.

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CHAPTER SIX

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO RELIGIOUS AFFILIATION

(A) REVIEW OF THE LITERATURE

A survey of the literature revealed no studies on the influence of differential religious affiliation on introversion-extraversion, neuroticism or lie scores among high school students within the same ethnic group. Only one study, that of Behr (1974), where religious affiliation was the independent variable, could be traced. However, that study was not among high school students but among Indian first-year university students.

Behr, studied among other aspects, the influence of religion on the EPI scores of Christian, Hindu and Muslim students. Because of the paucity of Christian students, she compared only the Hindus and Muslims. Form A of the EPI was administered to 259 Hindus and 152 Muslims and Form B to 283 Hindus and 143 Muslims. Details regarding the ages of the groups have not been given. Analyses of the results indicated that there were no significant differences in E, N and L scores by religion.

A possible flaw in Behr's work was that, when comparing the religious groups, she combined male and female scores. From the research design point of view such a procedure would have been justified if the numbers of males and females within each religious group had been equalised or, at least, if she had established, as a preliminary step, that there were no statistically significant differences between the sexes in the variable under scrutiny. It is not clear if the first alternative was followed or not as she does not give the relevant figures. The second alternative was certainly not adopted. Her results could not, therefore, be accepted particularly since she had discovered a significant sex difference on the N scale of both forms of the EPI and on the L scale of Form A of the EPI (1974, p. 14).

(B) METHOD

The total group of students in this aspect of the research (as well as those aspects investigating the relationship of introversion-extraversion to sex, IQ, birth order, family background and vocational interest) comprised 480 Indian standard nine high school pupils with a mean age of 17,05 years (240 boys - mean age=17,08 years and 240 girls - mean age= 17,02 years). All attended high schools within the city of Durban. Each sex group had 80 Christians, 80 Hindus and 80 Muslims and within each of these groups there were 40 subjects of high and 40 of low socio-economic status.

In order to be eligible for inclusion in any aspect of the research, the subjects and both their parents had to belong to the same religious group. All adopted children and those of mixed ethnic parentage were excluded.

When the high lie scorers (L score above 4) were excluded, the selected group for comparing Christians, Hindus and Muslims on extraversion comprised 252 subjects having a mean age of 17,02 years. There were 126 boys with a mean age of 17,08 years and 126 girls with a mean age of 16,97 years. Each sex group had 42 Christians, 42 Hindus and 42 Muslims and within each of these groups there were 21 subjects of high and 21 of low socio-economic status.

For reasons already outlined in Chapter 5 (p. 139), the researcher held age and IQ constant.

(C) RESULTS

The ANOVA Tables XXVIII and XXIX indicated that there were no overall differences in age between the 12 religious sub-groups of the total group of subjects and the 12 religious sub-groups of the selected group of subjects, respectively, on E, N and L.

TABLE XXVIII

ANOVA OF AGES OF TWELVE COMPARISON GROUPS (TOTAL GROUP)[1]

Source of Variation	SS	df	MS	F	P
Between groups	1,764	11	0,160	0,50	> 0,05
Within groups	149,971	468	0,320		
Totals	151,735	479			

TABLE XXIX

ANOVA OF AGES OF TWELVE COMPARISON GROUPS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	2,986	11	0,271	0,931	>0,05
Within groups	69,755	240	0,291		
Totals	72,741	251			

Two 3 X 2 factorial designs for independent measures (adapted from Winer, 1971) indicated that there were no significant overall differences in IQ between the religious groups and between the sexes for both the total group and the selected group of subjects, as indicated in Tables XXX and XXXI respectively.

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[1] The source data from which this table, as well as all the other tables presented in Chapter Six, was derived are given in Appendix F.

TABLE XXX

ANOVA OF IQ'S OF RELIGIOUS AND SEX GROUPS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	2,754	2	1,377	0,008	>0,05
B (Sex)	0,602	1	0,602	0,004	>0,05
A X B	2,555	2	1,278	0,008	>0,05
Error	77328,087	474	163,139		
Totals	77333,998	479			

TABLE XXXI

ANOVA OF IQ'S OF RELIGIOUS AND SEX GROUPS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	284,222	2	142,111	0,871	>0,05
B (Sex)	297,920	1	297,920	1,827	>0,05
AB	67,556	2	33,778	0,207	>0,05
Error	40114,381	246	163,067		
Totals	40764,079	251			

The fact that it is very difficult, if not impossible, to randomly equate high and low socio-economic status groups for IQ has already been discussed on p. 142.

With age and IQ effectively controlled, the three religious groups were then investigated for differences in extraversion. Two 3 X 2 X 2 (religion x sex x socio-economic status) ANOVA factorial designs for independent measures (Winer, 1971, pp. 452-463) indicated that, for the total group of subjects as well as the selected group , there

were no significant overall differences in total extraversion scores between the Christian, Hindu and Muslim subjects, as reflected in Tables XXXII and XXXIII, respectively.

TABLE XXXII

ANOVA OF EXTRAVERSION SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	30,838	2	15,419	1,111	>0,05
B (Sex)	10,800	1	10,800	0,778	>0,05
C (S-E S)	39,675	1	39,675	2,858	>0,05
A X B	8,262	2	4,131	0,298	>0,05
A X C	34,912	2	17,456	1,257	>0,05
B X C	39,675	1	39,675	2,858	>0,05
A X B X C	9,088	2	4,544	0,327	>0,05
Error	6496,950	468	13,882		
Totals	6670,200	479			

TABLE XXXIII

ANOVA OF EXTRAVERSION SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	2,381	2	1,190	0,083	> 0,05
B (Sex)	8,035	1	8,035	0,562	> 0,05
C (S-E S)	0,004	1	0,004	0,0003	> 0,05
A X B	2,381	2	1,190	0,083	> 0,05
A X C	10,698	2	5,349	0,374	> 0,05
B X C	23,528	1	23,528	1,646	> 0,05
A X B X C	3,940	2	1,970	0,138	> 0,05
Error	3430,000	240	14,292		
Totals	3480,964	251			

To investigate the effect of religion, sex and socio-economic status on neuroticism for the total group, the total neuroticism scores of the 480 subjects were subjected to a 3 X 2 X 2 (religion x sex x socio-economic status) factorial analysis of variance for independent measures. The results of this analysis are summarized in Table XXXIV.

TABLE XXXIV

ANOVA OF NEUROTICISM SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	32,305	2	16,153	0,965	> 0,05
B (Sex)	644,034	1	644,034	38,493	< 0,01
C (S-E S)	4,409	1	4,409	0,264	> 0,05
A X B	19,928	2	9,964	0,596	> 0,05
A X C	12,453	2	6,227	0,372	> 0,05
B X C	14,699	1	14,699	0,879	> 0,05
A X B X C	6,114	2	3,057	0,183	> 0,05
Error	7830,050	468	16,731		
Totals	8563,992	479			

There were no significant overall differences between the three religious groups or between the two socio-economic status groups in neuroticism, as indicated in the table above. However, there was a significant difference between the boys and girls in neuroticism. The girls ($\overline{X}$ = 12,988) scored significantly higher than the boys ($\overline{X}$ = 10,671). (Sex differences in neuroticism will be discussed in Chapter Seven).

To investigate the effect of religion, sex and socio-economic status on neuroticism for the selected group of subjects, the total neuroticism scores of the 252 low L-scoring subjects were subjected to a 3 X 2 X 2 (religion x sex x socio-economic status) factorial analysis of variance for independent measures. The results of the analysis are summarized in Table XXXV below.

TABLE XXXV

ANOVA OF NEUROTICISM SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	37,008	2	18,504	1,158	>0,05
B (Sex)	60,036	1	60,036	3,756	>0,05
C (S-E S)	0,004	1	0,004	0,0002	>0,05
A X B	30,881	2	15,440	0,966	>0,05
A X C	11,722	2	5,861	0,367	>0,05
B X C	0,004	1	0,004	0,0002	>0,05
A X B X C	24,865	2	12,432	0,778	>0,05
Error	3836,476	240	15,985		
Totals	4000,996	251			

As indicated in the table above, for the selected group of subjects, there were no significant overall differences in neuroticism between the religious groups, or between the sexes, or between the socio-economic status groups.

To investigate the effect of religion, sex and socio-economic status on the lie scale scores for the total group, the total L scores of the 480 subjects were subjected to a 3 X 2 X 2 (religion x sex x socio-economic status) factorial analysis of variance for independent measures. The results of this analysis are summarized in the table given below.

TABLE XXXVI

ANOVA OF LIE SCALE SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	0,612	2	0,306	0,090	>0,05
B (Sex)	32,552	1	32,552	9,622	< 0,01
C (S-E S)	0,752	1	0,752	0,222	>0,05
A X B	6,905	2	3,452	1,020	>0,05
A X C	0,655	2	0,328	0,097	>0,05
B X C	0,102	1	0,102	0,030	>0,05
A X B X C	6,128	2	3,064	0,906	>0,05
Error	1583,275	468	3,383		
Totals	1630,981	479			

There was no significant overall difference between the three religious groups or between the two socio-economic groups in the lie scale scores as indicated in Table XXXVI above. However, the main effect of sex was significant ,with the boys obtaining a significantly higher mean lie score (7,746) than the girls (6,754). (Sex differences in lie scores will be discussed in Chapter Seven).

A 3 X 2 X 2 (religion x sex x socio-economic status) factorial analysis of variance for independent measures indicated that, for the selected group of 252 subjects, there were also no religious, sex or socio-economic status differences in the lie scale scores (Table XXXVII).

TABLE XXXVII

ANOVA OF LIE SCORES BY RELIGION, SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Religion)	1,024	2	0,512	0,357	> 0,05
B (Sex)	0,099	1	0,099	0,069	> 0,05
C (S-E S)	0,004	1	0,004	0,003	> 0,05
A X B	6,960	2	3,480	2,427	> 0,05
A X C	1,341	2	0,670	0,467	> 0,05
B X C	0,194	1	0,194	0,135	> 0,05
A X B X C	1,056	2	0,528	0,368	> 0,05
Error	344,286	240	1,434		
Totals	354,964	251			

(D) CONCLUSION

Just as in the Behr study with university students, the present investigation with standard 9 Indian high school pupils revealed that, for both the total group as well as for the selected group, there were no significant differences between Christians, Hindus and Muslims in the extraversion, neuroticism or lie scores as measured by the EPI.

The hypothesis, stated on p. 54, that the different religious groups differ significantly in introversion-extraversion, was unconfirmed.

The next chapter takes up the question of whether sex is a significant determinant of introversion-extraversion, and secondarily, of neuroticism and lie scores. As pointed out in Chapter One (p. 54), the hypothesis that there is a significant difference between males and females in introversion-extraversion will be tested.

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CHAPTER SEVEN

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO SEX

(A) REVIEW OF THE LITERATURE

Researchers have investigated the relationship between extraversion, neuroticism and lie scores in relation to sex, and they were not unequivocal in their conclusions. For example, as the following review of the literature will indicate, some researchers have found males to be significantly more extraverted than females, others have found that the reverse applied, while still others have found no significant difference between the sexes in extraversion.

Carrigan (1960) pointed out discrepancies between factorial studies based on introversion - extraversion among male and female subjects and commented: "There are areas which have not been - or are just beginning to be - systematically explored. There are hints that introversion-extraversion may be differentially manifested in males and females" (p.357).

Eysenck (1960b) conducted a factor-analytic study of the responses of a quota sample of 1 000 English subjects on a five-part 29-item questionnaire. Details regarding the age, and number of males and females were not given. Included in the analysis were also the social status (middle versus working class) and sex of the respondents. Five factors were found to account for 63% of the variance.

The contribution of class to the variance was only 5%, whereas that of sex was over 55%. The conclusion was that the relationship between class and the dependent variable was negligible, while the influence of sex was very strong. The class relationships were in line with previous work, neuroticism having been found to show a very slight negative correlation with middle class.

With regard to sex, Eysenck found a negative correlation between neuroticism and masculinity and a positive one between extraversion and masculinity (1960b, p.53). These findings are all congruent with the previous work of Eysenck (1958). In addition to a high correlation between emotionality and femininity, Eysenck found a correlation of 0,24 between feminity and nervousness. Eysenck pointed out that these results did not necessarily imply that women were in fact more emotional, nervous, neurotic and introverted than men; they may merely have been more inclined to admit these facts (1960b, p. 53).

The work of Eysenck (1958) has suggested that, according to their questionnaire responses, women are somewhat more neurotic than men and that men are somewhat more extraverted than women.

In their discussion of some Junior Maudsley Personality Inventory (JMPI) data, Furneaux and Gibson (1961) stated that there appeared to be some reason for believing that the results of an item analysis of inventory material of the JMPI type depended, in part, on the sex of the group within which the analysis was conducted.

Costello and Brachman (1962) investigated, in addition to cultural differences, possible sex differences in extraversion and neuroticism, as measured by the JMPI, among Canadian and English children.

The test was administered under group conditions to 261 male and 248 female Canadian high school children between the ages of 14 and 16 years and to 304 male and 230 female English comperehensive school children between the ages of 14 and 16 years.

The differences between the mean extraversion score of the boys and girls were not significant. However, the differences between the mean neuroticism scores of the sexes were significant. Both the Canadian and English girls obtained higher mean neuroticism scores than the Canadian and English boys ($p < 0,01$) (p. 256).

The MPI (Eysenck, 1959a)and the Fear Survey Schedule (Wolpe and Lang, 1964) were administered by Hannah, Storm and Caird (1965) to 1154 male and 804 female Canadian undergraduates in order to investigate, inter alia, sex differences in extraversion and neuroticism. No details regarding the ages of the subjects were given.

The mean neuroticism score of the females ($\bar{X}$ = 25,18; S.D. = 9,79) was significantly higher than the corresponding score for males ($\bar{X}$ = 23,46; S.D. = 9,87) ($t = 6,49$; $p < 0,001$). On extraversion, the females obtained a mean score of 27,66 (S.D. = 9,33) while the male mean score was 27,93 (S.D. = 9,33). The sex difference on extraversion was not significant ($t = 1,05$; $p > 0,10$) (p.1214).

Eysenck and Eysenck (1969b)attempted to relate the scores of normal respondents on three scales, viz.,psychoticism (P), extraversion (E), and neuroticism (N) to such factors as age, sex and social class. These variables were often neglected in dealing with personality. The authors pointed out that previous research had indicated that E decreased with age, was not related strongly to social class, and was higher in males than females. N also decreased with age, was slightly higher in the lower social strata, and was higher in females than in males (Eysenck, 1956a; Eysenck, 1958; Eysenck, 1960b; Eysenck and Eysenck, 1964a). It should be noted that the samples used

in most of the studies referred to were not representative, so that sampling errors might have accounted for some of the observed differences.

The inventory contained 20 extraversion (E), 20 neuroticism (N) and 20 psychoticism (P) questions and was administered to 1 423 adult males and 968 females as well as to 1 400 students of both sexes and to 327 housewives. Eysenck and Eysenck (1969) used 5 socio-economic groups, viz., upper middle-class, middle-class, lower middle-class, skilled working-class and the semi- and unskilled working classes combined. In view of the relatively small number of respondents in class 1, this was combined with class 2, thus reducing the number of classes to four.

The age groups were amalgamated into three: young (below 30), middle-aged (30-49) and old (above 50). Taking age first, among both men and women, it was found that E scores declined with age. Among the young, the means were 13,46 and 13,02, respectively; among the middle-aged, 18,81 and 11,72, respectively, and among the old, 11,55 and 11,40, respectively. At all three ages, women were slightly less extraverted than men, although the differences were clearly quite small in absolute terms. With regard to social class, there was evidence that classes 1 and 2 (11,66 for males and 12,05 for females) were somewhat less extraverted than the rest (range for males = 13,03 - 13,28; range for females = 12,45 - 12,57). The trend towards middle class introversion appeared in both sexes but was stronger in the men. All these trends were replicated for both sexes, and Eysenck and Eysenck indicated that they were thus likely to be neither chance nor spurious selection effects (p. 70).

There was an age trend in both sexes from high N scores in the young (8,34 for males and 9,71 for females) to low scores in the old (5,79 for males and 6,50 for females) with the middle-aged intermediate

(6,68 for males and 7,62 for females). At each age the women had higher scores. As for social class, the middle-class groups (6,76 for males and 7,80 for females) had significantly lower scores than the other classes (range for males = 7,28 - 8,39; range for females = 7,84 - 9,07). There was no obvious class trend in N scores.

The findings mentioned above suggested that young people were high on E and N, that males were high on E and low on N, and that middle class people were low on E and N. None of these differences was very large, but, according to the authors, they were all sufficiently marked to have been statistically significant, although the researchers did not report the levels of significance.

Thirty male and 30 female subjects, randomly selected from the Florida State University sophomore class of 2 785 students, were individually administered the MPI to determine neuroticism and extraversion scores (Whittaker, 1969). As part of a larger study, the relationship between sex and E scores was investigated.

Whittaker obtained a mean N score of 25,63 for males and 24,17 for females ($p > 0,05$) (p.44). He concluded that there was no relationship between neuroticism scores and sex for the university students.

With regard to E scores, males obtained a mean of 29,00 and females 29,23 ($p > 0,05$). Whittaker concluded that although females had a slightly higher mean extraversion score on the MPI than male subjects, their higher score was far from statistically significant (p. 45).

However, Whittaker pointed out that those findings contrasted significantly with previous findings of many United States and European studies which had dealt with the same variables over the years (Eysenck, 1959a; Bendig, 1960; Knapp, 1962; Coleman, 1964).

As part of a broader study, Child (1969) analysed the EPI scores of male and female freshman students from the University of Bradford. Altogether there were 58 arts women, 45 science women, 107 arts men, and 397 science men. He found that the women were markedly more neurotic than men ($z = 4,17$; $p < 0,001$). Child pointed out that "the extraversion scores were very much alike for ...(the) sexes"(p. 42).

Mehryar (1970) administered a verbatim Persian translation of Form A of the EPI to 150 students (78 boys, 72 girls; age range=18-23 years) from Pahlavi University. He obtained a male mean E score of 12,26 (S.D.=3,27) and a female mean E score of 12,22 (S.D.=4,57). There was no significant difference between the E scores ($t = 0,060$; $p > 0,05$) and Mehryar commented that male and female Iranian students were closely similar to each other in terms of extraversion; males were somewhat more homogeneous than females. The difference between the N scores of Iranian male and female students was not significant ($\bar{X}$=12,68; S.D.=5,05 versus $\bar{X}$=13,38; S.D.=5,15, respectively) (p. 259). On the L scale, Mehryar obtained a mean of 3,40 (S.D.=1,91) for males and 3,86 (S.D.=1,39) for females (p. 258). A z[1] value of 1,68 ($p > 0,05$) indicated that the difference between male and female L scores was not statistically significant.

In their study, Kanekar and Mukerjee (1972) used 80 graduate students (age range=18-28 years) from Nagpur University, India. The total sample consisted of 20 male arts students, 20 male science students, 20 female arts students and 20 female science students.

Extraversion and neuroticism were measured by Form A of the EPI which was administered without any modification or translation.

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[1] Calculated by the present researcher using the formula given in the footnote on p. 167.

Analysis of the results revealed, inter alia, that the females scored significantly lower than the males on extraversion ($t = 3,33$; $p < 0,01$). There was no significant difference between the sexes on neuroticism (p. 310).

Lowe and Hildman (1972) designed a study to investigate possible differences in extraversion and neuroticism scores attributable to race. Form A of the EPI was administered to 1 149 students entering the University of Southern Mississippi and 495 students entering Alcorn Agricultural and Mechanical College, Mississippi.

Some of the results given by them (p. 191) are presented in the table below.

TABLE XXXVIII

EPI RESULTS OF MISSISSIPPI BLACK AND WHITE MALES AND FEMALES

		Extraversion			Neuroticism		
Group	n	$\bar{X}$	S.D.	z^1	$\bar{X}$	S.D.	z^1
Black Females	312	12,3	3,28	2,403*	11,7	4,09	6,443***
Black Males	227	13,0	3,37		9,4	4,08	
White Females	586	13,9	3,86	0,434	11,8	4,32	6,064***
White Males	519	14,0	3,78		10,2	4,42	

[1] Calculated by the present researcher using the following formula:

$$z = \frac{\left|\bar{X}_1 - \bar{X}_2\right|}{s_{D_{\bar{X}}}}$$

where $s_{D_{\bar{X}}} = \sqrt{s_{\bar{X}_1}^2 + s_{\bar{X}_2}^2}$

where $s_{D_{\bar{X}}}$ = the standard error of the difference between two means for uncorrelated data

$s_{\bar{X}}$ = the standard error of a sample mean (Downie and Heath, 1965, pp. 132 - 133)

It must be pointed out that, while the Lowe and Hildman study concerned racial differences in introversion and extraversion, the present researcher used the figures presented by them to test also for differences between the sexes.

The results indicated that black males were significantly more extraverted than black females ($p < 0,05$) while there was no significant difference between white males and females in this respect.

Black females and white females were significantly more neurotic than black and white males, respectively ($p < 0,001$).

Hetzel et al. (1973) selected 397 undergraduates (261 males and 136 females) chosen from a total group of 2 031 students who had completed the EPI (Form B) at their first enrolment in February, 1969, as part of a wider study. The E scale scores of males and females showed no significant difference ($\overline{X}$ = 13,7 versus $\overline{X}$ = 14,1 respectively; F=1,3). However, on the N scale, the females were found to be significantly more neurotic than males ($\overline{X}$=10,7 versus $\overline{X}$=9,7, respectively; F = 4,4, $p < 0,05$) (p.98).

Hosseini et al. (1973) administered a slightly modified version of the Persian form of the EPI (PEPI), which also included Eysenck's psychoticism scale, to 1 009 Iranian secondary school graduates (768 boys and 241 girls) aged between 18 and 20 years taking the Pahlavi University entrance examination.

The mean male E score of 11,097 (S.D.=3,854) was significantly higher than the mean female E score of 10,414 (S.D. = 3,745) (z = 2,53; $p < 0,05$). On the other hand, the female mean N score ($\overline{X}$=11,937; S.D. = 4,611) was significantly higher than the corresponding male score ($\overline{X}$ = 10,972; S.D. = 4,692) (z = 2,83; $p < 0,01$).

The difference between male and female L scores was not statistically significant (p. 200).

Iranian girls were thus found to be less extraverted, but more neurotic, than their male counterparts. Hosseini et al. (1973) pointed out that the differences were not only consistent with earlier findings with comparable Iranian groups but they were also in agreement with Eysencks' (1969b)theoretical explanations and their empirical findings with British subjects.

Mohan and Kumar (1973) investigated the relationships among neuroticism, extraversion and intelligence among 336 master's students at Punjab University in India. The EPI was used to measure extraversion and neuroticism, and IQ was measured by Raven's Standard Progressive Matrices Test (1960).

The researchers did not investigate differences between the sexes on extraversion and neuroticism. However, they provided the following data which the present investigator used to test for sex differences (p. 166, Table I):

			Males	Females
Neuroticism	:	$\overline{X}$	10,73	10,63
Extraversion	:	$\overline{X}$	10,57	10,28
		N	168,00	168,00
Neuroticism	:	S.D.	5,17	4,94
Extraversion	:	S.D.	3,95	4,39

The z[1] test revealed that there were no significant differences between males and females on both neuroticism ($z = 0,181$; $p > 0,05$) and extraversion ($z = 0,634$, $p > 0,05$).

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[1] Footnote: The formula used was the one given in the footnote on p. 167.

Behr (1974) administered the EPI to 1 858 Christian, Hindu and Muslim, first-year, Indian, University of Durban-Westville students. Form A was administered to 291 males and 152 females and Form B to 295 males and 120 females. The mean age of those who completed Form A was 19,41 years (S.D.=2,36) and the mean age for the Form B group was 19,24 years (S.D.=2,22). She found that the females had significantly higher N scores than males on both Form A ($p < 0,01$) and Form B ($p < 0,05$). There were no significant E-score differences between the males and females on either Form A or Form B. Males had a significantly higher score than females ($p < 0,05$) on the L scale of Form A. No significant L scale difference between males and females was observed on Form B (p. 14).

Koul (1976) studied differences in extraversion and neuroticism among urban adolescent boys and girls at high and low levels of general intelligence and socio-economic status. Five hundred boys and 500 girls were selected from 10th grade students from various schools in India. Jalota's Group Intelligence Test and the Socio-economic Status Scale Questionnaire were administered, along with a Hindi version of the Maudsley Personality Inventory. Koul reported that the girls were significantly more neurotic than the boys.

The foregoing review of the literature on the relationship between extraversion, neuroticism and sex indicated that while some researchers found males to be significantly more extraverted than females (Eysenck, 1960b; Eysenck and Eysenck, 1969b; Kanekar and Mukerjee, 1972; Lowe and Hildman (among blacks), 1972; Hosseini et al., 1973), other researchers discovered no significant differences between males and females on extraversion (Costello and Brachman (among school children), 1962;

Hannah, Storm and Caird, 1965; Child, 1969; Whittaker, 1969; Mehryar, 1970; Lowe and Hildman (among whites), 1972; Hetzel et al., 1973; Mohan and Kumar, 1973; Behr, 1974; Koul, 1976).

As far as neuroticism was concrened, Eysenck (1960b),Costello and Brachman (1962) - among children, Hannah, Storm and Caird (1965), Eysenck and Eysenck (1969b),Child (1969), Lowe and Hildman (1972) - among blacks and whites, Hetzel et al.(1973), Hosseini et al. 1973), Behr (1974) and Koul (1976) found females to score significantly higher than males. However, Whittaker (1969), Mehryar (1970), Kanekar and Mukerjee (1972) and Mohan and Kumar (1973) found no significant differences between the neuroticism scores of males and females.

Only two studies (Mehryar, 1970; Behr, 1974) which compared the L scores of males and females could be traced. While Mehryar's study showed no significant difference between the L scores of males and females, the Behr study showed that on Form A of the EPI, males had a significantly higher score than females.

The findings of researchers into a possible relationship between extraversion, neuroticism and sex is equivocal. This may be due to the fact that the various samples were drawn from different cultural, socio-economic, age or IQ groups, all of which have been demonstrated to have some effect on introversion-extraversion and neuroticism.

(B) METHOD

The method of research adopted with high school students into this aspect has already been outlined in Chapter Six.

From the total sample of university students available, 44 Chemistry I, 120 English I and 120 Psychology I students were randomly selected. They formed the total groups of students. Within each sample, an equal number of males and females was selected. It was ensured that within each sex group there was an equal number of high- and low-status subjects. When the high lie scorers (L score above 4) were excluded, the selected groups comprised 36 Chemistry I, 84 English I and 84 Psychology I students.

The scores of the subjects from the different departments were not pooled because a difference in extraversion was expected between the language (English I) and science (Chemistry I) students. In fact, one of the hypotheses to be tested in Chapter Thirteen is that students of the language subjects differ significantly from students of the science subjects in introversion-extraversion.

(C) RESULTS

The results of the investigation into the relationship between sex, on the one hand, and extraversion, neuroticism and lie scores, on the other, among high school students have already been given in Tables XXXII to XXXVII, inclusive.

Tables XXXII and XXXIII indicated that in the total and selected groups, respectively, there were no significant differences between the extraversion scores of the boys and girls.

Table XXXIV indicated that, among the total group of students, there was a significant difference between the neuroticism scores of the boys and girls ($\bar{X}$ = 10,671 and 12,988, respectively, $p < 0,01$). The girls were significantly more neurotic than the boys. There were no significant differences between the neuroticism scores of the boys and girls forming the selected group of students, as was evidenced in Table XXXV.

Table XXXVI indicated that there was a significant difference between the lie scores of the boys and girls ($p < 0,01$). The boys had significantly higher lie scores than the girls ($\bar{X}$ = 4,067 and 3,546, respectively). Table XXXVII indicated that, among the selected group of students, there was no significant difference between the lie scores of the boys and girls.

Tables XXXIX to LXII, inclusive, give the results of the university students.

ANOVA Tables XXXIX and XL indicate that, for both the total and selected groups, respectively, there were no significant overall differences in age between the four sub-groups of Chemistry I students that were to be compared on extraversion, neuroticism and lie scores.

TABLE XXXIX

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF CHEMISTRY STUDENTS (TOTAL GROUP)[1]

Source of Variation	SS	df	MS	F	P
Between groups	0,010	3	0,003	0,20	>0,05
Within groups	6,114	40	0,153		
Totals	6,124	43			

[1] The source data from which this table, as well as all other tables presented in Chapter Seven, was derived are given in Appendix G.

TABLE XL

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF CHEMISTRY STUDENTS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	1,037	3	0,346	1,341	>0,05
Within groups	8,250	32	0,258		
Totals	9,287	35			

With age controlled, the groups were then investigated for differences in extraversion.

Two 2 X 2 (sex x socio-economic status) ANOVA factorial designs for independent measures (adapted from Winer, 1971, pp. 452 - 463) indicate that there were no significant differences in extraversion between the sexes among Chemistry I students in both the total and selected groups (Tables XLI and XLII, respectively).

TABLE XLI

ANOVA OF EXTRAVERSION SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	20,454	1	20,454	1,670	> 0,05
B (S-E S)	2,272	1	2,272	0,185	> 0,05
A X B	99,001	1	99,001	8,082	< 0,01
Error	490,000	40	12,250		
Totals	611,727	43			

TABLE XLII

ANOVA OF EXTRAVERSION SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	1,001	1	1,001	0,061	> 0,05
B (S-E S)	0,445	1	0,445	0,027	> 0,05
A X B	5,444	1	5,444	0,330	> 0,05
Error	528,000	32	16,500		
Totals	534,889	35			

However, a significant sex by socio-economic status interaction was noticed in the total group. Among the males, the low-status group was more extraverted than the high ($\overline{X}$ = 14,636 and 11,182, respectively), while, among the females, the high-status group was more extraverted than the low ($\overline{X}$ = 12,818 and 10,273, respectively).

Tables XLIII and XLIV of two 2 X 2 ANOVA factorial designs for independent measures indicate that there was a significant difference in neuroticism between the Chemistry I males and females in the total group ($F = 6,506$; $p < 0,05$) and also in the selected group ($F = 5,744$; $p < 0,05$). In both groups, the females (total group $\overline{X}$ = 13,136; selected group $\overline{X}$ = 14,778) had significantly higher neuroticism scores than the males (total group $\overline{X}$=9,546; selected group $\overline{X}$ = 11,056).

TABLE XLIII

ANOVA OF NEUROTICISM SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	141,841	1	141,841	6,506	< 0,05
B (S-E S)	0,022	1	0,022	0,001	> 0,05
A X B	12,023	1	12,023	0,552	> 0,05
Error	872,000	40	21,800		
Totals	1025,886	43			

TABLE XLIV

ANOVA OF NEUROTICISM SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	124,694	1	124,694	5,744	< 0,05
B (S-E S)	26,694	1	26,694	1,230	> 0,05
A X B	4,695	1	4,695	0,216	> 0,05
Error	694,667	32	21,708		
Totals	850,750	35			

Tables XLV and XLVI, two 2 X 2 ANOVA factorial designs for independent measures, indicate that there were no significant differences between the lie scores of the sexes among Chemistry I students in both the total and selected groups, respectively.

TABLE XLV

ANOVA OF LIE SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	7,364	1	7,364	2,414	> 0,05
B (S-E S)	1,455	1	1,455	0,477	> 0,05
A X B	0,817	1	0,817	0,268	> 0,05
Error	122,364	40	3,050		
Totals	132,000	43			

TABLE XLVI

ANOVA OF LIE SCORES OF CHEMISTRY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	0,444	1	0,444	0,326	> 0,05
B (S-E S)	0,111	1	0,111	0,082	> 0,05
A X B	0,111	1	0,111	0,082	> 0,05
Error	43,556	32	1,361		
Totals	44,222	35			

ANOVA Tables XLVII and XLVIII indicate that, for both the total and selected groups, respectively, there were no significant overall differences in age between the four sub-groups of English I students that were to be compared on extraversion, neuroticism and lie scores.

TABLE XLVII

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF ENGLISH STUDENTS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	3,885	3	1,295	2,229	> 0,05
Within groups	67,432	116	0,581		
Totals	71,317	119			

TABLE XLVIII

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF ENGLISH STUDENTS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	2,998	3	0,999	2,197	> 0,05
Within groups	36,374	80	0,455		
Totals	39,372	83			

With age controlled, the groups were next investigated for differences in extraversion.

Two 2 X 2 (sex x socio-economic status) ANOVA factorial designs for independent measures indicate that, for both the total and selected groups, there were no significant differences in extraversion between the sexes among English I students (Tables XLIX and L, respectively).

TABLE XLIX

ANOVA OF EXTRAVERSION SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	63,075	1	63,075	3,678	>0,05
B (S-E S)	6,075	1	6,075	0,354	>0,05
A X B	6,075	1	6,075	0,354	>0,05
Error	1989,367	116	17,150		
Totals	2064,592	119			

TABLE L

ANOVA OF EXTRAVERSION SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	3,441	1	3,441	0,243	>0,05
B (S-E S)	0,964	1	0,964	0,068	>0,05
A X B	0,012	1	0,012	0,001	>0,05
Error	1134,476	80	14,181		
Totals	1138,893	83			

The following ANOVA tables of two 2 X 2 factorial designs for independent measures indicate that, for both the total and selected groups, there were no significant differences between the sexes in neuroticism among English I students (Tables LI and LII, respectively).

TABLE LI

ANOVA OF NEUROTICISM SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	29,009	1	29,009	1,148	>0,05
B (S-E S)	39,675	1	39,675	1,569	>0,05
A X B	4,408	1	4,408	0,174	>0,05
Error	2932,500	116	25,280		
Totals	3005,592	119			

TABLE LII

ANOVA OF NEUROTICISM SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	3,440	1	3,440	0,171	>0,05
B (S-E S)	33,440	1	33,440	1,663	>0,05
A X B	10,013	1	10,013	0,498	>0,05
Error	1608,857	80	20,111		
Totals	1655,750	83			

The following table of a 2 X 2 ANOVA factorial design for independent measures indicates that there was a significant difference in the lie scores of the sexes among the total group of English I students. The females had a higher mean lie score than the males ($\bar{X}$ = 3,500 and 2,767, respectively).

TABLE LIII

ANOVA OF LIE SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	16,134	1	16,134	5,295	< 0,05
B (S-E S)	16,134	1	16,134	5,295	< 0,05
A X B	0,132	1	0,132	0,043	> 0,05
Error	353,467	116	3,047		
Totals	385,867	119			

However, as reflected in Table LIV, when the high lie scorers were omitted, no significant difference in the lie scores was observed between the sexes.

TABLE LIV

ANOVA OF LIE SCORES OF ENGLISH STUDENTS BY SEX AND SOCIO-ECOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	4,762	1	4,762	3,453	> 0,05
B (S-E S)	1,714	1	1,714	1,243	> 0,05
A X B	0,190	1	0,190	0,138	> 0,05
Error	110,286	80	1,379		
Totals	116,952	83			

ANOVA Tables LV and LVI indicate that, for both the total group as well as the selected group, respectively, there were no significant overall differences in age between the four sub-groups of Psychology I students that were to be compared on extraversion, neuroticism and lie scores.

TABLE LV

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF PSYCHOLOGY STUDENTS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	0,155	3	0,052	0,027	>0,05
Within groups	219,534	116	1,893		
Totals	219,689	119			

TABLE LVI

ANOVA OF AGES OF THE FOUR SUB-GROUPS OF PSYCHOLOGY STUDENTS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	2,586	3	0,862	0,855	>0,05
Within groups	80,641	80	1,008		
Totals	83,227	83			

With age controlled, the groups were then investigated for differences in extraversion.

The following two 2 X 2 (sex x socio-economic status) ANOVA factorial designs for independent measures indicate that, for both the total and the selected groups, respectively, there were no significant differences in extraversion between the sexes among Psychology I students.

TABLE LVII

ANOVA OF EXTRAVERSION SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	1,857	1	1,875	0,125	>0,05
B (S-E S)	15,409	1	15,409	1,026	>0,05
A X B	25,208	1	25,208	1,679	>0,05
Error	1742,100	116	15,018		
Totals	1784,592	119			

TABLE LVIII

ANOVA OF EXTRAVERSION SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	1,441	1	1,441	0,103	>0,05
B (S-E S)	7,441	1	7,441	0,532	>0,05
A X B	14,583	1	14,583	1,042	>0,05
Error	1119,524	80	13,994		
Totals	1142,989	83			

The following two tables, each a 2 X 2 ANOVA factorial design for independent measures, indicate that, for both the total and selected groups, respectively, there were no significant differences between the sexes in neuroticism among Psychology I students.

TABLE LIX

ANOVA OF NEUROTICISM SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	70,534	1	70,534	2,878	>0,05
B (S-E S)	26,134	1	26,134	1,066	>0,05
A X B	4,032	1	4,032	0,164	>0,05
Error	2843,267	116	24,511		
Totals	2943,967	119			

TABLE LX

ANOVA OF NEUROTICISM SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	32,190	1	32,190	1,428	>0,05
B (S-E S)	15,428	1	15,428	0,685	>0,05
A X B	5,763	1	5,763	0,256	>0,05
Error	1802,571	80	22,532		
Totals	1855,952	83			

The following two tables, each a 2 X 2 factorial design for independent measures, indicate that, for both the total and selected groups, respectively, there were no significant differences between the sexes in the lie scores of Psychology I students.

TABLE LXI

ANOVA OF LIE SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	3,008	1	3,008	0,763	>0,05
B (S-E S)	0,075	1	0,075	0,019	>0,05
A X B	7,009	1	7,009	1,778	>0,05
Error	457,233	116	3,942		
Totals	467,325	119			

TABLE LXII

ANOVA OF LIE SCORES OF PSYCHOLOGY STUDENTS BY SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Sex)	0,428	1	0,428	0,246	> 0,05
B (S-E S)	0,048	1	0,048	0,028	> 0,05
A X B	0,429	1	0,429	0,246	> 0,05
Error	139,333	80	1,742		
Totals	140,238	83			

(D) DISCUSSION OF RESULTS

A comparison of the mean extraversion scores of high school as well as those of university chemistry, English and psychology students consistently indicated that, for both the total and selected groups, there were no significant sex differences. This result is in agreement with those obtained by Costello and Brachman (1962), Hannah et al. (1965), Whittaker (1969), Mehryar (1970),

Lowe's and Hildman's finding among Whites (1972), Hetzel et al. (1973), Mohan and Kumar (1973), Behr (1974) and Koul (1976).

The present finding, that girls have a higher neuroticism score than boys, is also consistent with some of the previous findings (Eysenck, 1960b; Costello and Brachman, 1962; Hannah et al., 1965; Eysenck and Eysenck, 1969b; Child, 1969; Lowe and Hildman, 1972; Hetzel et al., 1973; Hosseini et al., 1973; Behr, 1974; Koul, 1976). The higher neuroticism scores for females were significant among the total group of high school pupils and the university Chemistry I total and selected groups. Although significance was not attained in the high school selected group (male $\bar{X}$=11,730; female $\bar{X}$ = 12,706), English I total group (male $\bar{X}$ = 9,867; female $\bar{X}$ = 10,850), English I selected group (male $\bar{X}$ = 10,548; female $\bar{X}$ = 10,952), Psychology I total group (male $\bar{X}$ = 10,217; female $\bar{X}$ = 11,750) and the Psychology I selected group (male $\bar{X}$ = 11,071; female $\bar{X}$ = 12,310), the means indicate that the trend for females to have higher neuroticism scores than males was evident among them also.

A possible explanation for the sex difference in neuroticism is the higher incidence of neurotic reactions among women. This higher incidence has been repeatedly demonstrated by epidemiological studies (Hock and Zubin, 1961). On the other hand, the results do not necessarily mean that women are in fact more neurotic than men; they may merely feel freer to admit it.

Eysenck (1959a) claims that the N score measures liability to breakdown under stress and, therefore, people with high N scores are more likely to suffer psychological illness. Therefore, according to the results of the present investigation, females may be more susceptible than males to personality disorganization.

The results also indicate that, among the total group of high school students, the boys had a significantly higher mean L score than the girls. This could mean that boys have more difficulty than girls in accepting socially deviant impulses as part of the self (Adorno et al., 1950). While this fact may account for an elevated lie score for boys, on the one hand, the conformist, traditional, religious, honest sex role expected of females could have contributed to a lowering of the lie score for girls, on the other. However, it must be pointed out that these results must be accepted with reservation in view of the fact that, when the protocols of doubtful validity were omitted, the relationship between L scores and sex ceased to be significant (Table XXXVII).

The author cannot plausibly explain, apart from advocating the operation of sampling factors and the presence of invalid protocols, why the females had significantly higher lie scores than the males among the English students, while there was no such finding among the chemistry and psychology students. The fact that the relationship between sex and lie scores among the English students ceased to be significant when the high lie scorers were excluded, supports the view that the presence of invalid protocols could have caused the relationship to reach significance.

It must be pointed out that some of the results contained in Tables XXII and XXVI differ from those appearing in Tables XXXII and XXXVI. For example, Table XXII indicated a significant difference between the sexes in extraversion while no significant difference was recorded in Table XXXII. Also Table XXVI indicated no significant difference between the sexes in the lie scores while Table XXXVI reflected a significant difference. The results cannot be regarded as contradictory because the data on which Tables XXII and XXVI were based were drawn from only Tamil- and Hindi-speaking Hindus. The data contained in Tables XXXII and XXXVI were based on information drawn from the major Indian linguistic

groups, namely, Tamil, Hindi, Telegu, Gujerathi and Urdu, and also from the three religious groups studied, namely, Christian, Hindu and Muslim. The latter data may, therefore, be regarded as representative of the Indian standard 9 school population, unlike the former.

(E) CONCLUSION

The main hypothesis that there is a significant difference between Indian males and females in introversion-extraversion, as stated on p. 54, was not confirmed either at the high school or university level.

Chapter Eight will examine the relationships between extraversion, neuroticism and lie scores, on the one hand, and IQ, on the other. The hypothesis that there is a significant correlation between introversion-extraversion and IQ, as mentioned in Chapter One (p. 54), will be tested.

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CHAPTER EIGHT

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO IQ

(A) REVIEW OF THE LITERATURE

The following outline of the literature will indicate the extent to which results obtained on the relationship between extraversion and neuroticism, on the one hand, and IQ, on the other, are contradictory. Some researchers report no significant correlation between E and IQ, while others have found the reverse to be true. Different researchers have reported significant positive, significant negative, and the absence of any significant relationship between N and IQ.

The typical intelligence test may be regarded as an instance of massed practice, and one would consequently expect such phenomena as reactive inhibition to occur (Eysenck, 1957). In view of the relationship between inhibition and extraversion, Eysenck (1959b) predicted that in the process of solving the 60 problems of the Morrisby Compound Series Test (Morrisby, 1955), a non-verbal intelligence test, extraverts would show greater reactive inhibition, and consequently a falling off in performance during the last quarter of the test as compared with the first three-quarters. From 137 adult male and female neurotics who were given the MPI (Eysenck, 1959), he chose an introverted group (E score of 16 or below) and an extraverted group (E score of 30 or above). On this basis, 28 introverts and 19 extraverts were eligible for testing. They were administered the test individually, without time limit, and each item was separately timed.

There were no significant differences between the introverts and extraverts in the total number of items correctly solved or in the speed with which all items were finished. There was, however, a significant

difference between the two groups in the speed with which correct solutions were produced. On the first 45 problems, introverts were non-significantly slower than extraverts; on the last 15 problems, extraverts were significantly slower than introverts. With regard to the speed with which items were abandoned unsolved, Eysenck (1959b)found that there were no significant differences on the first 45 problems, but that,on the last 15 problems,extraverts gave up significantly more quickly. He concluded that extraverts, when compared with introverts, showed greater work decrement on an intelligence test by taking longer to obtain correct solutions and by giving up more easily, toward the end of the test.

Lynn and Gordon (1961) produced evidence that neurotic introverts tended to be more intelligent than neurotic extraverts (e.g.,Cattell, 1950; Eysenck, 1947). Broadbent (1958) found no correlation among students between introversion and intelligence as assessed by the AH4 test while Bendig (1960) and Eysenck (1947) found negative correlations. It has also been shown that introverted neurotics tended to have good vocabularies in relation to their scores on the Raven Matrices, while,in extraverted neurotics,the reverse was the case (Himmelweit, 1946). It is possible that the high P (Performance) : low V (Verbal) ratio which Wechsler (1944) regarded as characteristic of psychopaths and the high V : low P of neurotics reflect, at any rate to some extent, the same introvert-extravert dichotomy. It was argued by Eysenck (1957) that vocabulary was acquired by conditioning and the high verbal ability of introverted neurotics is a result of their conditionability accelerating the verbal skills; on the other hand, the high V : low P ratio was often interpreted as reflecting deterioration or impairment of the performance skills. Which of these theories is correct could, of course, be determined by examining the actual attainments of introverts and extraverts on verbal and non-verbal intelligence, rather than through the ratio of the scores.

In order to determine the inter-relationships among extraversion, neuroticism and intelligence, Lynn and Gordon (1961) administered to 60 male university students (age range=18 - 23 years) the MPI to measure neuroticism and introversion-extraversion, the Mill Hill Vocabulary Test to give a total vocabulary score, and Raven's Standard Progressive Matrices to obtain a non-verbal mental score.

They found that neither neuroticism (product-moment correlation = 0,07, $p > 0,05$; partial correlation = 0,08, $p > 0,05$) nor extraversion (product-moment correlation= -0,05, $p > 0,05$; partial correlation = -0,01, $p > 0,05$) had any significant correlation with intelligence. However, subjects scoring high on neuroticism worked faster and completed the Matrices Test more quickly. They also found neuroticism and vocabulary to be positively correlated. In spite of the fact that the finding of Lynn and Gordon (1961) confirmed the findings of a number of previous investigations and supported the view that explanations for the associations between introversion and neuroticism, on the one hand, and academic success, on the other, could not be due to an underlying interaction with intelligence, Biggs (1962) observed that this conclusion, at least on the basis of the data, was certainly not justified (p. 193). He also criticised their experiment on certain theoretical and methodological grounds.

As part of a larger study, Callard and Goodfellow (1962) investigated the relationship between neuroticism and IQ, and between extraversion and IQ among school children.

The Junior Maudsley Personality Inventory (JMPI) was administered by teachers and,in one instance,by researchers during the school years 1960 - 1962 to all 3559 boys,ranging in age from 11 years to 14 years 11 months,in the secondary schools under the jurisdiction of the Local Education Authority in Exeter.

IQ's of the boys in three of the urban schools (two secondary modern and one grammar-technical)were obtained from the Exeter Education Department. The IQ's had been obtained during the boys' 11-plus selection test, and they were used in this project to calculate correlation coefficients between neuroticism and extraversion, on the one hand, and intelligence, on the other.

Callard and Goodfellow (1962) obtained an r value of - 0,19 ($p < 0,05$) between neuroticism and intelligence for a random population of boys, 11 - 14 years, over the whole intelligence range.

Only two significant correlations were found between extraversion and intelligence. The second form "A" group (more intelligent group) of the two secondary modern schools and one of the non-"A" (less intelligent) third forms showed significant negative correlations between extraversion and intelligence (both at the 5% level). Although over half of all the forms showed a slight tendency for extraversion and intelligence to be positively correlated, the correlation for the two schools combined showed a very slight negative correlation. No significant correlation was found in the grammar school between extraversion and intelligence. However, there was a slight tendency for extraversion and intelligence to be positively correlated in the 11-year and 12-year old non-"A" groups.

One of the many aspects that Child (1964) investigated was the correlation between E, N and IQ. The subjects were 138 randomly selected children from each form in the first four years from an urban comprehensive school. The age range was 11 - 15 years.

The JMPI provided the measure of introversion-extraversion while the 11+ Moray House Test gave the IQ. Child obtained an r value of -0,07 between extraversion and neuroticism, + 0,10 between extraversion and IQ, and -0,14 between neuroticism and IQ. None of the correlations was significant.

Child concluded that extraversion and neuroticism were statistically unrelated to IQ.

Ley et al.(1966) designed a study to investigate, inter alia, the hypothesis that there were negative correlations between tests of intelligence and measures of extraversion.

The sample consisted of 144 normal volunteers drawn from the Liverpool M.C.R. Panel (Heron, 1962). The subjects had a mean age of 46,45 years (S.D.= 13,10 years). All subjects had previously completed the Matrices and the Mill Hill Synonyms Test, Form II Senior. The MPI was administered to obtain neuroticism and extraversion scores, while the 16 P.F. Questionnaire(Form C) also gave an IQ score since Factor B is a measure of intelligence.

An r of - 0,357 ($p < 0,01$)was obtained between the Progressive Matrices and the MPI N. The correlation between the Mill Hill Vocabulary Scale and the MPI N scale was 0,167 ($p < 0,05$), while that between the Cattell Factor B and the MPI N was -0,290 ($p < 0,01$).

The correlations between the two measures of extraversion and the three intelligence tests are given in the table below. (It should be noted that the scoring of the Cattell Second Order Extraversion Factor is such that high scores are associated with introversion).

TABLE LXIII

CORRELATIONS BETWEEN EXTRAVERSION AND INTELLIGENCE TESTS

Test	Progressive Matrices	Mill Hill Vocabulary	Factor B
MPI E scale	0,072	- 0,027	+ 0,171 *
16 P.F. Second Order Factor Introversion	- 0,104	+ 0,086	- 0,172 *

(Ley et al., 1966)

Only two of the correlations (marked *) are significant but not in the expected direction.

Work on personality and intelligence has suggested that extraversion and neuroticism may be related to intelligence in complex ways and would vary with the level of intellectual ability (Eysenck and White, 1965; Lynn and Gordon, 1961; Farley, 1966; Eysenck, 1967).

As part of a study to estimate the possible moderating effects of intelligence on the relationship between E and N, Farley (1967) also investigated the relationship between E and N, on the one hand, and IQ on the other. He used one of his samples for which intelligence test data were available. The sample consisted of 215 English male trade apprentices taken from a sample of 309 subjects for whom a complete set of observations (intelligence test scores, E and N) was available. The age range was 15 - 18 years. The subjects had been administered the EPI (Form A) individually while waiting to participate in an experiment. The intelligence test employed was Group Test 33 (GT 33) of the National Institute of Industrial Psychology of Great Britain.

Five groups of 43 subjects each were formed from the 215 subjects, ranked on the basis of GT 33 scores. The highest GT 33 group was labelled Group 1, the lowest Group 5, with the three remaining groups in ranked order between these two extremes.

The correlation between E and intelligence over the total sample of 215 subjects was 0,149 ($p > 0,05$) while the comparable correlation between N and intelligence was 0,012 ($p > 0,05$).

In order to test, among other things, the relationship between IQ and extraversion, and IQ and neuroticism, Mehryar et al. (1973) used a random sample of 707 male and 171 female secondary school graduates taking the annual entrance examination of Pahlavi University in Southern Iran. Apart from pointing out that the majority of the students were aged between 18 and 19 years, no other details regarding the age of the sample were given.

The students were divided into three groups according to their specialization, namely, mathematics (N = 384), natural sciences (N = 323) and literature (N = 171).

A correlational analysis of the data revealed small but consistently positive correlations between measures of intelligence and extraversion. The values of r varied from 0,11 to 0,14 and were significant in two of the three groups. However, the researchers did not identify the two groups. None of the correlations between neuroticism and intelligence was significant. The EPI lie scale correlated negatively with intelligence, two of the correlations (- 0,13 and 0,16) being statistically significant. Again, the authors did not indicate to which groups the significant relationships applied.

Since the research evidence suggested that the relationship of intelligence to neuroticism and extraversion seemed to be far from a direct one (Eysenck and White, 1965; Lynn and Gordon, 1961; Farley, 1966; Eysenck, 1967a, Mohan and Kumar (1973) investigated the problem with extreme scorers on neuroticism and extraversion.

The EPI (Eysenck and Eysenck, 1964a)was administered to 1500 Punjab University master's students of both sexes. The means on N and L were 11,00 and 10,00 and the S.D.'s,3,59 and 2,00,respectively. No details regarding the age of the sample were given. From this group, 336 students were selected on the basis of their scores on the EPI, sex and their choice of arts or science subjects.

The criterion for selecting the extreme groups on neuroticism and extraversion was 1/2 S.D. above or below the mean. The four extreme groups thus selected were called SE (stable extravert), NE (neurotic extravert), SI (stable introvert) and NI (neurotic introvert). The total sample of 336 subjects was divided into 4 personality x 2 sex x 2 academic choices groups making a minimum of 21 subjects in each group. These subjects were then administered the Raven Matrices.

The correlations between neuroticism and IQ and extraversion and IQ were significant for some of the groups only. Mohan and Kumar (1973) pointed out that the results bore out the independence of neuroticism, extraversion and intelligence.

In a study reported previously (p. 170), Koul (1976) studied differences in extraversion and neuroticism among urban,adolescent,tenth grade boys and girls at high and low levels of general intelligence and socio-economic status. He found that subjects of high intelligence were less neurotic than those of low intelligence.

As part of a larger study, Walsh and Walsh (1978) investigated the relationship between IQ, on the one hand, and extraversion and neuroticism, on the other. The subjects were 53 ninth-grade students (26 female and 27 male, aged from 14 to 16 years) representative of the advanced, academic stream of an English-speaking high school in Ottawa,

Ontario. Extraversion and neuroticism were measured by the EPI (Eysenck and Eysenck,1969a), while the average score of the combined Verbal Reasoning and Numerical Ability subtests of the Differential Aptitude Test battery was used as a measure of general intelligence.

A significant negative correlation was found between intelligence and extraversion ($r = -0,33$, $p < 0,05$) (p. 18). This indicated that the brighter students tended to be introverts rather than extraverts. No significant relationship between neuroticism and IQ was obtained.

It is evident from the foregoing that studies of the relationship between extraversion and neuroticism, on the one hand, and IQ, on the other, have employed mainly the MPI, JMPI or the EPI as measures of extraversion and neuroticism, and various IQ tests (e.g., the Mill Hill Vocabulary Test, Raven's Progressive Matrices, Cattell Factor B, Group Test 33) have been employed to measure mental ability.

The subjects were either school children (Callard and Goodfellow, 1962; Child, 1964), secondary school graduates (Mehryar et al., 1973), male trade apprentices (Farley, 1967) or university students (Lynn and Gordon, 1961; Mohan and Kumar, 1973).

The results of the investigations into the relationship between extraversion and neuroticism,on the one hand, and IQ, on the other, are contradictory. While Broadbent (1958), Child (1964), Farley (1967), Lynn and Gordon (1961), and Mohan and Kumar (1973) reported no significant correlation between extraversion and IQ, Mehryar et al.(1973) and Ley et al.(1966) reported a significant positive association. On the other hand,Walsh and Walsh (1978) reported a significant negative relationship. As far as the association between neuroticism and IQ is concerned, some researchers reported no significant relationships in the correlations (Walsh and Walsh, 1978; Mehryar et al., 1973;

Mohan and Kumar, 1973; Farley, 1967; Lynn and Gordon, 1961). Others reported significant negative correlations (Callard and Goodfellow, 1962; Ley et al., 1966), and still others reported a significant positive relationship (Ley et al., 1966). It must be noted that in the study by Ley et al., more than one IQ measure was employed. They obtained a significant negative correlation between neuroticism and IQ as measured by the Progressive Matrices Test, but a significant positive association when IQ was measured by the Cattell Factor B.

It is quite likely that contradictory results have been obtained because different tests have been used in different studies for measuring the same phenomenon and the characteristics of the sample differed from study to study.

No studies have been traced on the relationship between the lie score and IQ.

(B) METHOD

The 480 subjects (240 boys and 240 girls) described in Chapter Six formed the sample for the present correlational study as well as all the correlational studies involving high school pupils. In order to eliminate the possibility of faking, further correlational studies were conducted from which those subjects having an "L" score of 4 and above were excluded, as recommended by Eysenck and Eysenck (1964a). This left 117 males and 95 females. For this reason, as previously mentioned (p. 45), two sets of results are given on the EPI data.

(C) RESULTS

Table LXIV presents the results of the correlational studies (Pearson r) of the total group of 480 subjects and also of the selected group of 117 boys and 95 girls who had an L score of 3 and below.

TABLE LXIV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN IQ AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)	
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys	N = 95 Girls
E	0,119 **	0,068	0,171 **	- 0,053	0,243 *
N	0,005	0,059	-0,055	- 0,102	-0,154
L	-0,139 **	-0,076	-0,212 **	0,011	-0,239 *

The table indicates that, for the total group of boys and girls combined and for the total group of girls, there is a significant positive correlation ($p < 0,01$) between extraversion and IQ, and a significant negative relationship ($p < 0,01$) between lie scores and IQ.

When those subjects having a lie score of 4 and above were excluded, the relationships between IQ and extraversion and IQ and lie scores for the 95 girls were still significant, but, at the 0,05 confidence level.

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 480)	:	0,090	0,118	0,150
r (n = 240)	:	0,127	0,167	0,214
r (n = 117)	:	0,182	0,240	0,306
r (n = 95)	:	0,202	0,266	0,340

(D) DISCUSSION OF RESULTS

The results of the total group of boys and girls combined suggested that the more extraverted subjects had significantly higher IQ than the less extraverted subjects. However, when the sexes were separated, the results indicated that it was only among the girls that there was a significant positive relationship between extraversion and IQ. Therefore, the significant positive association between extraversion and IQ obtained among the total group of boys and girls combined was due to the significant relationship obtained among the girls. These results are consistent and valid in view of the fact that for the selected group of boys also, there was no significant relationship, while among the selected group of girls, the relationship was still significant, although at a lower level. It can then be accepted that the more extraverted girls have significantly higher IQ's than the less extraverted girls.

The question that arose was "Why should this finding hold for girls but not for boys?" The answers are probably provided by drawing deductions from the following statements made by van den Berghe (1964) and Balkisson (1980).

Culturally, in South Africa, the status of women is relatively highest among Europeans and lowest among Indians, with African women in an intermediate position (van den Berghe, 1964, p. 193). Although the situation is changing under pressure of westernization, Indian culture still ordains that the place of the woman is within the walls of the home. The Indian male is generally the bread-winner and is expected to venture out of the home into the tough world of competition outside to provide the necessities for the family.

According to Balkisson, the Indian female, on the other hand, is generally expected to remain at home and to practise whatever virtues, refinements and skills she may have acquired for the social, cultural and religious enrichment of the home and to rear the children. However, in a male dominated world, the Indian woman and her daughters generally lead a sheltered and restricted existence with fewer opportunities for social, cultural, sporting and religious interactions in the world outside than her husband and her sons (pp. 133 - 134).

From what Van den Berghe and Balkisson have written, one may deduce that among the Indians, the males, because they are generally the bread-winners, are given the educational opportunity to equip themselves for this role. Consequently, introverts and extraverts as well as those with high IQ's and low IQ's are strongly encouraged to remain at school. Therefore, there is no significant relationship between IQ and extraversion. On the other hand, because of male domination, selective drop out due to marriage, parental attitudes towards female education, economic factors, home responsibilities such as domestic chores and cultural stereotypes (Bhana, 1979, p. 50), among the females, it is only the intelligent and those who are prepared to challenge the sex-role that society expects of them and "fight" for what they believe is their right (that is, mainly the extraverts) that remain at school. Thus, among the standard 9 females, the more intelligent, extraverted ones are possibly in the majority.

The results contained in Table LXIV also indicated no significant relationship between neuroticism and IQ for any of the groups. This result is in keeping with the findings of Lynn and Gordon (1961), Farley (1967), Mehryar et al. (1973) and Mohan and Kumar (1973).

The results of the total group of boys and girls combined suggested that the higher lie scorers had significantly lower IQ's than the lower lie scorers. However, when the sexes were separated, the results indicated that it was only among the girls that there was a significant negative relationship between the lie scores and IQ. Therefore, the significant negative relationship between lie scores and IQ, obtained for the total group of boys and girls combined, was due to the significant negative relationship obtained for the girls. These results are consistent and valid in view of the fact that, for the selected group of boys also, there was no significant relationship, while among the selected group of girls, the negative relationship was still significant, although at a lower level. One may accept then, that the girls with higher lie scores have significantly lower IQ's than girls with lower lie scores.

(E) CONCLUSION

The results of this study revealed that, among girls, the more extraverted have significantly higher IQ's than the less extraverted. Therefore, the hypothesis that there is a significant relationship between introversion-extraversion and IQ, stated on p. 54, was confirmed only for girls. It was not confirmed for boys and the significant relationship observed for the total combined group of boys and girls could be attributed to the significant relationship obtained among the girls.

Also, among girls, the higher lie scorers have significantly lower IQ's than the lower lie scorers.

The subject of the next chapter is extraversion, neuroticism and lie scores in relation to family background. There, the following hypotheses, mentioned in Chapter One (p. 55), will be tested:-

(a) There is a significant difference in introversion-extraversion between subjects of high and low socio-economic status.

(b) There is a significant difference in introversion-extraversion between subjects from large and small families.

(c) There is a significant difference in the amount of parental interest shown in the academic standing of introverted and extraverted children.

(d) There is a significant relationship between introversion-extraversion and birth order.

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CHAPTER NINE

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO FAMILY BACKGROUND

In this study the global term "family background" is used to include the aspects of socio-economic status, family size, parental interest in the child's academic standing and birth order of the child.

(I) EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO SOCIO-ECONOMIC STATUS

(A) REVIEW OF THE LITERATURE

The work of Eysenck (1958) in connection with standardization studies of the short and long scales of the MPI has suggested that, according to their questionnaire responses, working-class subjects were slightly more neurotic than middle-class subjects.

Eysenck (1960b)conducted a factor-analytic study of the responses of a quota sample of 1 000 English subjects to a five-part 29-item questionnaire. Included in the factor analysis were also the class (middle versus working class) and sex of respondents. Social class was found to have negligible relationships to extraversion and neuroticism (p. 54).

In order to study, inter alia, the distribution of introversion-extraversion and neuroticism scores among the children of parents from different social classes, Child (1966) administered the JMPI (Furneaux and Gibson, 1961) to 324 school children, ranging in age from 11 to 14 years, from social classes 1 (professional and managerial occupations) to V

(skilled manual), according to the Registrar General's Classification of Occupations[1] (General Register Office, 1960).

A comparison of the mean extraversion scores showed that the Class I mean was significantly lower than the Class II ($p < 0,05$), the Class III non-manual ($p < 0,01$), the Class III manual ($p < 0,001$) and the Class IV ($p < 0,01$). The Class V mean was significantly lower than Class III manual ($p < 0,05$). A comparison of the mean neuroticism scores showed that there were no significant differences between the groups with regard to neuroticism (p. 197).

The results of the study indicated that, within the limits of the samples chosen, the children of professional and managerial parents, on the one hand, and those of unskilled workers, on the other, were significantly introverted when compared with the children of skilled manual workers (p. 198).

Another study by Child (1969) attempted to inter-relate, among other things, the personality traits of introversion-extraversion with the social class background of arts and social science students, on the one hand, and science and technology students, on the other. In order to do this, 504 men and 103 women freshers at the University of Bradford were administered the EPI (Eysenck and Eysenck, 1964a).

The mean extraversion and neuroticism scores for students from various social class backgrounds were considered in two ways. In the first place, when students were grouped according to their subject choices, the only significant distinction occurred between the means of Class I and

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1 Registrar-General's Scale of Occupations : (1) Professional occupations, (2) Semi-professional and managerial, (3) Clerical and skilled non-manual, (4) Highly skilled manual, (5) Skilled manual, (6) Semi-skilled manual, (7) Unskilled manual (Entwistle and Entwistle, 1969, p. 58).

and Class IV & V[1] for science and technology students (z = 2,10; p < 0,05). Class I had the lower score. Although the trend was for the extraversion scores to decrease from Class I to Class IV and V in both the arts and science data, statistical significance was not reached. Child pointed out that these results supported Eysenck's researches with adult samples. However, compared with the scores of Eysenck's students, it appears that Bradford's science and technology students from middle class backgrounds were more extraverted (Class II: z = 2,26; p < 0,05) and less neurotic (Class I: z = 2,27; p < 0,05).

In the second instance, an analysis of scores for different specialist fields within each class revealed that arts and social science undergraduates from professional and managerial homes were significantly more neurotic than their counterparts in science and technology (Class I: z = 2,30; Class II: z = 2,00; both p < 0,05) (p. 44).

The study by Eysenck and Eysenck (1969b), quoted on p. 163, produced evidence that Classes I (upper middle-class) and II (middle class) were somewhat less extraverted (11,66 for males and 12,05 for females) than the lower middle-class and the skilled, semi-skilled and unskilled working-classes (range for males = 13,03 - 13,28; range for females = 12,45 - 12,57). The trend toward middle-class introversion appeared in both sexes but was stronger in males (p. 70).

Eysenck and Eysenck (1969b) also found that the middle class groups (6,76 for males and 7,80 for females) had significantly lower N scores than the other classes (range for males = 7,28 - 8,39; range for females = 7,84 - 9,07). For these groups there was no obvious trend (p. 74).

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[1] Classification according to the Registrar General's Scale of Occupations.

Eysenck and Eysenck summarized their findings by pointing out that middle class people were low on both E and N.

In order to study, inter alia, the relationship between introversion-extraversion and parental occupation, Eysenck and Cookson (1970) administered the JEPI to 4000 eleven-year-old boys and girls. They rated the parental occupations from high (1) to low (5).

The researchers found that high occupational status was encountered more frequently in the parents of extraverted children ($p < 0{,}001$) and of low N-children ($p < 0{,}001$). This suggested that the stable extraverts came from more affluent homes. Eysenck and Cookson concluded that extraverted and neurotic children tended to come from high- and low-status families, respectively.

Robertson (1971) conducted a survey among 297 fourteen- and fifteen-year old Edinburgh boys from different social backgrounds to test the hypothesis that the relationship between birth order and personality development varied by social class. The subjects were administered Cattell's High School Personality Questionnaire. The results supported the hypothesis, with differences emerging particularly between middle-class and lower-working-class boys. Only sons from lower working-class homes were found to be more significantly anxious and more introverted than their late-born counterparts, whereas among middle-class boys this pattern was reversed, with only and first-born boys being significantly less anxious and somewhat more extraverted than late-borns. Only sons of middle class families were found to be significantly less anxious than only lower-working-class boys, while lower-working-class late-born were significantly more extraverted and less neurotic than middle-class late-born boys.

In an experiment, already described on p. 170, Koul (1976) studied, inter alia, differences in extraversion and neuroticism among boys and girls of high and low socio-economic status. He found that subjects in the higher socio-economic bracket were more extraverted than those in the lower.

The foregoing studies on the relationship between extraversion and socio-economic status indicate that the research findings are somewhat contradictory. On these variables, Child (1969) found no significant differences among Classes I - V; Eysenck (1960b)obtained negligible relationships; Eysenck and Eysenck (1969b)found middle-class subjects to be low on extraversion; and Eysenck and Cookson (1970) concluded that extraverted children tended to come from high-status families.

The literature on the relationship between neuroticism and socio-economic status is not entirely unequivocal. Subsequent findings (Eysenck and Eysenck, 1969b; Eysenck and Cookson, 1970) have corroborated the original evidence of Eysenck (1958), namely, that working-class subjects are more neurotic than middle-class subjects. The greater mental stability of the middle-class subjects,as compared with the working class,is not surprising in view of epidemiological evidence (Hock and Zubin, 1961). Eysenck's study is the only one that has produced slightly different results.

It is very likely that widely differing findings have been obtained partly because the various studies may have adopted different criteria for socio-economic classification.

(B) METHOD

The relationships between socio-economic status, on the one hand, and extraversion, neuroticism and lie scores, on the other, were tested among high school and university students.

The method adopted with high-school subjects has already been outlined in Chapter Six. The method employed with Chemistry I, English I and Psychology I students has been outlined in Chapter Seven. In addition, 60 first-year university male[1] students (mean age=18,21 years) from the Department of Engineering and 60 first-year male students (mean age = 18,20 years) from the Faculty of Education, were also tested.

(C) RESULTS

The results of the comparisons of the high and low socio-economic status groups on extraversion, neuroticism and lie scores among high school students are presented in Tables XXXII to XXXVII. In Tables XXXII and XXXIII it can be seen that, for the total and selected groups ($F=2,858$; $p > 0,05$, and $F = 0,0003$; $p > 0,05$, respectively), there were no significant differences between the high and low status groups in extraversion. Tables XXXIV and XXXV indicate that, for the total and selected groups ($F = 0,264$; $p > 0,05$ and $F = 0,0002$; $p > 0,05$, respectively), there were no significant differences between the high and low socio-economic groups in neuroticism. These two status groups also did not differ significantly on the lie scores, as recorded for the total group in Table XXXVI ($F = 0,222$; $p > 0,05$) and for the selected group in Table XXXVII ($F = 0,003$; $p > 0,05$).

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[1] The reason for excluding females is given in the footnote on p. 334.

For the total and selected groups, the results of the comparisons of the high- and low-status groups in extraversion among Chemistry I, English I, Psychology I and first-year engineering and education university students are presented in Tables XLI, XLII, XLIX, L, LVII, LVIII, CV and CVI, respectively. It is evident from these tables that there were no significant differences in extraversion between the high and low class Chemistry I (total group: $F = 0,185$, $p > 0,05$; selected group : $F = 0,027$, $p > 0,05$), English I (total group : $F = 0,354$, $p > 0,05$; selected group: $F = 0,068$, $p > 0,05$) and Psychology I students (total group : $F = 1,026$, $p > 0,05$; selected group: $F = 0,532$, $p > 0,05$) as well as the male first-year education and engineering subjects (total group: $F = 0,194$, $p > 0,05$; selected group : $F = 0,019$, $p > 0,05$).

For both the total and selected groups of university students, the results of the comparisons between the high- and low-status groups on neuroticism are given in Tables XLIII, XLIV, LI, LII, LIX, LX, CVII and CVIII. No significant differences in neuroticism were noticed between the status groups among Chemistry I ($F = 0,001$, $p > 0,05$ (total group); $F = 1,230$, $p > 0,05$ (selected group)), English I ($F = 1,569$, $p > 0,05$ (total group); $F = 1,663$, $p > 0,05$ (selected group)), Psychology I ($F = 1,066$, $p > 0,05$ (total group); $F = 0,685$, $p > 0,05$ (selected group)) and a group of male first-year education and engineering students ($F = 0,076$, $p > 0,05$ (total group); $F = 0,311$, $p > 0,05$ (selected group)).

For the total and selected groups, Tables XLV, XLVI, LIII, LIV, LXI, LXII, CIX and CX give the results of the comparisons between the high and low socio-economic status groups among university students on the L-score. No significant differences were observed between the two

status groups among Chemistry I ($F = 0,477$, $p > 0,05$ (total group); $F = 0,082$, $p > 0,05$ (selected group)), Psychology I ($F = 0,019$, $p > 0,05$ (total group); $F = 0,028$, $p > 0,05$ (selected group)) and the group of male first-year education and engineering students ($F = 0,059$, $p > 0,05$ (total group); $F = 0,105$, $p > 0,05$ (selected group).
A significant difference in lie scores between the high- and low-status groups among the total group of English I students was noticed ($F = 5,295$, $p < 0,05$). The high-status group had a higher lie score ($\overline{X} = 1,750$) than the low-status group ($\overline{X} = 1,383$). However, the significant difference was no longer evident when the high lie scorers were excluded ($F=1,243$, $p> 0,05$).

(D) CONCLUSION

No significant difference in extraversion between the high and low socio-economic status groups was observed either among standard 9 or first-year university students. The finding by Eysenck and Cookson (1970), that extraverted children tend to come from high-status families, was not confirmed. The hypothesis that there is a significant difference in introversion-extraversion between individuals from high and low-status groups, stated on p. 55, was not upheld.

(II) EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO FAMILY SIZE

(A) REVIEW OF THE LITERATURE

Eysenck and Cookson (1970) indicated that there was much agreement on the existence of a small negative correlation between scholastic achievement and mental ability, on the one hand, and family size, on the other. However, with respect to personality variables, they said that the position was more obscure and they cited a number of studies to support their point of view. Further, they pointed out that hardly any of the studies had

shed light on the extraversion and neuroticism variables in relation to family size (p. 117).

A review of the literature subsequent to 1970 revealed that no further studies on the relationship between extraversion and neuroticism, on the one hand, and family size, on the other, have been conducted.

In order to examine the relationship mentioned above, Eysenck and Cookson (1970) administered the JEPI to some 4000 eleven-year-old boys and girls. Both analysis of variance and product-moment correlation were used to interpret the results.

By ANOVA, they found extraversion to be highly significant statistically ($p < 0,001$). Sex had a significant p value ($< 0,05$), as had the sex X neuroticism X extraversion interaction ($p < 0,05$). The results suggested that the more extraverted children tended to come from smaller families (p. 118).

The correlations between extraversion and family size (-0,11; $p < 0,001$[1] for the 1869 boys and -0,11; $p < 0,001$[1] for the 2162 girls) indicated that children from the larger families were more introverted (p. 121). This corroborated the results obtained by the analysis of variance method.

According to Eysenck and Cookson (1970), the correlations between neuroticism and family size (0,09 ; $p < 0,001$[1] for boys and 0,08; $p < 0,001$[1] for girls) suggested that children from larger families

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[1] The probability levels given below were computed by the present researcher by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 1869)	:	0,045	0,060	0,076
r (n = 2162)	:	0,042	0,056	0,071

were also more neurotic. The authors pointed out that the correlations were very small indeed but that they supported the results from the analyses of variance (p. 121).

The authors concluded that extraverted children tended to come from smaller families and neurotic children from larger families.

(B) METHOD

The researchers, quoted above, did not specify whether they used nuclear (immediate)[1] or extended[2] families as samples. The present study was conducted among Indians and in view of the fact that both nuclear and extended family systems exist in the community, the number of members in both types of families was taken into consideration.

The total high school sample, 240 boys and 240 girls, has already been described in Chapter Six. The selected high school sample comprised 117 boys and 95 girls. There were 575 first-year students from the Departments of Chemistry, English and Psychology in the total university sample (mean age= 18,37 years; S.D.=0,873). They comprised 287 males (mean age=18,50 years; S.D.=0,747) and 288 females (mean age=18,24 years; S.D.=0,966). The selected university sample comprised 138 males and 138 females.

For both the high school and university samples, Pearson product-moment correlations were calculated between the extraversion, neuroticism and lie scores of the subjects, on the one hand, and the size of their immediate and extended families (which they had indicated on the biographical questionnaire), on the other.

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1 nuclear (immediate) family : included only father, mother, brothers, sisters and self (Appendix A : Biographical).

2 extended family : included not only members of nuclear family but others also, e.g., uncles, cousins, grandmother, nephews, nieces, etc., living in the same house (Appendix A : Biographical).

(C) RESULTS

Table LXV presents the correlations between extraversion, neuroticism and lie scores, on the one hand, and size of immediate family, on the other, for both the total and selected groups of high school students.

TABLE LXV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN IMMEDIATE FAMILY SIZE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF HIGH SCHOOL STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)	
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys	N = 95 Girls
E	- 0,064	- 0,041	- 0,089	0,002	- 0,238*
N	- 0,043	- 0,026	- 0,039	- 0,052	- 0,022
L	0,079	- 0,005	0,162	- 0,067	0,035

The results indicate that, among the total group of high school girls, there is a correlation of 0,162 ($p < 0,05$) between their lie scores and the size of their immediate families. This relationship, which suggests that higher lie scorers tend to come from larger families, is doubtful in view of the fact that it does not hold for the selected group.

The results also indicate that, among the selected group of high school girls, the more extraverted tend to come from smaller families ($p < 0,05$).

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[1] The probability levels for N = 480, 240, 117 and 95 are given in the footnote on p. 199.

Table LXVI presents the correlations between extraversion, neuroticism and lie scores, on the one hand, and size of extended family, on the other, for both the total and selected groups of university students.

TABLE LXVI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN IMMEDIATE FAMILY SIZE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF UNIVERSITY STUDENTS[1]

	Including L scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 287 males; 288 Females	N = 287 Males	N = 288 Females	N = 138 Males; 138 Females	N = 138 Males	N = 138 Females
E	- 0,110**	-0,138*	- 0,083	- 0,136*	-0,216*	- 0,059
N	0,041	0,074	0,018	0,112	0,171*	0,048
L	0,090*	0,101	0,072	0,042	0,096	-0,016

The results indicate that, for the group of university males and females combined, there is a correlation between extraversion and size of immediate family of - 0,110 ($p < 0,01$) for the total group and - 0,136 ($p < 0,05$) for the selected group. Also, for the males, there is a correlation between the same two variables of - 0,138 ($p < 0,05$) for the total group and - 0,216 ($p < 0,05$) for the selected group. These results indicate that, in both the group of university males and females combined and the group of university males, the more

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 575)	:	0,082	0,108	0,138
r (n = 287)	:	0,116	0,153	0,195
r (n = 288)	:	0,116	0,152	0,195
r (n = 276)	:	0,118	0,156	0,199
r (n = 138)	:	0,168	0,220	0,282

extraverted individuals tend to come from smaller families.

The results also indicate that, while there is no significant relationship between neuroticism and size of immediate family for the total group of males, the relationship attains significance for the selected group of males ($r = 0,171$; $p < 0,05$). This indicates that, among males, the more neurotic individuals hail from larger immediate families.

The relationship between the lie scores and the size of the immediate family is significant for the total group of males and females ($r = 0,090$; $p < 0,05$) but not for the selected group. This result is, therefore, equivocal.

Table LXVII presents the correlations between extraversion, neuroticism and lie scores, on the one hand, and size of extended family, on the other, for the total and selected groups of high school students.

TABLE LXVII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN EXTENDED FAMILY SIZE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF HIGH SCHOOL STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)	
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys	N = 95 Girls
E	- 0,023	- 0,026	- 0,025	0,061	- 0,083
N	- 0,109*	- 0,087	- 0,109	- 0,145	- 0,137
L	0,086	0,074	0,086	- 0,023	0,117

[1] The probability levels for N = 480, 240, 117 and 95 are given in the footnote on p. 199.

The results indicate, that for the total group of high school students, there was a significant negative correlation of - 0,109 ($p < 0,05$) between neuroticism and size of extended family. This suggests that a significantly greater number of more neurotic high school students, as compared with the less neurotic, tend to come from smaller extended families.

Table LXVIII presents the correlations between extraversion, neuroticism and lie scores, on the one hand, and size of extended family, on the other, for the total and selected groups of university students.

TABLE LXVIII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN EXTENDED FAMILY SIZE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF UNIVERSITY STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 287 Males; 288 Females	N = 287 Males	N = 288 Females	N = 138 Males 138 Females	N = 138 Males	N = 138 Females
E	- 0,056	- 0,040	- 0,077	- 0,016	- 0,037	0,007
N	0,028	0,049	0,018	0,097	0,127	0,060
L	0,067	0,097	0,024	0,099	0,141	0,050

There were no significant relationships between size of extended family and extraversion, neuroticism and lie scores among the total and selected groups of university students.

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[1] The probability levels for N = 575, 287, 288, 276 and 138 are given on p. 215.

(D) DISCUSSION OF RESULTS

The results indicate that the more extraverted high school girls tend to come from smaller immediate families, or, in other words, the more introverted girls tend to come from larger immediate families. A possible explanation of this phenomenon could be that there is a greater probability that there would be more males, who are naturally more aggressive and dominating than females (Hurlock, 1968), in a larger family than in a smaller family. The presence of more males (and, therefore, more aggression and domination) could cause the females to withdraw and adopt other similar introverted tendencies. In smaller families, where there are probably fewer males, the females have a better chance of developing and displaying extraverted behaviour.

It is interesting to note that the above-mentioned relationship between extraversion and size of immediate family among high school females does not hold for university females. A possible explanation for this result is that there are more extraverted females among the university sample of females when compared with the high school sample (mean E scores = 14,268 and 12,500, respectively).

The results reflected in Table LXVI indicate that, among university students, while there is no significant relationship between extraversion and the size of the immediate family among females, the more extraverted males tend to come from smaller families. It would seem that, among university males, the competition and other pressures within larger families result in their becoming introverted. However, within smaller families, they tend more toward extraversion.

The finding that, among university students, the more neurotic tend to come from larger families is in agreement with results obtained by Eysenck and Cookson (1970, p. 128) among primary school children.

(E) CONCLUSION

The hypothesis that family size is a determinant of introversion-extraversion (vide p. 55) was confirmed for high school girls, the combined group of university males and females and the separate group of university males, when the size of the immediate family was considered. However, the hypothesis was not upheld for these same groups when the size of the extended family was taken into account.

(III) EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO PARENTAL INTEREST IN THE CHILD'S ACADEMIC STANDING

(A) REVIEW OF THE LITERATURE

The study by Eysenck and Cookson (1970), described earlier (p. 207), also investigated the relationship between extraversion and parental interest in children's progress at school. Teachers rated the degree of interest shown by parents in their children's progress on a four-point scale from 1 (highest interest) to 4 (lowest interest). Parental interest showed a slight sex effect ($p < 0,05$), with females receiving greater parental interest. The researchers found that extraversion bore a very significant relationship ($p < 0,001$) to parental interest. They concluded that parents showed more interest in extraverted than introverted children and this relationship was more clearly expressed for the girls than for the boys, as evidenced by a very significant sex by extraversion interaction ($p < 0,001$).

No report was found of any investigation into the relationship between neuroticism and parental interest in their children's academic standing.

The literature contains no other study of the relationship between parents' interest in their children's academic standing and extraversion, neuroticism and lie scores.

(B) METHOD

From the 480 high school subjects mentioned in Chapter Six, 13 boys and 12 girls were excluded from the study investigating the fathers' interest in the subjects' academic standing since the latter were unable to rate their fathers' interest because they were very young when their fathers died. For a similar reason, another 2 boys and 1 girl were excluded from the study investigating the mothers' interest in the subjects' academic standing.

It has already been pointed out that, when the high lie scorers were excluded from the high school sample, 117 boys and 95 girls remained. Four boys and 5 girls were excluded from this sample because they were unable to rate their fathers' interest in their academic standing since they were very young when their fathers passed away. For a similar reason, 1 boy and 1 girl were excluded from the study investigating their mothers' interest in their academic standing.

Altogether 575 university students comprising 287 males and 288 females were available. Nineteen males and 11 females were excluded from the study because they were unable to rate their fathers' interest in their academic standing since they were very young when their fathers passed away. For a similar reason, 1 male and 1 female were excluded from the study investigating their mothers' interest in their academic standing.

As pointed out earlier, when the high lie scorers were excluded from the university group, the sample was reduced to 138 males and 138 females. From this sample, 11 males and 6 females were excluded on account of the fact they were unable to rate their fathers' interest in their academic standing because they were very young when their fathers passed away. For a similar reason, 1 female was excluded from the study investigating the mothers' interest in their childrens' academic standing.

Each subject rated his father's and mother's interest in his academic standing on a 7-point scale marked "very interested", "interested", "somewhat interested", "neither interested nor uninterested", "somewhat interested", "uninterested" and "very uninterested". This rating was correlated with the extraversion, neuroticism and lie scores.

(C) RESULTS

Table LXIX presents the correlations between extraversion, neuroticism, and lie scores, on the one hand, and fathers' interest in the high school children's academic standing, on the other, for both the total and selected groups.

TABLE LXIX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN FATHERS' INTEREST IN HIGH SCHOOL CHILDREN'S ACADEMIC STANDING AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N=227 Boys; 228 Girls	N = 227 Boys	N = 228 Girls	N=113 Boys; 90 Girls	N = 113 Boys	N = 90 Girls
E	0,527***	0,529***	0,514***	0,449***	0,335***	0,505***
N	0,423***	0,385***	0,438***	0,447***	0,323***	0,520***
L	0,436***	0,446***	0,434***	0,314***	0,189*	0,409***

It will be noted that all the relationships, except the one between lie scores and fathers' interest in their children's academic standing for the selected group ($p < 0,05$), are significant beyond the 0,001 level.

Table LXX presents the correlations between extraversion, neuroticism and lie scores, on the one hand, the fathers' interest in the academic standing of the children attending university, on the other, for both the total and selected groups.

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 455)	:	0,092	0,121	0,155
r (n = 227)	:	0,130	0,172	0,220
r (n = 228)	:	0,130	0,171	0,219
r (n = 203)	:	0,138	0,182	0,232
r (n = 113)	:	0,185	0,244	0,312
r (n = 90)	:	0,208	0,274	0,350

TABLE LXX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN FATHERS' INTEREST IN UNIVERSITY CHILDREN'S ACADEMIC STANDING AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N=268 Males; 277 Females	N = 268 Males	N = 277 Females	N= 127 Males 132 Females	N = 127 Males	N = 132 Females
E	0,534***	0,595***	0,446***	0,580***	0,630***	0,480***
N	0,429***	0,431***	0,390***	0,492***	0,497***	0,446***
L	0,322***	0,368***	0,256***	0,411***	0,412***	0,369***

Table LXX indicates that all the relationships between fathers' interest in the university children's academic standing, on the one hand, and extraversion, neuroticism and lie scores, on the other, are significant well beyond the 0,001 level of confidence for both the total and selected groups of university students.

Table LXXI presents the correlations between extraversion, neuroticism and lie scores, on the one hand, and mothers' interest in the high school children's academic standing, on the other, for both the total and selected groups.

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 545)	:	0,084	0,111	0,141
r (n = 268)	:	0,120	0,158	0,202
r (n = 277)	:	0,118	0,155	0,199
r (n = 259)	:	0,122	0,161	0,205
r (n = 127)	:	0,175	0,230	0,294
r (n = 132)	:	0,171	0,225	0,288

TABLE LXXI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN MOTHERS' INTEREST IN HIGH SCHOOL CHILDREN'S ACADEMIC STANDING AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N=238 Boys; 239 Girls	N = 238 Boys	N = 239 Girls	N=116 Boys; 94 Girls	N = 116 Boys	N = 94 Girls
E	0,138***	0,112	0,076	0,203***	0,028	0,202
N	0,032	- 0,046	- 0,015	0,082	- 0,055	0,003
L	0,124***	0,122	0,090	0,108	0,075	- 0,002

It is evident that, for the group of boys and girls combined in both the total and selected groups, there is a significant positive correlation ($p < 0,01$) between mothers' interest in the children's academic standing and extraversion. Also, while the relationship between the lie scores and the mothers' interest in the children's academic standing is significant for the total group of boys and girls combined ($p < 0,01$), it is not for the selected group.

The following table gives the correlation coefficients of the relationships between mothers' interest in the academic standing of the children attending university, on the one hand, and extraversion, neuroticism and lie scores, on the other, for both the total and selected groups.

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 477)	:	0,090	0,118	0,151
r (n = 238)	:	0,127	0,168	0,214
r (n = 239)	:	0,127	0,167	0,214
r (n = 210)	:	0,136	0,178	0,228
r (n = 116)	:	0,183	0,241	0,308
r (n = 94)	:	0,203	0,268	0,342

TABLE LXXII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN MOTHERS' INTEREST IN UNIVERSITY CHILDREN'S ACADEMIC STANDING AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N=286 Males; 287 Females	N = 286 Males	N = 287 Females	N=138 Males; 137 Females	N = 138 Males	N = 137 Females
E	0,126**	0,105	0,074	0,071	0,129	0,011
N	0,050	0,018	- 0,001	0,017	0,028	- 0,003
L	0,019	- 0,042	0,041	- 0,020	- 0,144	0,117

The results indicate that, in the total group, there is a significant relationship ($p < 0,01$) between extraversion and mothers' interest in the academic standing of the children attending university for the whole group of males and females. However, this relationship does not hold for the selected group.

(D) DISCUSSION OF RESULTS

It must be pointed out that although the present researcher investigated both the mothers' and fathers' interest in the children's academic attainment, the respondents to the questionnaires were the children So, it was the children's opinion of their parents' interest in their academic attainment that was measured.

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 573)	:	0,082	0,108	0,138
r (n = 286)	:	0,116	0,153	0,196
r (n = 287)	:	0,116	0,153	0,196
r (n = 275)	:	0,118	0,156	0,199
r (n = 138)	:	0,168	0,220	0,282
r (n = 137)	:	0,168	0,221	0,283

It is interesting to note that, in both the total and selected groups of high school and university students, the more extraverted subjects, in comparison with the less extraverted ones, see the fathers as being significantly more interested in their academic attainment. On the other hand, there is no significant relationship between extraversion and mothers' interest in the children's academic attainment for both the total and selected groups of high school and university students.

It is very likely that the different results with regard to fathers' and mothers' interest in the children's academic attainment could be explained in terms of communication and interaction patterns. Since fathers are usually more authoritarian than mothers, it is the more extraverted children who will be able to communicate and interact with the fathers better than the less extraverted and, consequently, feel that the fathers are interested in their academic attainment. On the other hand, the less extraverted children, because of their inherent inability to communicate adequately, view the fathers as lacking interest in their academic attainment. This phenomenon could account for the highly significant positive relationship between extraversion and fathers' interest in the children's academic attainment.

In comparison with fathers, mothers are generally more docile, less authoritarian, more tender and more loving. This implies that both the more extraverted and less extraverted subjects are able to communicate equally well with mother. Therefore, both the less extraverted and the more extraverted feel that mother is interested in their academic attainment. Hence, a lack of a significant relationship between extraversion and mother's interest in the children's academic attainment.

(E) CONCLUSION

From the results given above, it may be concluded that the more extraverted high school and university males and females perceive their fathers as being interested in their academic attainment, but not so their mothers.

The hypothesis that the degree of parental interest in the academic attainment of their children, as reported by the pupils themselves, differed significantly for introverted and extraverted children, was upheld in the case of fathers, but not in the case of mothers.

(IV) EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO BIRTH ORDER

(A) REVIEW OF THE LITERATURE

As early as 1936, Stagner and Katzoff concluded, on the basis of personality inventory data, that "the effect of the family constellation should be considered as only a small portion of the continuous interaction which determines personality" (p. 346). Among other aspects, subsequent investigations have tried to shed more light on the relationship between the personality characteristics of introversion-extraversion and birth order.

Hillinger (1958) tested the hypothesis that first-born children are more introverted than later-born ones. Parents rated their own children on 15 items on the introversion-extraversion scale of Mittenecker and Toman's PI-test. The validity of the test for this purpose had been established prior to the experiment proper. Hillinger found that first-born children tended to be significantly more introverted than later-born and only children.

In a review of "antecedents and outcomes" of ordinal birth position, Sampson (1965) concluded that there was conflicting evidence at best concerning sibling position and need affiliation as principally measured by projective techniques, such as the Thematic Apperception Test, or by the Edward's Personal Preference Schedule. Sampson noted, however, that several authors who used behavioural manifestations of socialibility (Bossard and Boll, 1955; Busemann, 1928; Singer, 1964; Stotland and Walsh, 1963) found that the first-born was more introverted than the later-born child.

Commensurate with the above data, Siegelman (1968) has written that only children in his earlier study (Siegelman, 1966) were rated more withdrawn than children who had siblings ($r = -0,38$; $p < 0,01$; $N = 52$ boys). Further, Siegelman (1968, p. 87) stated that,in unpublished material collected on college students, he also found similar results. For 296 females, being the only child, or oldest sibling with the greatest number of younger brothers and sisters, was accompanied by introversion on the 16 Personality Factor Questionnaire, while the second-born and girls with many older brothers and sisters were inclined toward extraversion. The 153 male students in the college group with the greatest number of younger brothers and sisters scored high on introversion, and the men with the fewest number of younger siblings depicted themselves as extraverted (p. 87).

The study by Robertson (1971), described on p. 207, tested the hypothesis that the relationship between birth order and personality development varied by social class. Since the results relating to birth order could not be discussed separately from social class, they have already been presented in the section entitled "Extraversion, Neuroticism and Lie Scores in Relation to Socio-economic Status" of the present report and will not be repeated here.

Farley (1975) pointed out that first-born children have generally been shown to achieve better academically than later-born ones; they more frequently attended college and attained eminence. They were also generally more conforming, more achievement motivated, more affiliation motivated and might differ from later-born children in other personality characteristics (p. 151).

However, the picture is not as clear as the foregoing statement by Farley might suggest in that a simple comparison of the first- and later-born children, without control over family size, sibling age separation and sex of siblings, has,in all likelihood,masked many subtle ordinal birth position effects or suggested birth order effects that might be attributable to family size. Thus, for example, it would now appear that the greater conformity of first-over later-born children is restricted to comparisons with certain kinds of later-born children who have certain sibling constellations where sex is concerned (Farley, 1975). In addition, some of the relationships with achievement and achievement-motivation depend on more subtle family structure characteristics than simple birth order per se.

Because of the likely significant role of ordinal birth position in personality development and the importance for personality analysis of Eysenck's (1970) two-dimensional system of extraversion and neuroticism, Farley (1975) deemed it reasonable to consider whether these dimensions were functionally related to birth order. His study examined birth order variance in introversion-extraversion and neuroticism, with control over family size and sibling age and sex separation,using two-sibling families and a minimum sibling age separation of five years.

Farley's subjects were 141 females from the University of Winsconsin introductory (undergraduate) classes in "learning and human abilities" who met the requirements relating to birth order, family size and sibling age separation.

The following birth order categories, with the number of subjects in parentheses, were used : female only child (46); first born with male sibling (30); first born with female sibling (28); second born with male sibling (25); and second born with female sibling (12).

Farley's(1975) results indicated that very little variation in scores for either personality dimension would seem to be attributable to birth order. A one-way analysis of variance was applied to each set of scores. Where introversion-extraversion was concerned, an F of 0,61 ($df = 4, 136$; $p > 0,05$) was obtained, while,for neuroticism,the F was 0,59 ($df = 4, 136$; $p > 0,05$), clearly indicating no significant effects of birth order (p. 152).

Farley concluded that his results strongly supported the notion, within the limits of the sample and birth order categories, that introversion-extraversion and neuroticism in females were not a significant function of familial structure as represented in birth position (p. 152). It is not known whether this negative result would generalize to male respondents.

McCormick and Baer (1975) pointed out that,although most studies of birth order suggested that first-born children differed in personality from their younger siblings, a common limitation of these studies was the failure to control for the number of children in the family. Since the two-child family is now so common, the study by McCormick and Baer focused on this group. The frequently observed

personality differences between siblings in these families raised the question of whether an individual's sex, his birth order, or his sibling's sex contributed to the traits of extraversion or neuroticism.

McCormick and Baer (1975) postulated the general hypothesis that older children in a two-child family would manifest lower extraversion and higher neuroticism than their younger siblings.

A sample of 120 white college students from two-children families with both parents living was secured from an introductory psychology course. The age of the subjects, 61 males and 59 females, ranged from 17 to 22 years. Only subjects with age space from sibling of less than 6 years were considered eligible for selection.

The Eysenck Personality Inventory, Form A, was used to measure the traits of extraversion and neuroticism. The Lie Scale was employed to screen out individuals who presented too positive an image of themselves.

Results of the two-way analysis of variance between sex of subject and birth order for the extraversion scores indicated that a significant interaction occurred between these two effects ($F = 9{,}27$; $df = 1, 116$; $p < 0{,}01$), with first-born males and second-born females exhibiting higher extraversion. The data, therefore, suggested that first-born males and second-born females were more extraverted than their siblings, in two-child families.

An analysis of sex of siblings (opposite or same) by birth order gave a significant main effect of sex of siblings for the neuroticism scores ($F = 4{,}02$; $df = 1, 116$; $p < 0{,}05$). The source of the effect lies primarily with the first-born children. Those with an opposite-sexed sibling had the higher, while those with a same-sexed sibling, the lower, neuroticism score.

The foregoing empirical data suggest that first-born children are more introverted than later-born ones, (Hillinger, 1958; Sampson, 1965); that only children are more withdrawn than children who have siblings (Siegelman, 1966); the variation in extraversion and neuroticism scores among females cannot be attributed to birth order (Farley, 1975); first-born males and second-born females are more extraverted than their siblings in two-children families (McCormick and Baer, 1975); and that the relationship between birth order and personality development varies by social class (Robertson, 1971).

(B) METHOD

The high school sample of 480 subjects has already been described in Chapter Six. After those students having a lie score of 4 and above were excluded, as explained in Chapter Eight, there were 117 males and 95 females available for this aspect of the research.

The university sample which has been described earlier in this chapter, No. II(B), entitled "Method" on p. 213, was also used.

Birth order was determined from information obtained from question 18, p. 4, of the biographical inventory. In order to determine whether or not there was a relationship between birth order, on the one hand, and extraversion, neuroticism and lie scores, on the other, birth order was correlated (Pearson r) with each of the other three variables.

(C) RESULTS

Table LXXIII presents the correlations for high school students.

TABLE LXXIII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN BIRTH ORDER AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF HIGH SCHOOL STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N =117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,012	0,006	-0,033	- 0,011	0,091	-0,142
N	- 0,032	-0,083	0,047	- 0,005	-0,064	0,136
L	0,036	-0,014	0,079	- 0,044	-0,079	-0,008

The correlation coefficients contained in the table above indicate that none of the relationships is significant.

Table LXXIV presents the correlations for university subjects.

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[1] The probability levels for N = 480, 240, 117 and 95 are given on p. 199.

The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 212)	:	0,135	0,178	0,227

TABLE LXXIV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN BIRTH ORDER AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF UNIVERSITY STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 287 Males; 288 Females	N = 287 Males	N = 288 Females	N = 138 Males; 138 Females	N = 138 Males	N = 138 Females
E	- 0,032	- 0,068	0,005	- 0,073	- 0,202*	0,051
N	- 0,019	0,020	- 0,055	0,059	0,112	0,002
L	0,091*	0,088	0,095	0,036	0,034	0,040

It will be noted from the table above that there is no significant relationship between extraversion and birth order for the total group of males. However, the negative relationship attains significance for the selected group of males, indicating that for this group the earlier-born are less extraverted than later-born children ($p < 0,05$).

The significant relationship between the lie scores and birth order for the total group ($p < 0,05$) is non-significant when this relationship is considered for the selected group.

(D) CONCLUSION

All the results indicate that, except for the selected group of university males, there is no significant relationship between extraversion and birth order.

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[1] See footnote on p.215 for probability levels.

The hypothesis that there is a significant relationship between extraversion and birth order, as stated on p. 55 , was not upheld for all the groups, except for the group of university males.

As indicated previously on page 55 , Chapter Ten will report the investigation of the relationship between extraversion, neuroticism and lie scores, on the one hand, and vocational interest, on the other. It was also previously mentioned (p. 55) that the following hypotheses will be tested:-

(1) There are significant differences between introverts and extraverts with regard to interest expressed in occupations related to the use of language, the arts, social service and business.

(2) There are significant differences between introverts and extraverts in interest in occupations related to science, mechanics and office work.

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CHAPTER TEN

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO VOCATIONAL INTEREST

(A) REVIEW OF THE LITERATURE

Certain personality factors appear to influence the choice of occupation (Sinha, 1966, p. 59). For example, introverts tend to aspire to occupations above their mental level while the opposite trend applies to extraverts (Sevransky, 1964). In a similar vein, Hilgard (1962, p. 470), Whittaker (1970, p. 463) and Furneaux (1962, p. 39) state that the introvert tends to prefer work that keeps him in solitude rather than in close contact with other people, while the extravert tends to choose occupations such as sales, promotional work, or social work, where he deals with people rather than things. It is in keeping with these viewpoints that Morris (1979) concluded that "the personality dimension of extraversion-introversion is a major variable in the study of vocational behaviour" (p. 102). Many studies, most of which will be reviewed below, have been undertaken to determine the relationship between extraversion and neuroticism, on the one hand, and vocational interest, on the other.

Rim (1961) studied, among other things, the relationship between the need for achievement and fear of failure, on the one hand, and extraversion and neuroticism, on the other.

Bendig and Stillman's list of eight job incentives (1958) yielded a need for achievement and a fear of failure score, while Eysenck's questionnaire (1958) was used to measure extraversion and neuroticism. These instruments were administered to 348 engineering students, 323 males and 25 females (age range=18 - 35 years) from the Isreal Institute of Technology.

Although correlations between the overall need achievement and fear of failure, on the one hand, and neuroticism and extraversion, on the other, were not significantly different from zero, some significant differences supporting a relationship were found.

Students scoring low on extraversion,as well as those scoring low on neuroticism,ranked "opportunity to learn new skills" as more important to them, than did high scorers. Students scoring high on neuroticism ranked "good salary" as more important to them than did low scorers. On the other hand, extraverts tended to prefer "fear of failure" incentives (p. 336).

Sinha et al. (1964) employed 120 postgraduate students (age range = 18 - 22 years), randomly selected from different departments of the University of Bihar,in order to test the hypothesis that, given freedom to change vocations, (i) introverts would be more rigid than extraverts, and (ii) ambiverts would be more rigid than extraverts and less rigid than introverts.

Conklin's Extraversion-Introversion Interest Scale (1927) was employed to obtain the extravert, introvert and ambivert groups. A sentence completion test having 20 neutral and 5 vocational items was used to gain information about the vocational aspirations of subjects, while the amount of item-to-item variation of vocational choice gave an inverse measure of rigidity of vocational aspiration.

The results indicated that, with regard to vocational change, introverts were more rigid than extraverts ($p < 0,01$), and ambiverts more rigid than extraverts ($p < 0,01$). Evidence was conflicting with regard to the hypothesis that ambiverts would be less rigid than introverts (p. 90).

It is interesting to compare the findings of Sinha et al. (1964), with regard to vocational change, with Evans' (1973) conclusions concerning occupational aspirations. Among other things, Evans' purpose was to determine the effect of vocational information on the occupational aspiration of students relative to levels of introversion-extraversion. The subjects were introductory psychology students - 110 in the experimental group and 65 in the control group. The Occupational Aspiration Scale (OAS) gave an indication of the occupational aspiration of the students, while the EPI and the MPI indicated the degree of introversion-extraversion.

The experimental group received three weeks of vocational information in the form of lectures, while the control group continued with regular psychology lectures.

At the end of the treatment, the OAS was given to both groups again. The results indicated that, in spite of vocational information, introverts and extraverts did not differ significantly with regard to change in occupational aspiration.

Sinha (1966) tried to ascertain the difference in occupational choice, if any, between introvert and extravert post graduate (N = 100) and undergraduate (N = 100) female students of Patna University.

Eysenck's short version of the MPI, a personal data form eliciting information regarding the subject's educational level and a check list of 27 occupations were administered.

The six most preferred occupations of extravert postgraduate female students (E score above the median), in order of preference, were as follows (the frequency of preference being indicated within brackets):

(i) administrative (38%), (ii) education and teaching (18%), (iii) law (12%), (iv) politics (10%), (v) social service (8%), (vi) journalism (6%). On the other hand, the following occupations, listed in order of preference, were the six most preferred by the introvert female postgraduate students (E score below the median): (i) accountancy (28%), (ii) arts (18%), (iii) banking (14%), (iv) teaching and education (12%), (v) administrative (10%), (vi) judicial service (8%).

About the foregoing results, Sinha (1966) commented: "This striking difference in the occupational preferences of introvert and extravert postgraduate female students, can presumably be ascribed to the tendency of extraverted subjects to choose such occupations as would enable them to fulfil their basic desire to make social contacts with other people" (p. 60).

There was a difference in the occupational preferences of undergraduate introvert and extravert female students. The order in which the extraverts preferred the first six occupations was : (i) administrative (30%), (ii) education and teaching (16%), (iii) journalism (14%), (iv) politics (12%), (v) social welfare (10%), (vi) law (8%).

On the other hand, the introverts showed the following order: (i) arts (30%), (ii) accountancy (20%), (iii) clerical and stenography (16%), (iv) education and teaching (12%), (v) administrative (10%), (vi) judicial service (6%).

Two occupations, namely, administrative and education and teaching were preferred by both the introverts and extraverts among the undergraduates and postgraduates. The preference frequencies for administrative occupations were significantly different between the introverts and extraverts among the two groups, beyond the 0,001 level; the differences in educational choices were not.

Sinha explained the results thus: "The above-mentioned differences in occupational choice can again be explained in terms of the basic desire of the extravert subjects to choose an occupation where maximum social contacts can be made. Accordingly, the extraverts have shown preference for administrative posts three times more than introverts" (p. 61).

Howarth (1969) investigated occupational expectations in relation to introversion-extraversion and asked the following question: "If the subject is given a verbal definition of a major personality dimension, which occupations will he list, and in what order, under that description?"

The description of an extravert from the EPI manual (Eysenck and Eysenck, 1964a)was presented; then the subjects were asked to list occupations which would use or possess those characteristics. The subjects were then presented with the EPI description of an introvert and were asked to list occupations which would fit those characteristics. The subjects were 132 second-year business administration students (mean age = 26 years) comprising 112 males and 20 females. Over 4000 responses were obtained.

The primary characteristics in the first 40 occupations in the extravert list involved interpersonal contact. Some of the occupations listed most frequently were those of salesman, lawyer, radio disc jockey, politician, teacher, public relations, actor, professional athelete, entertainer, nurse, policeman, doctor, social worker, minister, newspaper reporter, store clerk, taxi driver, waiter and waitress, stewardess, television announcer, barber, dentist, advertiser, professor, bartender. Evidently, subjects believed in the social nature of extraversion or they had been led to believe in it by the EPI manual description.

In the introvert list there was a preponderance of occupations which did not involve a large amount of social contact. Some of them, in order of the frequency with which they were mentioned, were those of librarian, accountant, doctor, scientist, research worker, writer, artist, minister, engineer, farmer, teacher, banker, lawyer, mechanic, pilot, dentist, janitor, laboratory technician, musician, secretary, forest ranger, chemist, mortician, policeman, architect, carpenter, night watchman, truck driver, pharmacist, judge.

There may be alternative concepts of the role involved in some items, for example, doctor, teacher, minister, which figure highly in both the list of introverts and extraverts. The main interest may lie in the kind of stereotypes involved and especially the "person contact" stereotype. The social concept of extraversion was only a part of the descriptive picture and yet it seemed to have undue prominence.

The close similarity between what Howarth (1969) found and Johansson (1970) indicated is evident. Johansson said that occupations which were considered characteristic of extraverts, involved contact with people or a sense of "being noticed". Extraverts liked the following occupations more than introverts : politician, interviewing clients, teaching adults and children, taking responsibility, expressing opinions openly regardless of what others say, meeting and directing people (p. 452). Activities which were considered characteristic of introverts consisted of those involving "not being noticed, such as astronomer, dealing with things rather than people, presenting a report in writing rather than verbally, listening to a story rather than telling a story, having a few close friends rather than many acquaintances" (p. 453).

Johansson (1970) pointed out that Darley (1938) and Tyler (1945) found significant correlations between social interest scales and scales of the SVIB. In general, negative correlations were found between scores on the technical and science scales of the SVIB and scores on scales which measured social factors; and positive correlations between scores on the sales and business scales of the SVIB and those on the social scales.

Johansson administered the MMPI and the SVIB to a random sample of 686 male freshmen just prior to their entering the College of Science, Literature and Arts at the University of Minnesota. Introversion-extraversion was measured by the social-introversion scale (Si) of the MMPI.

To develop a scale for the SVIB which would measure introversion-extraversion, 69 items which showed large response differences between the introverts and extraverts (at least 20%) were selected from the 291 SVIB items. The resulting scale was labelled Occupational Introversion-Extraversion (OIE). One hundred and twenty-nine male occupations were scored on this scale.

Occupations listed toward the introverted end of the scale (high scores) were those that dealt with things or involved primarily working alone or independently (farmers, physicists, artists); occupations at the extraverted end (low scores) involved those that dealt with the public (sales, legislators, governors) (p. 454).

Bendig (1971) undertook to provide descriptive data on the relationship of Eysenck's two second-order factors of introversion-extraversion (social activity or social extraversion) and of neuroticism (maladjustment or emotionality) (the terms within the brackets being alternate names for these factors), on the one hand, to certain specific vocational interests and broader areas of interest, on the other.

The MPI, to measure extraversion and neuroticism, and the SVIB, to measure vocational interest, were administered to 234 undergraduate students (115 men and 119 women) enrolled at the University of Pittsburgh and the scores on the SVIB and MPI were correlated.

Bendig reported that 81% of the correlations between the temperament traits of social extraversion and emotionality, on the one hand, and vocational interests, on the other, were significant at the 0,05 level or better and were negative. Only one of the significant positive correlations involved the MPI neuroticism scale. Bendig commented: "This means that we can best describe the strong vocational interests (high scores on the SVIB scales) of subjects scoring low on the MPI E and N scales (the 'introverted' and 'normal' subjects) and can infer only the absence of strong interests in the same vocational areas for subjects scoring high on the temperament scales (the "extraverted" and "neurotic" subjects). The "neurotic" subjects appear to have few, if any, consistent peaks in their SVIB profiles ...."

The hypothesized negative relationship between factor SE and interest in scientific and engineering occupations appeared to have been confirmed by the negative correlations for both sexes between MPI extraversion scores and scales in Strong's areas I (general professional) and II (science and engineering). In addition, the social extraversion scale was negatively correlated with SVIB scales in Strong's area IV (practical) for both sexes. SE was positively correlated with area V (social service) and negatively with areas VIII (business) and III (production manager) for men, while SE was positively correlated with interests in area IX (sales) for women. SE was also negatively related to the Author-Journalist interest scale for both sexes. The emotionality trait, as measured by the MPI neuroticism scale, was negatively correlated

with SVIB scales in areas III (production manager) and VIII (business) for both men and women, and with areas IV (practical) and V (social service) for women.

Social introverts of both sexes indicated more of an interest in the following occupations : architect, physicist, engineer and chemist. However, extraverted women and men had different interests, extraverted men preferring social service occupations and extraverted women preferring sales occupations. Morris (1979) has pointed out that the results obtained with males have been consistent with later studies. However, he has expressed reservations about similar results being obtained with females 20 years later (p. 103).

Studies using the SVIB indicate a moderate preference of introverts for the profession of artist (Morris, 1979, p. 106). These findings are corroborated in a study by Gotz and Gotz (1973), who administered the MPI to students at an art academy. Art teachers were asked to nominate the young adult students with whom they had worked for a minimum of two years for inclusion in either the gifted or ungifted category. Fifty of each were utilized in the study. In addition, 15 of the 50 gifted students were designated highly gifted. The findings indicated that the gifted students were significantly more introverted and more neurotic than the ungifted students and the standard norms. There was no significant difference between the ungifted students and standard normative data on introversion and neuroticism. Furthermore, the 15 highly gifted students were significantly more introverted and more neurotic than the remaining 35 gifted students. Therefore, the relationship of introversion to the degree of creativity among professional art students is clear.

The relationship between interest in the ministry as a vocation and extraversion has been found to be a slight positive but non-significant one, which would seem in many respects to fit the person orientation of extraverts as opposed to introverts (Morris, 1979, p. 107). However, the picture is more complicated as shown in a literature review by Nauss (1973). The studies of theological students and ministers reviewed indicated that ministers actually combined one aspect of extraversion, that is, friendliness, dominance, and sociability, with one aspect of introversion, that is, reflectiveness, introspection, and seriousness. According to Nauss, the profile that resulted from the combination of these characteristics, plus other minor attributes, described the ministerial personality. Along the same line, Carlson and Levy (1973) reasoned that, persons classified as intuitive extraverts on the Myers-Briggs Type Indicator, should be much more likely to be involved in volunteer social service activities than other personality types. In that context, extraversion was described as an empathic responsiveness to others, and intuition was described as an openness to the possibilities of others. They provided striking supportive evidence from a group of 10 black university students who were doing volunteer work in a halfway house for disturbed adolescents, 7 of whom scored in the predicted category. Only 1 of 10 students in a control group was an intuitive extravert. This study must be criticized for the very small sample used, which severely limits the generalization of the results.

Dorr, Cowen, Sandler and Pratt (1973) did not find significant extraversion differences on the OIE Scale, or on an extraversion factor derived from factor analysis of several measures, between adult nonprofessional mental health workers and controls. The workers (females) had been hired to work with children in a school mental health programme.

In two isolated studies, Lester (1976) found no significant differences between white male police officers' means and standard extraversion norms, and Exner, Wylie, Leura and Parrill (1977) found no significant difference between prostitutes and a group of normals. The personality profiles of five groups of prostitutes, assumed to represent a hierarchy in terms of status within the profession, were compared with control groups matched for age, marital status, education, and father's occupational status. The five groups were 25 call girls, 25 in-house prostitutes, 10 basic streetwalkers, 10 daytime street-walking housewives, and 10 streetwalkers who were also addicted to drugs. The personality assessment of each subject was conducted by a female experimenter. Both the MMPI and the Rorschach Inkblot Test were administered. The general conclusions were that the basic streetwalkers seemed more immature and dependent than their controls, and more so than their higher class associates. The streetwalking addicts and the streetwalking housewives showed more signs of psychopathology. On the social introversion scale, two of the three groups of streetwalkers were more socially introverted than their normal controls and the higher-status call girls and in-house prostitutes. All the above-mentioned differences were statistically significant. The housewife street-walkers were significantly more socially introverted than their more successful colleagues but not significantly more introverted than their normal controls. The more successful prostitutes were not significantly more introverted than their respective control groups.

Holland's (1973) theory of vocational choices, in which he delineated six vocational personality types, did not utilize a single introversion-extraversion dimension, but several authors have noted some obvious semantic similarities. At face value, it appeared from Holland's descriptions, that extraversion was included in both the social and enterprising personality types, whereas introversion related primarily to the investigative personality type, but, was also invoved in the conventional and realistic personality types. His sixth type, the artistic, was not clearly related.

One must be cautious about taking these descriptions at face value because of the results obtained by Ward, Cunningham and Wakefield (1976). They administered Holland's Vocational Preference Inventory to 425 college students and found that, neither the social nor the investigative scales, showed the expected relationship with the 16 PF scales known to be related to introversion-extraversion. However, these investigators used primarily females as subjects, whereas most of the work that has been done on vocational interests involved primarily male populations. Studies yielding high correlations between established measures of extraversion and Holland's six vocational personality types are valid. Nevertheless, the point is that when one considers vocational interests, this personality variable, i.e., extraversion, receives frequent attention.

Costa, Fozard and McCrae (1977) administered the SVIB to more than 1,000 adult males. They extracted five factors related to vocational interest. The factor accounting for the most variance was labelled person-versus-task orientation. The most person-oriented vocations were community recreation administrator, YMCA secretary, chamber of commerce executive, credit manager, business administrator, rehabilitation counsellor, social worker, and social science teacher. The most task-orientated professions were architect, physicist, mathematician, engineer, artist, chemist and dentist. The subjects were also given the 16 PF, the scales of which were correlated with the five vocational factors extracted. The primary extraversion scales on the 16 PF related significantly to the person-versus-task orientation factor on the SVIB. That is, those subjects preferring person-oriented vocations also rated themselves as being outgoing, happy-go-lucky, venturesome and group oriented, whereas subjects preferring task-oriented vocations scored low on these variables.

Similar results have been found with the CPI, which was administered along with the SVIB, by Johnson, Flammer and Nelson (1975) to 359 male college freshmen. The results were factor analyzed and extraversion was the second of five factors extracted. This factor reflected primarily high scores on the dominance, sociability, and sense of well-being scales and was clearly the most important of the five factors extracted in terms of relationship to occupational scales. Extraverts preferred the occupations of YMCA staff member, personnel director, public administrator, rehabilitation counselor, social worker, school superintendent and minister. Introverts preferred dentist, architect, physicist, chemist, engineer, carpenter, farmer and printer. Interest in business and sales was not related to either.

The relevance of extraversion was further underscored by the usefulness of the OIE Scale (Johansson, 1970), consisting of a recombination of items of the SVIB. The scale correlated significantly with other extraversion scales (Goodyear and Frank, 1977; Johnson, Nelson, Nolting, Roth and Taylor, 1975). Johnson et al. found that extraversion scores on this scale were associated with vocational scales tapping physically active, outgoing and administrative interests, and Goodyear and Frank (1977) found introversion to be related to the vocations of engineer, physicist, mathematician and farmer. In contrast, extraversion was related to YMCA secretary, chamber of commerce executive, and community recreation leader. In addition, these authors found physical science, biological science, and engineering majors in college to be more introverted than business administration majors.

Interestingly each of these studies by Costa et al., Johnson et al. and Goodyear and Frank involved males and none utilized Eysenck's scale of introversion-extraversion.

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Morris (1979) pointed out that the information relating to the vocational choices of introverts seems clearer than that for extraverts. Because of aptitude differences, college achievement differences, and/or vocational interests, introverts are more likely to end up in task-oriented, technical professions than are extraverts.

One of the reasons for the picture being clearer for introverts than for extraverts, as suggested by Pillai (1975), may be that introverts are more consistent in stating their occupational interests, values and aspirations than are extraverts. His subjects were more than 400 high school students in India who completed an occupational values questionnaire and an occupational aspirations questionnaire separately. Disparity between the two was related to both extraversion and neuroticism. The author explained that, more introverted students both valued and aspired to traditional, high status, professional vocations. More extraverted students stated more liberal, less socially conforming values, but their actual aspirations were governed more by immediate status and monetary considerations.

(B) METHOD

The present study was conducted among high school students only (described on p.55). Pearson product-moment correlations between vocations related to language, the arts, social service, science, mechanics, business and office work, on the one hand, and extraversion, neuroticism and lie scores, on the other,

were calculated for the total group of 480 males and females combined, and for the total group of 240 males and the total group of 240 females. Similar correlations were also calculated for the selected group of 212 male and female subjects combined, and the selected groups of 117 males and 95 females who remained after the high lie scores (4+) were excluded. For reasons already given in Chapter One, the results of the selected groups were accepted as the more "valid".

Vocational interest was measured by the Interest Questionnaire for Indian Pupils (IQIP). The higher the score on this test, the greater the interest in the particular area.

(C) RESULTS

Table LXXV gives the correlations between interest in occupations related essentially to language production and usage, on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE LXXV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO LANGUAGE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,086	0,019	0,173**	0,116	0,043	0,195
N	0,168***	0,140*	0,056	0,205***	0,217*	0,136
L	0,083	- 0,096	0,003	- 0,095	- 0,031	- 0,164

[1] The probability levels for N = 480, 240, 117 and 95 are given on p. 199 while the levels for N = 212 are given on p. 233.

It will be noted that the relationship between extraversion and occupations related to language, while significant for the total group of girls ($p < 0,01$), is not significant for the selected group.

The table also indicates that there is a significant relationship between neuroticism and occupations related to the production or use of language in the following groups: the total group of boys and girls combined ($p < 0,001$), the selected group of boys and girls combined ($p < 0,01$), the total group of boys ($p < 0,05$) and the selected group of boys ($p < 0,05$). The indications are that, among these groups of subjects, the more neurotic individuals express an interest in occupations related to the production or use of language. Also, significant correlations for the total groups still remain significant for the selected groups.

Table LXXVI presents the correlations between interest in occupations related to the arts (that is, activities that have to do with line, colour and sound), on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE LXXVI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO THE ARTS AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,096*	0,063	0,145*	0,139*	0,178	0,061
N	0,124**	0,026	0,175**	0,135*	0,166	0,034
L	- 0,056	- 0,013	- 0,070	0,032	0,052	0,017

The table indicates that, for the total group of boys and girls combined, for the total group of girls and for the selected group of boys and girls combined, there is a significant relationship between extraversion and interest in occupations related to the arts ($p < 0,05$).

In addition, the table shows that, for the same three groups, there is a significant relationship between neuroticism and interest in occupations related to the arts, the relationships involving the first two groups being significant at the 0,01 level. These results reveal that for all these groups the more extraverted and more neurotic subjects express a greater interest in activities that have to do with line, colour and sound than the less extraverted and less neurotic subjects, respectively.

It must be pointed out that the significant relationships between extraversion and neuroticism, on the one hand, and interest in occupations related to the arts, on the other, for the total group of boys and girls

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[1] See footnote on pp. 199 and 233 for keys to the probability levels.

combined were still present for the selected group of boys and girls combined, although, in the case of neuroticism, the relationship decreased to a lower level of significance for the selected group ($p < 0,05$).

Table LXXVII presents the correlations between interest in occupations related to social service, on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE LXXVII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO SOCIAL SERVICE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,061	0,088	0,072	0,066	0,061	- 0,0002
N	0,226***	0,054	0,255***	0,262***	0,182	0,226*
L	- 0,030	0,040	- 0,001	0,057	0,022	- 0,069

The table indicates that there are significant relationships ($p < 0,001$) between neuroticism and interest in occupations related to social service for the total group of boys and girls combined, for the selected group of boys and girls combined and for the total group of girls. In addition, the relationship between neuroticism and interest in occupations related to social service is significant for the selected group of girls ($p < 0,05$). These correlations indicate that, among these

[1] See footnote on pp. 199 and 233 for keys to the probability levels.

groups, the more neurotic individuals tend to express a greater interest in occupations offering assistance to people either individually or in groups than the less neurotic.

In Table LXXVIII, the correlations between interest in occupations related to science, on the one hand, and extraversion,neuroticism and lie scores, on the other, are given.

TABLE LXXVIII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO SCIENCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 112 Boys; 95 Girls	N = 112 Boys	N = 95 Girls
E	0,039	0,028	0,032	- 0,017	- 0,031	0,074
N	- 0,058	0,026	0,001	- 0,057	0,024	- 0,044
L	- 0,017	- 0,099	0,001	0,004	- 0,025	0,015

Table LXXVIII indicates that no significant relationships between interest in occupations in the field of science, on the one hand, and extraversion, neuroticism and lie scores, on the other, were observed.

Table LXXIX presents correlations between interest in occupations related to mechanics, on the one hand, and extraversion, neuroticism and lie scores, on the other.

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[1] See footnote on pp. 199 and 233 for keys to the probability levels.

TABLE LXXIX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO MECHANICS AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,093*	0,144*	0,008	0,058	0,200*	- 0,042
N	- 0,263***	- 0,104	- 0,125	- 0,245***	- 0,147	- 0,206*
L	- 0,050	- 0,075	- 0,043	- 0,005	- 0,132	0,144

It will be noted from the table above that, for the total group of boys and girls combined, for the total group of boys and for the selected group of boys, there are significant positive correlations between extraversion and interest in occupations in the area of mechanics ($p < 0,05$). In these groups, the more extraverted individuals express a greater interest in occupations related to the production, manipulation and repair of machinery, than the less extraverted.

For the total group of boys and girls combined, for the selected group of boys and girls combined and for the selected group of girls, there is a significant negative correlation between neuroticism and interest in occupations related to the production, manipulation and repair of machinery. This indicates that, in these groups, those individuals who tend to be more neurotic express less interest in mechanics than the less neurotic.

The significant relationships obtained between extraversion and vocational interest, among the total group of boys, and between neuroticism

[1] See footnote on pp. 199 and 233 for keys to the probability levels.

and interest in occupations related to mechanics, among the total group of boys and girls combined, persist for their respective selected groups.

Table LXXX gives correlations between interest in occupations related to business, on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE LXXX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO BUSINESS AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,013	0,027	- 0,005	0,074	0,132	- 0,013
N	- 0,020	- 0,063	0,052	0,048	0,018	0,067
L	0,054	0,066	0,028	-0,041	0,007	- 0,095

It is evident from the results contained in the table above that none of the relationships between interest in occupations related to business, on the one hand, and extraversion, neuroticism and lie scores, on the other, is significant.

Table LXXXI presents the correlations between interest in occupations related to office work, on the one hand, and extraversion, neuroticism and lie scores, on the other.

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[1] See footnote on pp. 199 and 233 for keys to the probability levels.

TABLE LXXXI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN INTEREST IN OCCUPATIONS RELATED TO OFFICE WORK AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,069	0,019	- 0,121	- 0,072	- 0,068	- 0,138
N	0,033	- 0,188	0,054	0,078	- 0,084	0,110
L	0,085	0,091	0,177	0,109	0,126	0,138

The table presented above indicates that there are no significant relationships between interest expressed in occupations related to office work, on the one hand, and extraversion, neuroticism and lie scores, on the other.

(D) DISCUSSION OF RESULTS

As pointed out in Chapter One of this report, two sets of results have been presented. One set excludes subjects with high lie scores (4 and above). The other set includes subjects with high lie scores, that is,subjects who"faked good" or gave favourable and socially acceptable answers. Eysenck and Eysenck (1964a,p. 14) pointed out that the responses of high lie scorers were of doubtful validity and could not be accepted.

In view of the foregoing points, the present author has accepted as"valid"only the results obtained when high lie scorers were excluded.

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[1] See footnote on pp. 199 and 233 for keys to the probability levels.

All discussions will, therefore, be based on these latter results.

The current investigation indicates the presence of a significant positive relationship between extraversion and interest in occupations related to the arts for the group of boys and girls combined. This result is in the expected direction since most of the occupations in this field, for example, barber, musician, photographer, tailor, dressmaker, involve people.

One would have expected a high positive correlation between extraversion and interest in occupations related to social service, but none appeared. However, there is a high positive correlation between neuroticism and social service ($p < 0,001$). If, as implied by Sinha (1966, p. 59), the personality factor of neuroticism is influencing individuals to choose occupations in the social service area, one could justifiably question the quality and efficacy of the service rendered. This disturbing finding calls for intensive research in the public interest.

Contrary to expectations, a significant positive correlation between interest in occupations related to mechanics and extraversion was obtained for the separate group of boys ($p < 0,05$). This indicates that in this group the more extraverted boys have greater interest in occupations related to mechanics than the less extraverted ones.

The results also indicate that, among the group of boys and girls combined and the separate group of girls, the less neurotic are significantly more interested in occupations related to mechanics than the more neurotic.

The studies described in the review of literature and the study undertaken in this project have approached vocational choices solely from

the standpoint of preferences and interests without dealing explicitly with the role of ability or educational achievement. However, it will become evident from the review of the literature in Chapter Eleven, that introverts have a tendency to achieve higher educational and professional training levels than extraverts because of their superiority at advanced educational levels. Such differences undoubtedly influence preferences for occupations for which advanced degrees are required. At the same time, academic excellence in these professional areas (e.g., physics) may depend on one's interest, tolerance of, or facination with the subject matter. Also, individuals who become interested in various occupational and academic pursuits may experience personality changes as a result.

Another possible explanation follows. Because of aptitude differences, college achievement differences, and/or vocational interests, introverts are more likely to end up in the task-oriented, technical professions than extraverts. Some authors have interpreted this as an orientation toward things, put probably that is too simplistic a view. The orientation seems to be toward ideas, often abstract ideas, and structured, detailed work as opposed to the less well-ordered and perhaps more practical person-oriented occupations.

These points could explain why many of the results are either not significant at all, or are significant, but in the unexpected direction.

(E) CONCLUSION

Except for the group of boys and girls combined, for occupations related to the arts, the hypothesis that there is a significant difference between introverts and extraverts with regard to interest expressed in occupations related to the use of language, the arts, social service and business, as stated on p. 55 , was not confirmed.

Similarly, except for the separate group of boys for occupations related to mechanics, the hypothesis that there is a significant difference between introverts and extraverts in interest in occupations related to science, mechanics and office work, as mentioned on p. 55, was not confirmed.

As indicated previously in Chapter One (p. 56), Chapter Eleven will report the investigation of the relationship between extraversion, neuroticism and lie scores, on the one hand, and academic success, on the other. It has also been previously mentioned (p. 56) that the following hypotheses will be tested:-

(1) There is a significant difference between introverts and extraverts with regard to academic performance.

(2) At university level, there is a significant difference in academic performance between neurotic introverted students and other personality types, namely, neurotic extraverts, stable extraverts and stable introverts.

(3) There is a significant difference between the academic performance of introverted and extraverted students in the language subjects.

(4) Introverted science students differ significantly from extraverted science students in performance in the science subjects.

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PROJECT TWO

CHAPTER ELEVEN

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO ACADEMIC SUCCESS

(A) REVIEW OF THE LITERATURE

The relationship between introversion-extraversion and academic success has been researched by many authors. The following review of the literature will indicate that there is lack of unanimity with regard to the findings.

Furneaux (1956), Broadbent (1958) and Bendig (1960) reported a tendency for introverted university students to do well academically. Furneaux (1962) has also commented that "neuroticism and introversion-extraversion do not serve only as determinants of examination performance in their own right, ... but they profoundly affect the influence which purely intellectual characteristics have on such performance" (p. 40). In addition, there is evidence that introversion favourably affects the attainment of school children taking advanced level examinations (A - levels) in Britain (Lynn, 1959). Lynn and Gordon (1961) pointed out that there is also indirect evidence supporting the following findings, e.g.,: (a) Delinquents have extraverted behaviour patterns and tend to be educationally retarded. (b) Introverts tend to be leptomorphic in body build (i.e., to be thin in relation to height) and leptomorphic children tend to be good readers. (c) Women tend to be more introverted than men, and girls do better than boys in England in the eleven-plus examination and do better academically in the United States. Brain-injured people tend to be extraverted and brain-injured children tend to be poor academic attainers in relation to their intelligence (p. 194).

The findings concerning neuroticism and attainment are less well established. A positive correlation between neuroticism and attainment in University students was found by Furneaux (1956). Consistent with this is the

finding that university students score more highly on tests of neuroticism than other young people (Lynn, 1959), which suggests that neuroticism is a factor in educational success. On the other hand, Bendig (1960) found no association between neuroticism and attainment in American university students.

There is considerable literature on the relationship between anxiety and attainment, which is of interest in this connection because anxiety and neuroticism are highly correlated, although anxiety is also associated with introversion. There is some evidence that anxious children tend to be good readers (Lynn, 1955; Biggs, 1959). But, Sarnoff et al. (1959) found no association between anxiety and attainment in the eleven-plus examination, and investigations in the United States have frequently reported negative correlations between anxiety and attainment (e.g., McCandless and Cataneda, 1956). The English studies tend to suggest that the relationship between neuroticism and attainment is positive, and the American findings that it is negative.

In an experiment described previously (pp. 190-191), Lynn and Gordon (1961) attempted to provide indirect evidence for the relationship between introversion-extraversion and academic performance. Using Eysenck's theory as their base, they made certain predictions concerning the association of neuroticism and introversion-extraversion with persistence, size of vocabulary and IQ. The predictions were: on an intellectual task, introverted subjects will take longer than extraverted, and neurotic subjects will be quicker than the stable; introverts should have a higher, and extraverts a lower, vocabulary-intelligence ratio; on the basis of the Yerkes-Dodson law (i.e., high anxiety facilitates the learning of simple tasks but impairs the learning of complex ones), higher neuroticism scores should be associated with better vocabulary; a curvilinear relation between neuroticism

and a task of moderate complexity (e.g., Raven's Standard Progressive Matrices scores) was expected.

The results indicated that there was a positive correlation between introversion and persistence, and between neuroticism and size of vocabulary ($p < 0,05$). Also, there was a curvilinear relationship between neuroticism and scores on the Raven Matrices ($p < 0,05$), subjects in the middle range of neuroticism doing best. No significant correlation between either neuroticism or introversion and intelligence was obtained (pp. 199-200).

Savage (1962) conducted his investigation on 168 male and female first-year arts students. Among other things, it was hypothesized, in terms of Eysenckian theory, that the higher the academic success of the student the lower the extraversion and neuroticism scores.

The MPI was used, the neuroticism and extraversion scores being correlated with the results obtained in the annual examinations. All the students in the study had attempted four first-year subjects within the arts faculty curriculum. The students were divided into five groups according to the number of passes, out of four, obtained in the final examinations: group 1 - no passes, group 2 - one pass, and so on.

On neuroticism, the variances between groups were found to be significant ($p < 0,01$) while there was a negative correlation of 0,9 ($p < 0,05$)[1] between neuroticism and academic success within each group.

On extraversion, the variances between groups were also significant ($p < 0,01$) while the correlation between extraversion and academic success was $-0,9$($p < 0,05$)[1] with each group.

The results of the investigation showed that neuroticism and

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[1] The relatively low probability levels associated with the very high coefficients of correlation seem strange to the present writer, but the figures are being reported correctly.

extraversion scores on the MPI were significantly related to academic performance.

The positive association between neuroticism and academic failure reported by Savage (1962), did not support the results of Furneaux (1956) and Lynn (1959), among others. Groups 3 and 4 who passed 2 and 3 subjects, respectively, out of 4, had a mean neuroticism score significantly above the norm for the test. Groups 1, 2 and 3, however, had significantly higher neuroticism scores than the other two groups. These higher scores tended to impair performance. Savage (1962) suggested that an optimum level of neuroticism exists for successful academic achievement (pp. 252-253).

However, the relationship found between extraversion and academic performance by Savage, confirmed the results obtained by Furneaux (1956), Broadbent (1958) and Lynn (1959), with British university subjects. The most successful group was that with the lowest extraversion scores, while the other groups were in the predicted order.

Callard and Goodfellow (1962), in a study already described on pp. 191-192, administered the JMPI to 3 559 boys in secondary modern and grammar schools. They concluded that their results did not suggest any relationships between extraversion and the other variables studied (neuroticism, intelligence and attainment). This study must be criticized because the administration of the test was carried out by school teachers who were not qualified in psychological testing. Also, the lack of control of the conditions of testing raises the issue of the comparability of the scores of the various groups.

Child (1964), in a study described previously on pp. 192-193, used, inter alia., the JMPI, the 11+ Moray House Intelligence Test, and the results of the Christmas terminal examination to study 138 pupils of both sexes aged 11-15 years, randomly selected from each form in the first four years of an urban comprehensive school.

Child, like Callard and Goodfellow (1962), found no significant intercorrelations between neuroticism, extraversion and intelligence. He reported a "zone analysis" of high, medium and low groups on both neuroticism and extraversion, and showed that attainment was affected by both neuroticism and extraversion. Child, using the 20% confidence level, concluded that extraverted children who were higher on neuroticism had a lower mean attainment score. The present writer does not accept the use of such a high probability level.
Child also found that the difference between the "extraverted medium neuroticism" and "introverted medium neuroticism" groups was significant ($p < 0,05$). The influence of neuroticism was stronger in the case of the extraverts than among the introverts as far as attainment was concerned.

Child (1964) studied a small group of promoted ($N = 17$) and demoted ($N = 14$) children. He concluded that promoted children were significantly more introverted ($p < 0,05$) and displayed average neuroticism and anxiety. Demoted children tended to be extraverted and more anxious than average (p. 193). It must be noted that Child had a very small sample. This would greatly limit the generalizability of his results.

Subsequent researches have tended to find results contrary to those of Child. Rushton (1966) reported a study of eleven-year-olds, using the Cattell Children's Personality Questionnaire to measure introversion-extraversion and the Verbal Reasoning, Arithmetic, English and Spatial sub-tests of the Moray House Test as a measure of scholastic success. He concluded that extraversion favoured scholastic success (p. 180) and extraverted children were more able scholastically (p. 182).

Similarly, Ridding (1967), using Cattell's and Eysenck's questionnaire methods of assessing personality traits on a sample of 600 boys and girls aged 12 plus, investigated personality differences between pupils over- and under-achieving in English and arithmetic. They reported that introversion and extraversion correlated significantly with under-achievement and over-achievement, respectively (p. 398).

Likewise, Regan (1967) investigated attitude to school among 368 second-year secondary school pupils and concluded that extraverts had a significantly more favourable attitude. Attitude to school was measured by a twenty-item Thurstone-type scale constructed by Regan and extraversion and neuroticism by the JMPI.

Savage (1966) investigated a sample of 93 school children (mean age= 7 years, 11 months; S.D.=6 months) of both sexes in two testing sessions. In the first, the Otis Quick Scoring Mental Ability Test (1937) and the EPI were given. In the second session, one of either the Schonell Essential Mechanical Arithmetic or the Essential Problem Arithmetic Tests (1965) was given at random as well as the Watts Sentence Reading Test 1(1965).

The results indicated a significant relation between extraversion and IQ (0,267) and between extraversion and arithmetic (0,235), whilst the extraversion-reading relation (0,191) just failed to reach the 5% significance level. It would appear, therefore, that high extraversion is related to a higher intellectual level and higher academic attainment in these children (p. 91). This finding is of some interest as previous work with students had suggested that the above-mentioned relationships were in the opposite direction (Furneaux, 1956; Gibbins and Savage, 1965; Lynn, 1959; Lynn and Gordon, 1961; Savage, 1962).

The relationship between neuroticism and academic attainment in this sample is also of interest. Neuroticism was significantly related to reading in a negative direction (- 0,217), but not to intelligence or arithmetic. It would appear that the relationships between neuroticism and success in reading and arithmetic are not as striking in these children as they were found to be in previous studies of student samples (p. 91).

Entwistle and Cunningham (1968) administered the JEPI to 2 995 Aberdeen children aged about 13 years. The pupil's average mark for all academic subjects was taken as a measure of school attainment, while IQ was assessed by the Moray House Advanced Verbal Reasoning Test 12. They found that the correlations between extraversion, on the one hand, and intelligence and teachers' marks, on the other, were essentially zero. However, they did observe that the relationship was non-linear and there was an important sex difference. Girls with high extraversion scores tended to be high in attainment whereas the reverse was true of the boys.

In testing the hypothesis that among the brightest children, the "neurotic introverts" would form the superior group in school attainment, they found that, among the girls "stable extraverts" formed the superior group, but,among the boys, the "stable introverts". They concluded: "There is no suggestion amongst either boys or girls that the "neurotic introverts" are more successful in their schoolwork" (p. 130). Hence, they rejected their hypothesis that, among bright children, "neurotic introversion" would be associated with scholastic success.

Entwistle and Welsh (1969), in what appears to be a further study of the same sample as that used by Entwistle and Cunningham (1968), found distinct differences in the relationship between extraversion and attainment at different levels of ability. Extraversion was found to correlate - 0,102 with attainment in high ability boys, + 0,174 in low ability boys, + 0,036 in high ability girls,and + 0,205 in low ability girls.

They commented: "The advantage of the introvert in school has been mentioned by Eysenck (1965a). The build-up of reactive inhibition is delayed in the introvert, thus facilitating prolonged study. Eysenck has not suggested, as yet, a sex difference in the effect of this reactive inhibition, which might explain the greater success of extraverted girls .... . The behaviour of extraverted girls may well be more social and less aggressive than that of the boys and so they avoid academic deterioration" (p. 62).

Entwistle and Welsh also pointed out that an alternative explanation of the different relationships between extraversion and attainment at the different ability levels may be that there is a tendency for the correlation between intelligence and extraversion to vary with age and hence "behind this may be a change in the direction of the relationships at different mental ages" (p. 63).

Eysenck and Cookson (1969) obtained extraversion and neuroticism scores of 4 000 eleven-year-old boys and girls on the JEPI and analysed them in relation to performance on scholastic and ability tests at the primary school-leaving age. Abilities and achievements were measured by the Moray House tests of verbal reasoning, mathematics and English. Reading level was measured by the Schonell Graded Word Reading Test (Schonell and Schonell, 1960).

Results revealed that extraverted boys and girls were significantly scholastically superior to the introverted (p. 119); that stable boys and girls did only marginally better than unstable ones (p. 119); that interaction effects between neuroticism and extraversion only occurred in conjunction with sex, unstable extraverted girls doing unexpectedly well, unstable extraverted boys unexpectedly poorly (p. 120). The results suggested the importance of introversion-extraversion in the attempt to predict scholastic success and Eysenck and Cookson speculated that introverts were "late developers" as compared with extraverts.

As part of a larger study, Frost (1969) investigated the relationship of extraversion to other personality variables and to cognitive measures. The subjects were 310 eleven-year-old school children (170 boys, 140 girls) from a wide variety of socio-economic backgrounds. The measures used in the study were the Frost Self-Description Questionnaire (which includes seven anxiety scales, five aggression scales, a measure of denial, assertiveness, submissiveness and affiliation); the JEPI; the Crichton Vocabulary Scale; the Raven Standard Matrices; tests of reading comprehension, mechanical and problem arithmetic; measures of social class and parental interest.

Frost found a small positive, but statistically non-significant relationship in both sexes between extraversion and the attainment variables. For example, for girls, the correlations between extraversion and Crichton Vocabulary, reading, mechanical arithmetic and problem arithmetic were 0,20, 0,15, 0,13 and 0,18, respectively. For boys, the corresponding figures were 0,10, 0,05, 0,09 and 0,06, respectively.

The results are in agreement with those obtained by Rushton (1966), Ridding (1967) and Eysenck and Cookson (1969).

Whittaker (1969) used 30 male and 30 female randomly selected university students to determine, among other things, the relationship between extraversion and neuroticism, on the one hand, and grade point average[1], on the other. Neuroticism and extraversion scores were determined by the MPI.

The results indicated a negative relationship ($p < 0,01$) between grade point averages and extraversion for female subjects only (p. 49). The relationships between grade point averages and neuroticism for male and female subjects were not significant (pp. 49 - 50), as also the correlations between grade point averages and extraversion for male subjects (p. 49).

As part of a larger study, Entwistle and Wilson (1970), investigated the relationship between academic performance, on the one hand, and extraversion and neuroticism, on the other. Extraversion and neuroticism were measured by the EPI. It was administered to 72 graduates, 35 men and 37 women taking the Diploma in Education at Aberdeen University. Academic performance was categorized into "good honours", "honours ordinary" and "poor ordinary". Each group contained, by chance, 24 students.

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[1] The Florida State University, from which the subjects were selected, used a five-point scale for grading with A = 4,0; B = 3,0; C = 2,0; D = 1,0 and F or failure, representing grade averages below 1,0 (Whittaker, 1969, pp. 26 - 27).

Scores on extraversion and emotional instability in relation to academic performance indicated that introverts were overwhelmingly from the "good honours" category and the overall relationship was statistically significant ($X^2 = 6,38$; df = 2; $p < 0,05$) (p. 152). There was no evidence of unstable students doing particularly well ($X^2 = 0,34$; df = 2; $p > 0,05$).

Entwistle and Wilson concluded that stability or instability appeared to be almost irrelevant to examination performance.

In order to examine the relationship between personality and academic performance, Cowell and Entwistle (1971) used 117 first- and second-year trainee technicians studying for the British Ordinary National Certificate. Extraversion and neuroticism were measured by the EPI and scaled examination marks obtained at the end of the academic year provided the criterion of academic performance. The researchers found that stable introverts did not have significantly better examination results than unstable extraverts. They also found no significant difference between the examination results of introverts and extraverts.

Kline and Gale (1971) commented that although the postulated relationships between academic success and neuroticism and extraversion seem to hold outside Great Britain, not all studies have confirmed the importance of neuroticism. For example, Cortes (1969) failed to confirm the influence of extraversion on academic success.

Kline and Gale (1971) investigated the relationship between introversion-extraversion, neuroticism and performance in a first-year psychology end-of-year examination at the University of Exeter, over a period of four years. The examination in question was selected because it was common to a large number of students and thus overcame the difficulty of different standards and methods of marking across departments. The EPI provided the

measure for introversion-extraversion and neuroticism. The sample comprised 455 students, 258 females and 197 males.

The researchers hypothesized positive correlations between academic performance and neuroticism. They commented on their results as follows: "In fact, of the 15 correlations reported for individual groups only three are significant (two in the opposite direction to that hypothesized). Of the non-significant correlations, five are contrary to the hypothesis. Thus, the relationship can hardly be regarded as stable ... the hypothesized relationship of neuroticism and academic attainment is not strongly supported" (p. 93).

In the case of academic performance and extraversion, Kline and Gale hypothesized a negative correlation between them. However, they reported as follows: "... of the 15 individual group correlations only two are significant at the 0,05 level or beyond. The hypothesis under consideration cannot, therefore, be accepted without reservation. It is confirmed less often than it is rejected" (p. 93).

Kline and Gale concluded that the stability of the relationship between academic success in a psychology examination and introversion-extraversion and neuroticism was low. It would certainly be unwise, in the light of these results, to state, as a general finding, that academic success was related to personality variables.

Jabin (1971) investigated the relationship between introversion-extraversion and learning. She hypothesized that, since introverts develop the excitatory potential more quickly and strongly than extraverts, introverts would perform better on a learning task than extraverts (pp. 41 - 42).

The MPI was administered to 66 university students, 47 males and 19 females. The top 10% (extraverts) and bottom 10% (introverts) on the MPI were then given nonsense syllables to learn and the number recalled were compared. She concluded: "The difference between the means of the two groups was in the predicted direction ($t = 1,4$; $df = 11$; $p < 0,05$ (one-tailed test)). This finding is interpreted as supporting, though not confirming the hypothesis" (p. 44).

An important criticism of Jabin's work is that she used a small sample. Another is that, in testing her hypothesis, she used a one-tailed test. At any given confidence level and at any given degree of freedom, the magnitude of the t ratio necessary for rejection (at that level) of the null hypothesis is always less for the one-tailed analysis than for the two-tailed. Senter (1969) indicates that some researchers resort to a one-tailed analysis because their data cannot meet the demands of a two-tailed test at a respectable (0,05 or 0,01) confidence level (p. 194). It is very tempting for a researcher, who may be desperately defending some theory, to switch post hoc to a one-tailed pronouncement. The criticism was aptly made by Senter when he said: "This is considered highly improper, bordering on the unethical (if not downright corrupt), but nonetheless is done" (p. 194).

Elliott (1972) investigated the relationship between reading attainment and intelligence, on the one hand, and extraversion and neuroticism, on the other, in groups of junior school children whose chronological, mental and reading ages were held constant. The subjects were primary school children who formed three groups. There was some degree of overlap between the groups, some subjects being present in more than one group. The "chronological age restricted" group comprised 111 children between the ages of 8,5 and 8,9 years. The "mental age restricted" group comprised 110 children who obtained a raw score, on the Moray House Picture Intelligence Test, equivalent to an IQ of

100 for children whose chronological age is 8,5 years to 8,9 years, inclusive. The "reading age restricted" group comprised 101 subjects whose reading age, on the Schonell Graded Word Reading Test, was 8,5 to 8,9 years, inclusive.

The following tests were given during one week to all the subjects by personnel from the schools that the children were attending: (a) Schonell Graded Word Reading Test (Schonell and Schonell, 1960), (b) Moray House Picture Intelligence Test (Mellone, 1958), (c) JEPI (Eysenck, 1965b). The six relevant variables in the study were chronological age (CA), reading age (RA), IQ, and scores on the extraversion, neuroticism and lie scales of the JEPI.

Just like the Callard and Goodfellow (1962) study, this one must also be criticized on the grounds that the tests were administered by school personnel not qualified in psychological testing. In addition, the conditions of testing were not standard from group to group.

Each of the three groups was subjected to a zone analysis (Furneaux, 1962; Eysenck 1967a). Elliott (1972) made a median split in the distribution of extraversion and neuroticism scores yielding four sub-groups for each of the three groups. The numbers in each sub-group were equalized to 25 by random selection.

The conclusions outlined below, *as emanating from Elliott's study*, must be regarded as tentative in view of the relatively small sample he used:
(a) At a given CA, when IQ and RA were allowed to vary, both correlated significantly with extraversion. This confirmed many previous findings using samples of young children (p. 28).
(b) The correlation between RA and extraversion was highly significant when the IQ of the sample was held constant (p. 29).
(c) There was no significant correlation between IQ and extraversion when RA and CA were held constant (p. 29).

(d) The significant negative correlation between IQ and extraversion, when both IQ and RA were allowed to vary, was due to the correlation of IQ with RA. The findings are in accord with Eysenck's general theory that extraversion and intelligence are independent (p. 29).

(e) Neuroticism was found to be significantly correlated negatively with both IQ and RA (p. 29).

Elliott demonstrated that the significant positive relationship between extraversion and RA in his sample was not a function of either chronological age or IQ differences. With these two factors eliminated, the explanation of the superiority of extraverts must lie within the interaction between personality and educational practices.

A study of preschool and first-grade children by Stedman and Adams (1972) indicated a strong superiority of extraverted over introverted children. The subjects in the study were disadvantaged Mexican-American children, who were tested for personality and achievement differences at the beginning of a preschool Headstart programme and again at the end of the first grade with the Metropolitan Achievement Test. Seventy-six children were involved in the study. The personality measure used was Schaeffer's Classroom Behaviour Inventory, which involved teacher ratings of a number of child attributes and was scored for positive social behaviour, introversion-extraversion, and positive task orientation. The extraversion score included amount of verbal expressiveness, gregariousness, absence of social withdrawal, and absence of self-consciousness.

Of all the measures taken at the beginning of the Headstart programme, extraversion was found to be the best predictor of achievement at the end of the first grade. It showed a strong positive relationship to the three Metropolitan Achievement Test subareas of word knowledge, reading achievement and mathematics achievement. It would seem that if these results apply to the general population of preschool and first-grade children as well as to disadvantaged children, the greatest superiority of extraverts over introverts

occurs at the earliest ages.

Mann and Rizzo (1972) explored the relationship of extraversion, as measured by the 16 PF, to academic success at college, as indicated by a specially designed scale, the Opinion, Attitude and Interest Survey among 480 male freshmen. According to the authors, the Survey correlated 0,35 with college grade point average. The finding from this study was that extraversion correlated negatively with success at college significantly.

In an investigation of the influence of introversion-extraversion and neuroticism on performance in elementary mathematics, Lewis and Ko (1973) used a stratified sample of 80 male and 80 female fourth- and fifth-year fourteen- to sixteen-year-old secondary school pupils, all of whom had completed a mathematics course leading to the Certificate of Secondary Education. All pupils were given the JEPI, the Standard Matrices Test (Raven, 1938), and a series of mathematics tests comprising four distinctive item type sections, namely, multiple choice, data sufficiency, multi-facet and traditional. Each of these sections was divided into two broad content areas, number and space.

A six-way analysis of variance of the scores showed that (a) extraverted boys and introverted girls constituted a higher performing group within their own sex (p. 29); (b) the overall performances of both stable introverts and neurotic extraverts were significantly better than those of the other personality types (p. 30); (c) among those of high ability, introverts performed significantly better than extraverts, while among those of lower ability, the reverse applied (p. 30); and (d) stable pupils performed significantly better than the neurotic on traditional items in space content

(p. 30). The authors suggested that introversion might become advantageous at an earlier age for girls than for boys.

In a study of children younger than eight years, Jensen (1973) administered to white, black and Mexican-American pupils in California, a battery of tests, including the JEPI, at the beginning of the school year, and the Stanford Achievement Test, at the end of the year. He found that the correlations between extraversion, on the one hand, and intelligence and achievement, on the other, were positive but not significant.

A detailed longitudinal study of 345 boys, aged 11 to 15 years, was conducted by Banks and Finlayson (1973). School examination performance was studied in relation to JEPI scores. In general, introverts performed significantly better, especially in two schools where ability and aspiration levels were higher. The relationship between introversion and performance increased with age, particularly for students with higher neuroticism scores. The trend in the results became more marked when extreme over- and underachievers were considered. There were two clusters of variables in the study that were related to successful academic performance, namely, achievement-motivation and introversion. Included with introversion were (a) intellectual curiosity, (b) homework orientation, (c) parental warmth and support, combined with (d) dependence and conformity on the part of the boy, and (e) a slower development of interest in girls.

Mehryar, Khajavi, Razavieh and Hosseini (1973) correlated an Iranian version of the EPI as well as a psychoticism scale with academic achievement in college entrance examinations. Only a small, positive, significant relationship between extraversion and IQ for two out of three groups[1] and

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[1] The researchers neither identify the groups nor do they report the r values.

no significant relationship between extraversion and either mathematics or natural science scores were found for both males and females.

Honess and Kline (1974) examined the relationship between personality and academic performance in Uganda. The subjects were black Ugandans from two rural secondary schools near Kampala. They were divided into three age groups: (a) 42 boys and 38 girls, mean age=14 years, who took the JEPI; (b) 40 boys and 35 girls, mean age=15 years, who took the JEPI; (c) 49 boys and 20 girls, mean age=17 years, who took the EPI. Academic attainment was assessed through the end of year school examination.

With the youngest age group, Honess and Kline found extraversion almost invariably related to academic success especially among the girls, among whom three of the five correlations were significant ($p < 0,05$). This finding strongly supports the Aberdeen study of Entwistle and Cunningham (1968), especially in view of the fact that Ugandans, in comparison with their English contemporaries, are scholastically retarded by at least one year (Honess and Kline, 1974). With the older children, none of the correlations was significant, although it is worthy of note that, among the oldest girls, the correlations with extraversion changed sign: introversion became more important for success. This is again in agreement with British data provided by Eysenck and Cookson (1969).

With increase in age, there was a consistent trend across all groups and subjects for the less stable to be more successful academically. A similar pattern was found in Britain for young children: high N scores were associated with poor performance (Butcher et al., 1963; Entwistle and Cunningham, 1968).

From this study it appears that the Ugandan results are essentially similar to those obtained with British children, especially the youngest age group.

This is highly interesting for one would expect that, with this young group, home background variables would play a large part, whereas the similarity of the results across cultures suggests otherwise. What is perhaps indicated is the strong influence of British educational methods prevailing in Uganda.

Gover (1975) attempted, among other things, to determine whether there was a significant relationship between scores on the extraversion and neuroticism scales of the EPI and the academic achievement of 55 architecture and planning university students. They were administered the EPI on their first day on campus and, at the end of the Spring Quarter, grade point averages were compiled.

Gover found that there was no significant correlation between extraversion, on the one hand, and both the academic achievement of the sample in course-work within the College of Architecture and Planning, and the overall university achievement of the sample, on the other.

Mehryar, Hekmat and Khajavi (1975) asked United States university students the question, "Do you regard yourself as an academically successful student?" The group that answered the question "yes" (N = 312) was compared with the group that answered "no" (N = 170) on the Psychoticism-Extraversion-Neuroticism Scale (PEN) and on Lanyon's Psychological Screening Inventory (PSI). A comparison of the two groups on the nine personality variables covered by the PEN and the PSI showed that academic success, as rated by the subjects themselves, was significantly associated with low psychoticism, neuroticism and discomfort, but with high extraversion and defensiveness.

Warburton (1968), Entwistle (1972) and Honess and Kline (1974) reported that, at the later secondary and university levels, introverts, possibly the more unstable ones, perform significantly better than extraverts, and that, at the early secondary and primary school levels, stable extraverts significantly outperform unstable introverts. Orpen (1976) designed a study to investigate whether these reports about other cultures held among two different South African groups, deliberately chosen because of their adherence to unlike cultural norms and values.

The subjects were Xhosa-speaking Blacks and Afrikaans-speaking Whites. The black group comprised 46 males and 36 females (mean age= 14,6 years) attending a rural secondary school, and 38 males and 31 females (mean age=20,2 years) attending a university established exclusively for blacks. The white group comprised 48 males and 40 females (mean age= 14,0 years) attending a rural secondary school in a predominantly "Afrikaans" area of South Africa, and 40 males and 41 females (mean age=19,6 years) attending an Afrikaans-medium university.

The black and white school samples completed Xhosa and Afrikaans versions of the JEPI, respectively, while the black and white university students completed Xhosa and Afrikaans versions of the EPI, respectively. Academic attainment was taken as the average percentage marks obtained by the subjects in their year-end examinations.

With both the black and white school children, three of the four correlations between extraversion and academic success were positive and significant ($p < 0,05$). Only the correlation between extraversion and academic success among the white females failed to reach significance.

Among black and white university students, three of the four correlations between extraversion and academic success were significantly negative ($p < 0,05$) (p. 221), the other being non-significant.

Orpen's results offer cross-cultural support for the view that extraversion is more important for success at school, as against introversion at university. The relation between neuroticism and academic success is not as strong as that between extraversion and success. For instance, of the eight correlations only three were significant ($p < 0,05$). The two correlations that were significantly negative, indicating that stability is more important than instability for success, were both at the school level, one among the whites and the other among the blacks. The one correlation that was significantly positive, indicating that instability is more important than stability for success, was at the university level, among the black females. An examination of the directions of the correlations revealed a consistent trend in both the white and black groups for stability to be associated with school success and instability or neuroticism with university success, although the overall relationship was fairly weak (p. 222).

The most important general finding was that the pattern of relationships between extraversion and neuroticism, on the one hand,and academic attainment, on the other, was similar in both the white and black groups, despite their very different socio-cultural backgrounds. In addition, the South African results were essentially similar to those found with Ugandan and British school children and to some, though not all, of those found with British and American university students. They can be regarded as offering firm cross-cultural support for the existence of an age effect to which Entwistle (1972) drew attention.

Brar (1976) studied the relationship between introversion-extraversion and neuroticism, on the one hand, and academic achievement, on the other, among Army Educational Corps personnel. One hundred and ninety subjects consisting of 70 non-commissioned, 70 junior commissioned and 50 commissioned officers were selected randomly as a sample. Introversion-extraversion and neuroticism were measured by the Hindi version of the MPI prepared by Jalota, while academic achievement was measured through the army examinations. The data were analysed separately for the three ranks.

Significant negative correlations between academic achievement and neuroticism were found among all three **ranks.** The correlations between academic achievement and extraversion were also negative and significant in the case of non-commissioned and commissioned officers. However, it was positive and significant for junior commissioned officers. Age did not have any relationship with neuroticism and extraversion.

In Newfoundland, **Griffiths** and Crocker (1976) found only a slight tendency for introverts to attain better grades in first-year college chemistry. Actually these investigators were attempting to relate personality differences to different teaching methods but found no interaction between individualized and conventional approaches to teaching chemistry to first-year college students. Paramesh (1976) found no relationship between extraversion or neuroticism, measured by the EPI, and performance in seven different subject areas among 155 high school boys in India.

Goh and Moore (1978) found generally negative correlations between extraversion and grade point averages among 78 university students, 48 vocational technical institute students, and 49 high school students in the United States. There were no significant differences between groups on Eysenck Personality Questionnaire extraversion scores, indicating that differential

correlations were not the result of different levels of extraversion at the three educational levels. The negative correlation between extraversion and achievement was significant only at the university level and was much higher for a group of science students than for social studies students.

The PEN (Eysenck and Eysenck, 1968b) was administered to 128 Turkish university students (78 males, 50 females; mean age=23 years) and its Persian version (Irfani, 1978a) to 209 university students (94 males, 115 females; mean age=22 years) and 101 high school pupils (69 males, 32 females; mean age= 17 years) in southern Iran by Irfani (1978b).

Following Mehryar et al. (1975), the test item, "Do you regard yourself as an academically successful student?", was appended to the inventory as the criterion for self-rated academic success. Taking the mean extraversion score of each sample as its norm, groups of extraverts (+1 S.D. or more) and introverts (-1 S.D. or less) were drawn separately from each of the three samples.

A comparison of self-rated academic success among extraverts and introverts showed that among the Turkish students, 13 of the 28 extraverts and only 5 of the 20 introverts rated themselves successful ($X^2 = 4,01$; $p < 0,05$). Among the Iranian university students, 33 of the 53 extraverts and only 24 of the 55 introverts rated themselves as academically successful ($X^2 = 3,04$; $p < 0,1$). Similarly, in the Iranian high school group, 20 of the 26 extraverts and only 11 of the 23 introverts rated themselves academically successful ($X^2 = 3,28$; $p < 0,1$), (Irfani, 1978b, p. 510). Although Irfani said that the comparisons seemed to indicate that the possibility that a student would rate himself academically successful was likely to be greater when the student was extraverted rather than introverted, the present author must point out that all the differences did not reach a desired level of significance, viz., the 5% level and beyond.

The present writer observed from some of the studies reviewed above (e.g., Stedman and Adams, 1972; Elliott, 1972; Jensen, 1973; Banks and Finlayson, 1973) and some to be outlined below (e.g., Barton et al. 1974; Seddon, 1975) that there is another trend that appears consistently in the study of introversion-extraversion in relation to academic performance. Extraverts are superior to introverts at the preschool and primary school ages, up until perhaps 12-15 years of age. Then a transition occurs, and beyond that level the opposite trend is noticed. Although the correlation between extraversion and achievement is not large on either side of the transition period, the relationship is consistently positive before age 12 or 13 and consistently negative after age 15 or 16. Literature reviews by Entwistle (1972) and Anthony (1973) support this conclusion, and results of more recent studies are also consistent with this finding. Entwistle found extraverts, particularly stable extraverts, to be superior to introverts up until age 13 in studies using Eysenck's scale and until age 12 or 14 in studies using the Cattell scales, all in Great Britain. Researchers, using both scales, show introverts to be superior beyond that age level. Although the majority of studies in the United States have been of the older age groups, the same trend appears.

Warburton (1968), in a survey of the effects of introversion-extraversion and neuroticism on academic performance, pointed out that there were considerable age differences, depending on the maturity of the subjects. At the primary school level, extraverts tended to do better than introverts, whereas the opposite trend was found at university. Eysenck and Eysenck (1969a) summarized the position by claiming that, at the tertiary level of education, the neurotic introvert is the most successful student in comparison with the neurotic extravert, stable introvert and stable extravert.

Barton, Bartsch and Cattell (1974) collected data that appear to apply to the beginning of the transition period. Large samples of both sixth and seventh graders were administered intelligence and achievement tests and Cattell's High School Personality Questionnaire, which yielded scores on anxiety and extraversion, at 6-month intervals over a 12-month period. The only findings relating to extraversion that are reported in the article indicate a change over time in its relationship with social studies grades. Initially, extraverts scored significantly higher than introverts, but from 6 months to 1 year later they were equal to the introverts in social studies scores. Over this time span all subjects improved, but introverts improved more than extraverts. Interestingly, both extremes, introverts and extraverts, scored significantly higher than a group of ambiverts. It seems that the subjects in this study were passing the transition stage mentioned above, the characteristic of which appears to be that introverts were catching up and equalised with the extraverts by the time the end of the seventh grade was reached. Apparently, however, these results apply only to social studies.

In a study by Seddon (1975), a sample of 741 15- to 19-year-old chemistry students at various educational levels was used. Employing multiple regression analysis, he found that introversion-extraversion was significantly related to achievement in chemistry, but not to IQ. For the sample as a whole, there was a negative correlation between extraversion and achievement in chemistry, an indication that, for these students, the transition had already occurred. More important, however, there was an interaction between extraversion and age, indicating that the negative correlations between extraversion and performance increased at each age level so that the superiority of introverts over extraverts continued to increase with each year of experience. A few weeks after the above-mentioned data were collected, the same subjects were exposed to a nine-

session self-instructional chemistry programme (Seddon, 1977). According to pre- and post-treatment scores on a background chemistry test, there was an interaction, as in the earlier data, between extraversion and age.

Although, throughout most of the literature, there is some general agreement among authors as to the age effect described above, there are differences in opinion as to the interpretation of how the effects occurs. Entwistle (1972) discussed the differences in terms of different responses to social motivation on the part of introverts and extraverts and indicated that the introvert is a late developer educationally because the social motivations so important in early school years are not as important to the introverted as to the extraverted child. However, at more advanced levels of education, social motivation took second place to individual or intrinsic motivation in the educational process at which point the introvert was best suited to educational attainment. It is true that good study habits, including self-discipline, consistency, and perseverance, are related to introversion and are an important factor in academic success at the later grade levels.

Anthony's (1973) interpretation of these same findings was a bit different. He also viewed studies that indicated that developmental changes in the level of extraversion parallel the age trends outlined above. In addition, he cited cross-sectional studies that indicated that extraversion increased in the general population until about age 14 and then began to decline from that point throughout the life-span. On the other hand, the development of ability followed a linear progression, increased until the 20s before it levelled off. Anthony felt that plotting these two curves together provided an explanation for the transition in superiority from extraverts to introverts in the educational realm. He made the dubious assumption that a person who was a late developer in reaching the peak in extraversion would also be a late developer in attaining the peak of ability.

The superiority of the extraverted child arose from the fact that he or she was an early developer both in terms of personality and ability; as long as both lines were "increasing" in parallel fashion, say up to age 13, there was a positive relationship between extraversion and ability. At that point, however, extraversion reached a peak and began to decline, whereas, ability continued to increase so that, beyond the age of 13 or 14, the person who was more advanced in both personality and ability was progressively becoming more able and less extraverted, hence the negative correlation between extraversion and ability beyond age 14. This explanation did bring to attention the important fact that it simply could not be assumed that the same individuals who were introverted at age 9, and performed more poorly than extraverts, were the ones who were also more introverted at age 16, and performed better than extraverts. Anthony suggested, in fact, that those who were introverted at an earlier age and performed more poorly were the ones who were more extraverted at the age of 16 (because they reached their peak later) and continued to perform poorly. Thus, whereas one position held that the level of introversion-extraversion remained the same and the academic performance changed, the other position assumed that the level of performance stayed the same and the degree of introversion-extraversion changed.

A more recent report indicated that both changes occurred simultaneously. Anthony (1977) reported an analysis of longitudinal data collected in 1969 by Rushton. Two hundred and sixty-six children were tested at age 10-11 and again at age 15-16 with intelligence, mathematics, and Cattell's 16 PF tests. As expected, correlations between extraversion, on the one hand, and the intellectual and academic variables, on the other, changed from positive to negative as a function of time, especially for English. Correlations with change scores from the first to the second testing indicated that the students

who were capable initially became relatively more introverted with age; in addition, the students who were more introverted initially became relatively more capable with age. Also, the seemingly contrasting relationships were similar in magnitude. Whatever the explanation, the age by personality effect seems to be an agreed-upon finding in the study of educational processes.

The foregoing review of the literature on the association between introversion-extraversion and neuroticism, on the one hand, and academic performance, on the other, provides information which is equivocal. Many researchers have suggested that, among school children, introversion was associated with good academic performance (Furneaux, 1956; Lynn, 1959; Lynn and Gordon, 1961; Savage, 1962; Child, 1964; Eysenck, 1965a; Gibbins and Savage, 1965; Entwistle and Cunningham (among boys), 1968; Lewis and Ko, 1973; Banks and Finlayson, 1973; Goh and Moore, 1978). However, there were other authors who put forward the reverse view, namely, that among school children, extraversion was associated with academic success (Rushton, 1966; Savage, 1966; Ridding, 1967; Warburton, 1968; Entwistle and Cunningham, 1968; Eysenck and Cookson, 1969; Stedman and Adams, 1972; Lewis and Ko, 1973; Jensen, 1973; Honess and Kline, 1974; Orpen, 1976). Yet others indicated that there was no relationship between these variables. (Callard and Goodfellow, 1962; Frost, 1969; Mehryar et al., 1973; Paramesh, 1976).

Furneaux (1956), Broadbent (1958), Bendig (1960), Savage (1962), Warburton (1968), Whittaker (among female students) (1969), Entwistle and Wilson (1970), Mann and Rizzo (1972), Brar (1976), Orpen (1976), Griffiths and Crocker(1976) and Goh and Moore (1978) indicated that introversion was associated with high academic performance among university students. Cortes

(1968), Whittaker (among male students) (1969), Cowell and Entwistle (1971), Kline and Gale (1971) and Gover (1975) claimed that there was no relationship between these variables among university students.

Savage (1962; 1966), Butcher et al. (1963) and Entwistle and Cunningham (1968) found neuroticism to be associated with superior academic performance among school children.

While Furneaux (1956) and Lynn (1959) claimed that neuroticism was associated with superior academic performance among university students, Brar (1976) suggested that,among army personnel,neuroticism was associated with poor academic attainment. Bendig (1960), Eysenck and Cookson (1969), Whittaker (1969), Entwistle and Wilson (1970) and Kline and Gale (1971) found no significant relationship between neuroticism and academic success among university students.

While Entwistle and Cunningham (1968) found that,among school children, stable extraverted girls performed well academically, Eysenck and Cookson (1969) found unstable extraverts to be superior in academic performance. Entwistle and Cunningham (1968) found that stable introverted boys tended to be superior to stable extraverts, neurotic introverts and neurotic extraverts in attainment,while Eysenck and Cookson (1969) found that unstable extraverted boys performed poorly.

In view of the foregoing contradictory findings and claims, the present researcher intended to re-examine cross-culturally the relationship between introversion-extraversion and neuroticism, on the one hand, and academic performance, on the other, using Indian high school and university students.

Many studies supported the age by personality interactive effect on academic performance (e.g.,Stedman and Adams,1972; Elliott, 1972; Jensen, 1973; Banks and Finlayson, 1973; Barton et al., 1974; Seddon, 1975). Also,these

studies revealed that the relationship between academic performance and extraversion was consistently positive before age 12 or 13 and consistently negative after age 15 or 16, the period between these two age limits being referred to as the transition period. Because of these facts, the present researcher controlled for age, as already indicated in Chapter Two. Also, it was ensured that the mean age of the high school pupils taking the various subjects (Tables XC and XCI) was at least 16 years so as to be outside the transition period. Because the university students were older, there were no problems with them in this regard.

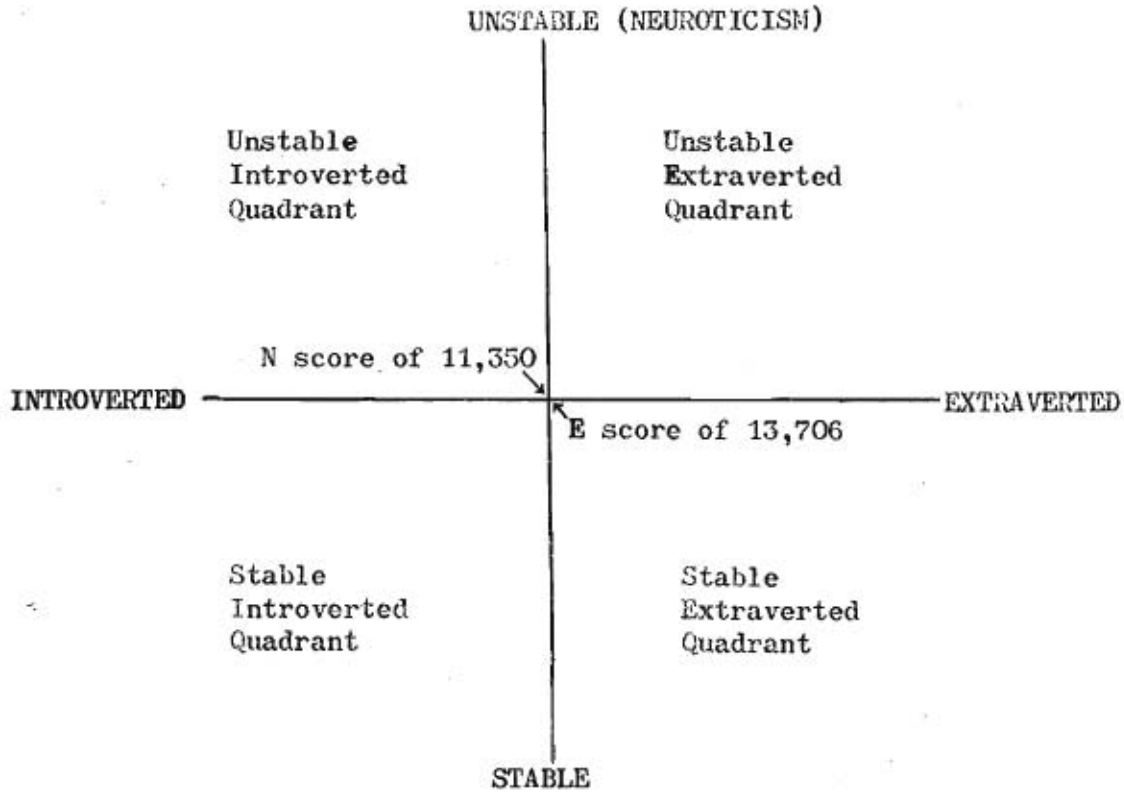
(B) METHOD

The total university sample comprised 575 students (mean age=18,37 years, S.D.=0,87 years), 287 males (mean age=18,50 years, S.D.=0,75 years) and 288 females (mean age=18,24 years, S.D.=0,97 years) drawn from the Departments of English, Chemistry and Psychology of the University of Durban-Westville. Further details regarding the means and standard deviations of ages, and the total and selected number of students of each sex from each of the departments are given in subsequent tables listing the results.

The total high school sample comprised 549 pupils, 246 males and 303 females. For the total and selected groups, the means and standard deviations of the ages of pupils and the numbers in each academic subject are listed in the subsequent tables detailing the results.

To test three of the four hypotheses concerned with introversion-extraversion in relation to academic performance, i.e.,the first four hypotheses listed on p. 56 , Chapter One, the E scores of the students were correlated with the academic performance (marks) of the students. In order to test the fourth hypothesis, that,at university level,there is a significant difference in attainment between neurotic introverted students and other personality types, i.e.,neurotic extraverts, stable extraverts and

stable introverts, the analysis of variance technique was used. The total year marks of the students falling into four "zones", as explained in Chapter One, were compared. Every student had a particular N and E score above or below the mean for the scale. The two scales were arranged at right-angles to each other with the origin at the means (N = 11,350; E = 13,706, for the total Psychology I group), forming four quadrants or "zones" (Child, 1964, p. 189) as illustrated below:



Although the high school students were tested in standard 9, the marks they obtained in their common matriculation examination held months later, which became available during the writing of this report, were used. These marks were chosen in preference to school marks because they were based on an examination common to all students from the various schools and, thus, overcame the difficulty of different standards and methods of marking across schools.

For university students, the class year marks were used as a measure of academic performance. Examination marks were not used because students who failed to obtain a class year mark of at least 40 per cent were not allowed to sit for the examinations. If the examination marks were used, the results would not have been representative since the students who performed poorly throughout the year would have already been excluded from the sample.

Chemistry I and English I students were chosen as representative of the first-year university students in the Faculties of Science and Arts, respectively, because most science students have to take at least one course in chemistry and most arts students take English. In addition, the two Departments were used because it helped to overcome the difficulty of different standards and methods of marking across departments.

The literature suggested that students of language subjects are more extraverted than science students and also that, at university level, introverts have a superior level of academic performance to extraverts. In view of these facts, if the chemistry or English students were used to test the hypotheses that there is a significant difference between introverts and extraverts with regard to academic performance at university, and that, at university level, there is a significant difference in attainment between neurotic introverted students and other personality types, they would have constituted biased samples. Therefore, the researcher chose to use the Psychology I students for these analyses.

(C) RESULTS

Tables LVII to LXII, inclusive, indicate that no significant differences were found between the sexes on E, N and L among the Psychology I students. Therefore, in testing the hypothesis, that, at university level, there is a significant difference in attainment between neurotic introverted students and other personality types, the scores of both sexes were pooled. Based on the total group's mean E score of 13,706 and a mean N score of 11,350, 48 students

fell into the unstable introvert, 48 into the unstable extravert, 55 into the stable extravert and 46 into the stable introvert quadrants.

The selected group of Psychology I students (L score of 4 and below) numbered 143 and had mean E and N scores of 14,176 and 12,062, respectively. Based on these scores of the selected group, 35 students fell into the unstable introverted, 26 into the unstable extraverted, 40 into the stable extraverted and 42 into the stable introverted zones.

The following ANOVA table indicates that there were no significant overall differences in academic performance between the four sub-groups of the total group of psychology students.

TABLE LXXXII

ANOVA OF ACADEMIC PERFORMANCE OF FOUR SUB-GROUPS OF THE PSYCHOLGY I STUDENTS[1] (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
Between Groups	270,421	3	90,140	1,330	> 0,05
Within Groups	13085,660	193	67,801		
TOTAL	13356,081	196			

The following ANOVA table indicates that there were no significant overall differences in academic performance between the four sub-groups of the selected group of psychology students.

[1] The source data from which this table was derived are given in Appendix H.

TABLE LXXXIII

ANOVA OF ACADEMIC PERFORMANCE OF FOUR SUB-GROUPS OF THE PSYCHOLOGY I STUDENTS (SELECTED GROUP)[1]

Source of Variation	SS	df	MS	F	P
Between Groups	29,41	3	9,803	0,138	> 0,05
Within Groups	9890,66	139	71,156		
TOTAL	9920,07	142			

Tables LXXXIV and LXXXV present the correlations between the extraversion, neuroticism and lie scores, on the one hand, and academic performance (class year marks) in psychology, on the other, of the total group of 197 (mean age= 18,48 years) and selected group (L scores of 4 and below) of 143 (mean age=18,38 years) Psychology I students, respectively.

[1] The source data from which this table was derived are given in Appendix H.

TABLE LXXXIV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE PSYCHOLOGY I STUDENTS[1] (TOTAL GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	77	18,66	0,785	- 0,094	- 0,103	- 0,085
Females	120	18,36	1,315	0,114	- 0,229*	- 0,102

TABLE LXXXV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE PSYCHOLOGY I STUDENTS[1] (SELECTED GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	53	18,64	0,839	- 0,128	0,018	- 0,145
Females	90	18,23	0,864	0,136	- 0,211*	- 0,145

The results indicate that in both groups there were no significant relationships between introversion-extraversion and academic performance for either sex. However, a significant negative relationship between neuroticism and academic performance among females was evident for the total and selected groups indicating that the less neurotic females perform significantly better academically in psychology than the more neurotic females ($p < 0,05$)

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[1] The probability levels given below were computed by the method described in the footnote on p. 46).

p	:	0,05	0,01	0,001
r (n = 77)	:	0,225	0,296	0,378
r (n = 120)	:	0,179	0,236	0,301
r (n = 53)	:	0,269	0,354	0,453
r (n = 90)	:	0,208	0,274	0,350

In Tables LXXXVI and LXXXVII the correlations between academic performance (class year mark) in English for the total group of 170 English I students (mean age=18,51 years) and the selected group (L scores of 4 and below) of 127 English I students (mean age=18,45 years), respectively, on the one hand, and extraversion, neuroticism and lie scores, on the other, are presented.

TABLE LXXXVI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE ENGLISH I STUDENTS[1] (TOTAL GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	74	18,80	0,817	- 0,022	0,187	- 0,089
Females	96	18,29	0,598	0,056	- 0,179	- 0,006

TABLE LXXXVII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE ENGLISH I STUDENTS[1] (SELECTED GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	57	18,77	0,792	0,057	0,300**	- 0,179
Females	70	18,20	0,464	0,101	- 0,279**	- 0,096

[1] The probability levels given below were computed by the method described in in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 74)	:	0,228	0,300	0,384
r (n = 96)	:	0,201	0,265	0,339
r (n = 57)	:	0,260	0,342	0,437
r (n = 70)	:	0,234	0,308	0,394

Among the total and selected groups of English I males and females, there was no significant relationship between introversion-extraversion and academic performance. However, there was a significant positive relationship for males ($p < 0,05$) and a negative relationship for females ($p < 0,05$) between neuroticism and academic performance among the selected group of English I students. This indicates that, in these groups, the more neurotic males had a significantly better academic performance in English than the less neurotic, while the opposite relationship held for the females.
It must be pointed out again that, throughout this report, it is the results of the selected group that are considered "valid". The reasons for this have already been given in Chapter One.

Tables LXXXVIII and LXXXIX present the correlations between academic performance (class year mark) in chemistry for the total group of 208 Chemistry I students (mean age=18,16 years) and the selected group (L scores of 4 and below) of 137 Chemistry I students (mean age=18,14 years), respectively, on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE LXXXVIII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE CHEMISTRY I STUDENTS (TOTAL GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	136	18,26	0,585	- 0,179*	- 0,026	- 0,053
Females	72	17,99	0,536	- 0,164	- 0,088	0,258*

TABLE LXXXIX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE CHEMISTRY I STUDENTS[1] (SELECTED GROUP)

Sex	Number	$\bar{X}$ Age (Years)	S.D.	E	N	L
Males	83	18,30	0,611	- 0,112	- 0,191	- 0,149
Females	54	17,90	0,520	0,047	- 0,095	0,025

For the total group of Chemistry I males, there was a significant negative relationship ($p < 0,05$) between extraversion and academic performance and, for the females, a significant positive relationship ($p < 0,05$) between the lie scores and academic performance in chemistry. However, both these relationships are of doubtful "validity" because, as reflected in Table LXXXIX, they ceased to be significant when the high lie scorers were excluded. The issue of high lie scores indicating doubtful "validity" has been discussed previously (p. 44).

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 136)	:	0,169	0,222	0,284
r (n = 72)	:	0,231	0,304	0,389
r (n = 83)	:	0,216	0,285	0,364
r (n = 54)	:	0,267	0,351	0,449

Table XC gives the correlations between academic performance (examination marks) by school subjects, on the one hand, and extraversion, neuroticism and lie scores, on the other, of the total group of high school boys.

TABLE XC

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE HIGH SCHOOL BOYS[1] (TOTAL GROUP)

School Subjects	Number	$\bar{X}$ Age(Yrs)	S.D.	E	N	L
English (H.G.)[2]	199	16,92	0,580	- 0,046	0,049	- 0,134
English (S.G.)[3]	46	17,02	0,665	0,129	0,301*	- 0,050
Afrikaans (H.G.)	197	16,91	0,573	- 0,124	0,098	- 0,079
Afrikaans (S.G.)	49	17,03	0,677	- 0,020	0,223	0,178
Physical Science (H.G.)	79	16,75	0,443	- 0,236*	0,017	- 0,181
Biology (H.G.)	151	16,85	0,559	- 0,100	0,087	- 0,066
Biology (S.G.)	60	17,14	0,660	- 0,010	0,206	- 0,148

[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 199)	:	0,139	0,183	0,234
r (n = 46)	:	0,292	0,385	0,492
r (n = 197)	:	0,140	0,184	0,236
r (n = 49)	:	0,283	0,372	0,476
r (n = 79)	:	0,222	0,292	0,374
r (n = 151)	:	0,160	0,211	0,269
r (n = 60)	:	0,255	0,336	0,430

[2] H.G. : Higher Grade

[3] S.G. : Standard Grade

The terms "higher grade" and "standard grade" have already been explained in the footnote on p. 101.

Table XCI gives the correlations between academic performance (examination marks) by school subjects on the one hand, and extraversion neuroticism and lie scores, on the other, of the selected group of high school boys (L scores of 4 and below).

TABLE XCI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE HIGH SCHOOL BOYS[1] (SELECTED GROUP)

School Subjects	Number	$\bar{X}$ Age(Yrs)	S.D.	E	N	L
English (H.G.)[2]	82	16,94	0,586	- 0,029	- 0,009	- 0,200
English (S.G.)[3]	13	16,91	0,638	0,035	0,338	0,166
Afrikaans (H.G.)	79	16,92	0,573	- 0,152	0,051	- 0,153
Afrikaans (S.G.)	16	17,03	0,677	0,000	0,273	0,221
Physical Science (H.G.)	29	16,78	0,396	- 0,512**	- 0,018	- 0,334
Biology (H.G.)	61	16,86	0,555	- 0,128	- 0,042	- 0,265*
Biology (S.G.)	24	17,18	0,653	- 0,046	0,040	0,100

[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 82)	:	0,218	0,287	0,367
r (n = 13)	:	0,566	0,745	0,953
r (n = 79)	:	0,222	0,292	0,374
r (n = 16)	:	0,506	0,666	0,852
r (n = 29)	:	0,370	0,488	0,624
r (n = 61)	:	0,253	0,333	0,426
r (n = 24)	:	0,409	0,538	0,688

[2] H.G. : Higher Grade

[3] S.G. : Standard Grade

Table XC indicates that, among the total group of high school boys, there was a negative relationship between extraversion and academic performance in physical science (higher grade) and a positive relationship between neuroticism and academic performance in English (standard grade), both the relationships being significant at the 0,05 confidence level.

Table XCI indicates that the relationship between neuroticism and academic attainment in physical science (higher grade), for the selected group of high school boys, still held, but, at a higher level (0,01) of significance, while the correlation between neuroticism and academic attainment in English (standard grade) was no longer significant. In addition, the negative association between lie scores and academic performance in biology (higher grade), observed in Table XC, now attained significance at the 0,05 confidence level. These relationships indicate that, among high school boys, the less extraverted performed significantly better academically in physical science (higher grade) than the more extraverted and that, in biology (higher grade), those with lower lie scores performed significantly better than those with higher lie scores.

Tables XCII and XCIII present the correlations between academic performance (examination marks) by school subjects, on the one hand, and extraversion, neuroticism and lie scores, on the other, of the total and selected (L scores of 4 and below) groups of high school girls, respectively.

TABLE XCII

CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE HIGH SCHOOL GIRLS[1] (TOTAL GROUP)

School Subjects	Number	$\bar{X}$ Age(Yrs)	S.D.	E	N	L
English (H.G.)	267	16,75	0,504	0,089	- 0,028	- 0,166**
English (S.G.)	36	17,34	0,622	0,075	0,178	- 0,123
Afrikaans (H.G.)	263	16,73	0,475	0,076	0,038	- 0,136*
Afrikaans (S.G.)	40	17,44	0,631	0,183	0,162	- 0,043
Physical Science (H.G.)	65	16,53	0,423	0,088	- 0,132	0,009
Biology (H.G.)	211	16,68	0,473	- 0,035	- 0,036	- 0,054
Biology (S.G.)	73	17,24	0,604	- 0,081	- 0,126	- 0,116

[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 267)	:	0,120	0,158	0,202
r (n = 36)	:	0,331	0,436	0,558
r (n = 263)	:	0,121	0,159	0,204
r (n = 40)	:	0,314	0,413	0,528
r (n = 65)	:	0,245	0,322	0,412
r (n = 211)	:	0,135	0,178	0,228
r (n = 73)	:	0,231	0,304	0,389

TABLE XCIII

CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF THE HIGH SCHOOL GIRLS[1] (SELECTED GROUP)

School Subjects	Number	$\bar{X}$ Age (Yrs)	S.D.	E	N	L
English (H.G.)	156	16,75	0,494	0,202*	0,047	- 0,214**
English (S.G.)	18	17,19	0,615	0,195	- 0,042	- 0,387
Afrikaans (H.G.)	154	16,72	0,460	0,093	0,090	- 0,090
Afrikaans (S.G.)	20	17,38	0,625	0,488*	0,111	0,055
Physical Science (H.G.)	34	16,49	0,426	0,356*	- 0,082	- 0,293
Biology (H.G.)	121	16,66	0,454	0,005	0,063	- 0,050
Biology (S.G.)	40	17,22	0,566	- 0,246	- 0,225	0,078

It is evident from Table XCII that, among the total group of high school girls, there were significant negative relationships between lie scores, on the one hand, and academic performance in English (higher grade) ($p < 0,01$) and Afrikaans (higher grade) ($p < 0,05$), on the other. However, Table XCIII reflects that among the selected group of girls, the significant relationship for English (higher grade) was maintained, while the relationship for Afrikaans (higher grade) was not significant. This indicates that the higher lie scorers had a significantly poorer academic performance in English (higher grade) than the lower lie scorers. In addition, there were significant positive

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[1] The probability levels given below were computed by the method described in the footnote on p. 46.

p	:	0,05	0,01	0,001
r (n = 156)	:	0,157	0,207	0,265
r (n = 18)	:	0,475	0,626	0,800
r (n = 154)	:	0,158	0,209	0,267
r (n = 20)	:	0,450	0,592	0,757
r (n = 34)	:	0,341	0,449	0,574
r (n = 121)	:	0,179	0,236	0,301
r (n = 40)	:	0,314	0,413	0,528

relationships ($p < 0,05$) between extraversion, on the one hand, and academic performance in English (higher grade), Afrikaans (standard grade) and physical science (higher grade), indicating that the more extraverted girls had significantly better academic performances in these subjects than the less extraverted.

(D) DISCUSSION OF RESULTS

This investigation showed no significant positive relationship between extraversion and academic performance in psychology among first-year university students. This supports the findings of Cortes (1968), Whittaker (among male students) (1969), Cowell and Entwistle (1971), Kline and Gale (1971) and Gover (1975).

The results of this investigation also revealed no significant relationship between any of the personality types, namely, unstable introverts, unstable extraverts, stable extraverts and stable introverts, on the one hand, and academic performance in psychology, on the other, among first-year university students. This finding, therefore, does not corroborate the findings of Entwistle and Cunningham (1968) or those of Eysenck and Cookson (1969). There is also no significant relationship between academic performance in English and chemistry, on the one hand, and extraversion, on the other, for either sex, among university first-year students. These results tend to support the view expressed by Morris (1979) that "there is simply no relationship between extraversion-introversion and scholastic performance in ... (non-western) cultures" (p. 98).

While there is no significant relationship between extraversion and academic performance in the language subjects (English and Afrikaans), either for the higher or standard grades among the boys, there is a significant positive relationship between academic performance in English (higher grade) and extraversion, among girls.

In the case of the relationship between extraversion and performance in physical science (higher grade), it is significant for both sexes, but negative for boys and positive for girls. This indicates that the less extraverted boys performed better than the more extraverted in physical science while, among the girls, the situation was **reversed.**

The writer cannot advance a convincing explanation for the above-mentioned sex reversals. The view of Entwistle and Welsh (1969, p. 62) that "the behaviour of extraverted girls may well be more social and less aggressive than that of the boys and so they avoid academic deterioration" may be advanced, but it does not explain why there are sex reversals in academic performance in relation to introversion-extraversion in English (higher grade), Afrikaans (standard grade) and physical science (higher grade), but not in the other academic subjects.

(E) CONCLUSION

The hypothesis that there is a significant difference between introverts and extraverts with regard to academic performance, as stated on p. 56, was not confirmed.

The hypothesis that, at university level, there is a significant difference in attainment between neurotic introverted students and other personality types, namely, neurotic extraverts, stable extraverts and stable introverts (p. 56), **was also not confirmed.**

Further, there was no confirmation of the hypothesis that there is a significant difference between the academic performance of introverted and extraverted students in the language subjects, among university and male high school students (p. 56). The hypothesis was confirmed for female high school

students for English (higher grade) and Afrikaans (standard grade).

The hypothesis that introverted science students differ significantly from their extraverted colleagues in their academic performance in science subjects, as stated on p. 56 , was confirmed for high school students. The relationship was negative for males and positive for females.

As indicated in Chapter One (p. 56), the next chapter will describe the relationship between extraversion, neuroticism and lie scores, on the one hand, and study habits, on the other. Chapter Twelve will, therefore, test the following hypotheses, as mentioned on pp. 56-57:-

(1) There is a significant difference between introverts and extraverts with regard to study habits.

(2) Introverts and extraverts differ significantly in the amount of time that they spend on studies.

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CHAPTER TWELVE

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO STUDY HABITS

(A) INTRODUCTION

One of the recurrent themes to be found in educational research involves the attempt to unravel the complex determinants of academic attainment. Early work concentrated on intelligence as the explanatory variable and this is still the most effective single predictor of school achievement. Subsequently, a wide variety of research reports has drawn attention to the importance of environmental factors in scholastic achievement. Environment affects both the development of intelligence and the level of achievement. It must be noted that any attempt to understand the causal chain associated with school attainment must include the effect of personality factors on the child's academic performance. Personality factors are involved in shaping a student's study habits. Since it appears from research evidence that personality variables are important determinants of study habits, as will be shown below, this chapter investigates specifically the relationships of extraversion, neuroticism and lying, which are central traits of personality, to study habits. As indicated in Chapter One (pp. 56-57), the following hypotheses will be tested:-

(a) There is a significant difference between introverts and extraverts with regard to study habits and attitudes.

(b) Introverts and extraverts differ significantly in the amount of time that they spend on studies.

(B) REVIEW OF THE LITERATURE

Estabrook and Sommer (1966) investigated the influence of personality factors on the choice of study places. A 12-item questionnaire dealing with study habits and the MPI were administered to 130 students in introductory psychology classes. The group was then divided into approximate

thirds on the basis of the subjects' scores on the MPI, those with scores between 3 and 22 being regarded as introverts, between 23 and 31 as a "middle" group, and between 32 and 46 as extraverts. All differences between the three groups were evaluated by chi-square tests.

Although no significant differences appeared between the three groups with regard to the time of day that they reported as being the most effective for study, introverts, as compared with extraverts, spent more time studying on Friday nights. Introverts tended to study while sitting at a desk or table, while extraverts preferred to sit on a couch or a bed. Extraverts also snacked considerably more than introverts ($p < 0,001$), and smokers tended to smoke more while studying ($p < 0,01$). Over 95% of the 130 subjects took breaks during study periods, but there was a significant trend for extraverts ($p < 0,02$) to spend the break with other people. Finally, there was an interesting trend ($p < 0,05$) for introverts to earn higher grade point averages than extraverts : 41% of the introverts reported grade point averages of B or better, as compared with 27% of the "middle" group and 24% of the extraverts.

While these differences do not mean that study guides must be prescribed like medicine, according to the individual's personality, they do suggest some degree of flexibility in planning, so that an individual can select the kind of arrangement he wants and adapt it to his needs.

Research has also demonstrated a relationship between scores on personality inventories, on the one hand, and motivation and study methods, on the other. Lynn and Gordon (1961) found that introverts were more persistent than extraverts on an intelligence test, and Furneaux (1962) reported that introverts spent more time on private study. In Aberdeen, Wilson (1968) investigated the personality and study methods of arts and science students using individual interviews before examinations.

He was able to show not only that the students who failed at the end of the first year tended to be unstable extraverts, but also that these students admitted to poor note-taking during lectures.

Entwistle and Wilson (1970) addressed themselves to the question of the extent to which personality differences interact with study methods in their relation to good examination results. A questionnaire and the EPI were given to 72 graduates, 35 men and 37 women, who were attending the Diploma in Education Course at Aberdeen University. These students were asked to relate the questions to their activities in the previous year - the year leading up to "finals". Lastly, they were asked to give a record of their examination performance as undergraduates. It was found that the most successful students reported having had better study methods (X^2 = 12,69; df = 2; $p < 0,01$) and higher motivation (X^2 = 10,41; df = 2; $p < 0,01$) than the weaker students (p. 150).

However, Entwistle and Wilson (1970) cautioned that one could not read too much into this particular finding, as the students were providing retrospective information. This may have tempted some of the weaker students to rationalize their poor showing in the final examinations by attributing to themselves poor study methods and low motivation.

Entwistle and Entwistle (1970) studied the relationship between personality and study methods. Their sample consisted of 257 students. One hundred and thirty-nine (96 men and 43 women) were at university taking a wide range of courses and 118 (40 men and 78 women) were in a college of education, all first year. They were asked to complete a "Student Attitudes Questionnaire" which included a section on study methods and either Form A or Form B (randomly allocated) of the EPI. The questionnaire and inventory yielded four scores - motivation, study methods, extraversion, and neuroticism. The section of the questionnaire

relating to study methods included a question on the number of hours spent studying during the previous week.

Previous academic achievement was assessed as the sum of A-level grades. A criterion of academic performance at the end of the first year of higher education was also obtained. The criterion used for the university students was the sum of marks from three subjects. Marks from each subject were scaled to produce an arbitrary, but equal, standard deviation for each department. The authors pointed out that it was not possible to apply the same procedure to the marks received from the college, but all students had taken one common examination (education). This, they took to provide the most reliable criterion, though they pointed out that its validity might well be challenged.

There is fairly close agreement between the results obtained by Entwistle and Entwistle (1970) and those obtained by Entwistle and Wilson (1970). Motivation and study methods were found to be related to academic performance, though the correlations were not consistenly significant. The correlation between number of hours worked and attainment just failed to reach significance among university students, but was near zero in the college sample. There was further support for the mounting evidence that the introvert tends to make a successful student but no support for the superiority of the neurotic student. As in the Aberdeen study, the relationship between neuroticism and academic performance was not found to be significant.

The Aberdeen study suggested that unstable introverts show higher motivation scores than other personality types, and that better study methods are to be found among the stable introverts. The results obtained by Entwistle and Entwistle (1970) are in broad agreement with these findings. High

motivation at university was related to introversion and to neuroticism. High scores on the study methods scale were related to introversion, and also to stability. There was a tendency for neurotic introverts to work longer hours than other personality types, but this was only found among university men. In several of these relationships there seemed to be indications of sex differences, in particular, on the motivation dimension. However, because of the small numbers, firm conclusions could not be drawn.

The results obtained by Entwistle and Entwistle (1970) have confirmed and amplified the results obtained previously in Aberdeen. The successful student in both college and university tended to have below average scores on extraversion together with high scores on the study methods and motivation scales. There was a clear link between good study methods and both introversion and stability, though some highly motivated students had higher scores on neuroticism.

In order to examine the relationship between personality and study attitudes, Cowell and Entwistle (1971) used 117 first- and second-year students studying for the British Ordinary National Certificate. All of them were trainee technicians employed in the construction industry. Extraversion and neuroticism were measured by the EPI and study attitudes by the Brown-Holtzman Survey of Study Habits and Attitudes. The researchers compared the study orientation scores using a zonal analysis (Eysenck, 1967b). To form personality types, the extraversion and neuroticism scores were dichotomized near the median value (extraverts 14+; unstable students 11+). Three categories of "study orientation" scores (110+ = high; 80-109 = medium; 79 - = low) were used in the chi-square analysis. The stable introverts emerged as a distinctive group with good study methods (X^2 : unstable extraverts versus stable introverts = 6,31; df = 2; $p < 0,05$) (p. 86).

The results presented by Cowell and Entwistle (1971, p. 87) indicated that stable introverts scored significantly higher than the other three groups, namely, unstable extraverts, stable extraverts and unstable introverts,

on "study orientation" ($p < 0,01$), "study habits" ($p < 0,05$) and "study attitudes" ($p < 0,01$). Only on the "work methods" scale did the stable introverts fail to score significantly higher than the other three groups.

There was overall agreement in the findings among the 117 students that the stable introverts had the best academic performance and study methods. In addition, introverts were assessed more favourably by their teachers than extraverts. No significant correlations between neuroticism and academic attainment were found. There was consistency also in the findings on study methods. Stable introverts were found to have significantly better study methods than the other personality "types".

(C) METHOD

In the present investigation, in order to determine the relationships between extraversion, neuroticism and lie scores, on the one hand, and study habits, on the other, scores on the EPI were correlated (Pearson r) with scores on the SSHA. As explained in Chapter Two (p. 68), the SSHA was adminstered to the high school subjects only. Therefore, the aforementioned correlations were computed only for high school subjects.

As also indicated in Chapter Two (p. 68), the EPI and the biographical questionnaire which contained a question on "number of hours studied per week" (Appendix B), were administered to both high school and university students. Therefore , the relationships between extraversion, neuroticism and the lie scores, on the one hand, and the number of hours studied per week, on the other, were investigated among both groups of students.

It must be pointed out that the correlations between scores on the EPI, on the one hand, and the SSHA and the number of hours studied per week, on the other, were worked out, firstly, for the whole group (labelled "total group") and then for only those subjects whose lie scores were 3 and below (labelled "selected group"). This was done because, during the course of analysis,

the researcher discovered significant correlations between lie scores and study habits which suggested that the higher lie scorers reported better study habits than the lower lie scorers. The researcher also wanted to establish and report results with the high lie scorers (Eysenck and Eysenck, 1964a) excluded, something which, surprisingly, no one had done before.

(D) RESULTS

The tables given below report all the correlations between extraversion, neuroticism and lie scores, on the one hand, and study habits, on the other. As explained previously (Chapter One, p. 44), it was the results of the selected group[1] that were accepted as "valid". It was also pointed out in Chapter Two (p. 62), that high scores on the SSHA indicated favourable study habits and attitudes while low scores indicated unfavourable study habits and attitudes.

Table XCIV provides the correlations between delay avoidance, i.e., the extent to which a pupil promptly completes his assignments, avoids delay and is not inclined to waste time (du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other.

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[1] See footnote on p.126 for definitions of "total" and "selected" groups.

TABLE XCIV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN DELAY AVOIDANCE (VU/DA) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,093*	- 0,099	- 0,079	0,014	- 0,143	0,147
N	- 0,315***	- 0,366***	- 0,358***	- 0,241***	- 0,287**	- 0,214*
L	0,319***	0,354***	0,326***	0,181*	0,291**	0,054

There is a significant negative relationship ($p < 0,05$) between extraversion and delay avoidance for the total group of boys and girls combined.

The negative relationship between neuroticism and delay avoidance is significant at the 0,001 confidence level for the total group of boys and girls combined, for the total group of boys, the total group of girls and for the selected group of boys and girls combined. This negative relationship is also significant for the selected group of boys and for the selected group of girls, although the probability levels attenuate to 0,01 and 0,05, respectively. These results consistently indicate that the subjects who are lower on neuroticism report that they avoid delay[2] in their studies significantly more frequently than the subjects who are higher on neuroticism.

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

[2] It must be noted that delay avoidance in regard to study habits is a positive characteristic.

There is a significant positive relationship ($p < 0,001$) between the lie scores and delay avoidance for the total group of boys and girls combined, for the total group of boys, and for the total group of girls. However, when the high lie scorers are excluded from the sample, the significance level attentuates to 0,05 for the boys and girls combined, 0,01 for the boys, and to non-significance for the girls.

Table XCV presents the correlations between work methods, i.e., pupils' use of effective study methods, efficiency in doing assignments and the extent to which school work is done in the most effective way (du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE XCV

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN WORK METHODS (WM/WM) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	0,060	- 0,010	0,138*	0,148*	0,035	0,288***
N	- 0,257***	- 0,294***	- 0,303***	- 0,237***	- 0,301**	- 0,167
L	0,118**	0,162*	0,104	- 0,016	0,082	- 0,128

[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

The results indicate that extraversion is positively related ($p < 0,05$) to work methods for the total group of girls. However, when the high lie scorers are excluded, the significance level rises to 0,01 for this group. This indicates that the more extraverted girls report better work methods than the less extraverted. Although the correlation coefficient for the selected group of boys and girls combined attains significance, the result is accepted with some reservation because of the unequal number of boys and girls (despite the numerical difference being relatively small), and because of the fact that the significant relationship obtained for the girls could have contributed to the relationship attaining significance when the boys and girls were combined to form one group.

Neuroticism is negatively related ($p < 0,001$) to work methods for the total group of boys and girls combined and for the total groups of boys and girls separately. However, when the high lie scorers are excluded, the negative relationship weakens to the 0,01 level for the selected group of boys and the relationship for the selected group of girls is no longer significant. These results indicate that, among boys, the more neurotic individuals report poorer study methods than the less neurotic.

A positive significant relationship was observed between the lie scores and work methods for the total group of boys and girls combined and for the total group of boys. However, when the high lie scorers are excluded from the sample, the relationships for these groups lose their statistical significance.

Table XCVI presents the correlations between study habits, i.e., a pupil's academic behaviour (du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE XCVI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN STUDY HABITS (SG/SH) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,023	- 0,062	0,026	0,073	- 0,062	0,240*
N	- 0,314***	- 0,364***	- 0,364***	- 0,264***	- 0,325***	- 0,210*
L	0,244***	- 0,286***	0,242***	0,092	0,209*	- 0,041

The results indicate that there is a significant positive correlation ($p < 0,05$) between extraversion and study habits for the selected group of girls. This means that the more extraverted girls report better study habits than the less extraverted girls.

There is a significant negative correlation at the 0,001 confidence level between neuroticism and study habits for all the groups, except for the selected group of girls where the correlation coefficient is significant at the 0,05 confidence level. These results unequivocally indicate that the more neurotic students report very significantly poorer study habits than the less neurotic students.

The relationship between the lie scores and study habits is significant at the 0,001 confidence level for the total group of boys and girls combined, for the total group of boys and for the total group of girls. However, when the high lie scorers are excluded, a significant relationship remains for only the selected group of boys, and that, at the attentuated 0,05 confidence level.

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

In Table XCVII the correlations between teacher approval, i.e., pupils' attitude toward the teacher's classroom behaviour and methods (described previously in Chapter Two, p. 62 and defined by du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other, are given.

TABLE XCVII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN TEACHER APPROVAL (OG/TA) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,095*	- 0,103	- 0,079	- 0,064	- 0,150	0,023
N	- 0,160***	- 0,207**	- 0,208**	- 0,106	- 0,154	- 0,107
L	0,135**	0,166*	0,149*	0,164*	0,210*	0,126

The results indicate a significant negative relationship ($p < 0,05$) between extraversion and teacher approval for the total group of boys and girls combined. However, the relationship is no longer statistically significant when the high lie scorers are excluded.

There is a significant negative relationship between neuroticism and teacher approval for the total group of boys and girls combined ($p < 0,001$), for the total group of boys ($p < 0,01$) and the total group of girls ($p < 0,01$). All these relationships cease to be statistically significant when the high lie scorers are excluded.

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

The relationship between the lie scores and teacher approval is significant for the total group of boys and girls combined ($p < 0,01$), for the total group of boys ($p < 0,05$) and the total group of girls ($p < 0,05$). When the high lie scorers are excluded from the sample, the statistical significance is attenuated for the selected group of boys and girls combined ($p < 0,05$), maintained for the selected group of boys and becomes non-significant in the case of the selected group of girls. For similar reasons to those given previously (p. 316), when explaining why the relationships between neuroticism and work methods (Table XCV) for the selected group of boys and girls combined were accepted with reserve, the present association between the lie scores and teacher approval for the selected group of boys and girls combined is also accepted with reserve.

It has been pointed out earlier (Chapter One, p. 44) that the results of the sample with the high lie scorers excluded, i.e., the results of the selected group, are accepted as "valid". Accordingly, from the results given below, the only relationship that can be accepted without reservation is that the higher lie scorers among the boys report significantly greater teacher approval than the lower.

Table XCVIII gives the correlations between education acceptance, i.e., the extent of pupils' acceptance of educational ideals, objectives, practices and requirements (du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other.

TABLE XCVIII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN EDUCATION ACCEPTANCE (AO/EA) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,040	- 0,048	- 0,027	- 0,004	- 0,042	0,014
N	- 0,211***	- 0,246***	- 0,245***	- 0,134	- 0,234*	- 0,087
L	0,180***	0,259***	0,125	0,052	0,111	0,003

The relationship between extraversion and education acceptance is not significant for any of the groups.

The association between neuroticism and education acceptance is significant for the total group of boys and girls combined, the total group of boys and the total group of girls, all the relationships being significant at the 0,001 level. When the high lie scorers are excluded, however, only the coefficient for the selected group of boys remains significant, and that at a lower confidence level ($p < 0,05$).

The correlation between the lie scores and education acceptance is significant ($p < 0,001$) for the total group of boys and girls combined and for the total group of boys. However, when the high lie scorers are excluded, the coefficients for both groups cease to be statistically significant.

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

The results indicate that the only "valid" relationship is that the boys with higher neuroticism scores report significantly less education acceptance than the boys with lower neuroticism scores.

The correlations between study attitudes, as defined in Chapter Two, p. 62 , on the one hand, and extraversion, neuroticism and lie scores, on the other, are detailed in the table given below.

TABLE XCIX

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN STUDY ATTITUDES (SH/SA) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,079	- 0,087	- 0,062	- 0,041	- 0,114	0,021
N	- 0,200***	- 0,246***	- 0,245***	- 0,131	- 0,208*	- 0,109
L	0,173***	0,230***	0,157*	0,127	0,185*	0,078

The results indicate that the relationships between extraversion and study attitudes do not reach significance for any of the groups.

Neuroticism is significantly related negatively ($p < 0,001$) to study attitudes for the total group of boys and girls combined, for the total group of boys and for the total group of girls. However, when the high lie scorers are excluded, the relationship is significant only for the selected group of boys, but is attenuated ($p < 0,05$).

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

The relationship between the lie scores and study attitudes is significant at the 0,001 confidence level for the total group of boys and girls combined and for the total group of boys, and at the 0,05 level for the total group of girls. When the high lie scorers are excluded from the sample, the correlation coefficient remains significant for only the selected group of boys, but is attenuated ($p < 0,05$).

From these results, the "valid" (as defined in Chapter One, p. 44) relationships indicate that the more neurotic boys report significantly poorer study attitudes in comparison with the less neurotic boys. Also, among boys, the higher lie scorers report better study attitudes than the lower.

The correlations between study orientation, i.e., an overall measure of pupils' study habits and attitudes (du Toit, 1974, p. 7), on the one hand, and extraversion, neuroticism and lie scores, on the other, are given in the table below.

TABLE C

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN STUDY ORIENTATION (SO) AND EXTRAVERSION, NEUROTICISM AND LIE SCORES[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 4 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,056	- 0,083	- 0,018	0,018	- 0,096	0,142
N	- 0,287***	- 0,338***	- 0,343***	- 0,222**	- 0,303**	- 0,175
L	0,231***	0,287***	0,220***	0,117	0,210*	0,022

The correlation coefficients indicate that there is no significant relationship between extraversion and study orientation for any of the groups.

Neuroticism is significantly correlated negatively with study orientation for all the groups except the selected group of girls. The significance level, however, attenuates from 0,001 for the total groups to 0,01 for the selected group of boys and girls combined and for the selected group of boys.

The lie scores are significantly related to study orientation for the total group of boys and girls combined, the total group of boys and the total group of girls. When the high lie scorers are excluded, however, the relationship is significant only for the group of boys, and that at an attenuated confidence level ($p < 0,05$).

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

The "valid" relationships indicate that, for the boys, the more neurotic individuals report a significantly poorer study orientation than the less neurotic and the higher lie scorers report a significantly better study orientation than the lower.

The observed significant relationship between neuroticism and study orientation for the selected group of boys and girls combined must be accepted with some reservation for the following reasons: (a) Despite the relatively small numerical difference between the sex groups (22), the group comprises an unequal number of boys (N = 117) and girls (N = 95) (b) The significant relationship observed for the separate group of boys could possibly contribute to the observed significant relationship among the selected group of boys and girls combined.

The following table presents the correlations between the total number of hours per week devoted to study, on the one hand, and extraversion, neuroticism and lie scores, on the other, for the high school students.

TABLE CI

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN TOTAL NUMBER OF HOURS PER WEEK DEVOTED TO STUDY AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF HIGH SCHOOL STUDENTS[1]

	Including L Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 240 Boys; 240 Girls	N = 240 Boys	N = 240 Girls	N = 117 Boys; 95 Girls	N = 117 Boys	N = 95 Girls
E	- 0,105*	- 0,193**	- 0,007	- 0,055	- 0,242*	0,100
N	- 0,030	- 0,055	- 0,122	0,090	0,024	0,045
L	0,176***	0,176**	0,245***	- 0,035	- 0,032	- 0,013

The results indicate that there is a significant negative relationship between extraversion and the number of hours per week devoted to study for the total group of boys and girls combined ($p < 0,05$) and for the total group of boys ($p < 0,01$). When the high lie scorers are excluded, the coefficient remains statistically significant for only the group of boys, but at a lower confidence level ($p < 0,05$).

The relationship between neuroticism and the number of hours per week devoted to study is not significant for any of the groups.

While the relationship between the lie scores and the number of hours per week devoted to study is significant for the total group of boys and girls combined ($p < 0,001$), for the total group of boys ($p < 0,01$), and for the total group of girls ($p < 0,001$), the relationships do not remain

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[1] See footnote on pp. 199 and 233 for the keys to the probability levels.

statistically significant for any of the groups when the high lie scorers are excluded.

These results indicate that the only "valid" relationship is that the more extraverted boys report that they spend significantly fewer hours per week on study than the less extraverted boys.

The table below gives the correlations between the total number of hours per week devoted to study, on the one hand, and extraversion, neuroticism and lie scores, on the other, for the university students.

TABLE CII

PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN THE TOTAL NUMBER OF HOURS PER WEEK DEVOTED TO STUDY AND EXTRAVERSION, NEUROTICISM AND LIE SCORES OF UNIVERSITY STUDENTS[1]

	Including Scores of 4 and Above (Total Group)			L Scores of 3 and Below (Selected Group)		
	N = 286 Males; 287 Females	N = 286 Males	N = 287 Females	N = 138 Males; 137 Females	N = 138 Males	N = 137 Females
E	- 0,095*	- 0,228***	0,032	- 0,076	- 0,230**	0,042
N	- 0,044	- 0,065	- 0,034	0,080	0,065	0,085
L	0,097*	0,195***	- 0,008	0,042	0,196*	- 0,110

The results indicate a significant negative relationship between extraversion and the number of hours per week devoted to studies for the total group of university males and females combined ($p < 0,05$) and for the total group of males ($p < 0,001$). However, when the high lie scorers are excluded, the coefficient remains significant for only the group of males ($p < 0,01$). This indicates that the more extraverted males report spending

[1] See footnote on p. 225 for the key to the probability levels.

significantly fewer hours per week on their studies than the less extraverted ones.

There is a significant relationship between the lie scores and the number of hours per week devoted to studies for the total group of males and females combined ($p < 0,05$) and the total group of males ($p < 0,001$). When the high lie scorers are excluded, the relationship remains significant for only the group of males but at an attenuated confidence level ($p < 0,05$). This indicates that, among the males, the higher lie scorers report spending significantly more time on studies than the lower.

(E) DISCUSSION OF RESULTS

In discussing the results, it is only the "valid" relationships that are considered (in the sense that "valid" is defined on p. 44).

With regard to extraversion, the results indicate that the more extraverted girls report better work methods and study habits than the less extraverted ones (Table XCV). Why the more extraverted girls should possess these desirable qualities and not the less extraverted, is not clear. It may be that the former act out their extraversion in a more scholastically acceptable way than do the latter.

The results consistently indicate that boys and girls combined and boys and girls separately, who are lower on neuroticism, report that they avoid delay in their studies significantly more frequently (which is a positive characteristic) (Table XCIV) and have significantly better study habits (Table XCVI) than subjects who are higher on neuroticism. Boys with higher neuroticism scores express significantly poorer education acceptance (Table XCVIII), study attitudes (Table XCIX) and study orientation (Table C) than boys with lower neuroticism scores.

From the previous two sentences, it is evident that neuroticism seems to be a trait that influences study habits and attitudes negatively.

Among boys, the higher lie scorers report significantly more delay avoidance (Table XCIV), better study habits (Table XCVI), greater teacher approval (Table XCVII), better study attitudes (Table XCIX), and study orientation (Table C) than the lower lie scorers. It is questionable as to whether these academic characteristics are really true of the higher lie scorers. Rather, it is more likely that these results reveal the greater eagerness of the higher lie scorers, among boys, to present themselves in a more favourable and acceptable way than the lower lie scorers.

The results also indicate that the more extraverted high school (Table CI) and university males (Table CII) report that they spend significantly less time studying than the less extraverted ones. It may be that the more extraverted males do not act out their extraversion in a scholastically acceptable way. Perhaps the values of the more extraverted males' peer groups tend to be in opposition to high academic attainment. From the definition of extraversion given earlier (p. 43), it is very likely that the more extraverted males will participate in these groups more actively than the less extraverted (introverts), and this may result in the extraverts spending less time on study.

(F) CONCLUSION

The results of this section of the investigation demonstrate that the more extraverted girls report better study habits than the less extraverted ones. The hypothesis stated earlier (Chapter One, p. 56), that there is a significant difference between introverts and extraverts with regard to study habits and attitudes,was, therefore, confirmed for the

girls, but not for the boys.

The study also revealed that the more extraverted males spent less time on their studies than the less extraverted (i.e., the introverted). Therefore, the hypothesis stated earlier (Chapter One, p. 57), that introverts and extraverts differ significantly in the amount of time that they spend on studies was confirmed for the males, but not for the females.

The next chapter takes up the question of whether introversion-extraversion is a significant determinant of choice of academic discipline, and secondarily of neuroticism and lie scores.

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CHAPTER THIRTEEN

EXTRAVERSION, NEUROTICISM AND LIE SCORES IN RELATION TO CHOICE OF ACADEMIC DISCIPLINE

(A) REVIEW OF THE LITERATURE

Possible differences in personality traits among students choosing different disciplines to pursue into future life careers represent another area of investigation by researchers into introversion-extraversion.

Eysenck and Cookson (1969, p. 110) have reported that Hudson (1966) suggested a relationship between introverted personality traits and preference for science. They also pointed out that the findings of MacNitt (1930) and the writings of Hudson (1966) suggest that introversion predisposes pupils towards scientific achievement, and extraversion towards linguistic pursuits (p. 110).

Child (1969, p. 40) referred to Warburton's (1964) study and said that successful students in literary and artistic subjects at universities tend towards extraversion rather than introversion. Child (1969) also referred to biographical and retrospective studies that point to "... a will ... to avoid personal relationships ... as symptomatic of eminent scientists" while "arts specialists were more concerned with people, were sociable ...." (p. 40).

A striking contrast, at sixth form level, was reported by Hudson (1963) who found that science specialists distinguished themselves from arts specialists by tending to be conformist, much less given to emotion, interested in practical hobbies and outdoor pursuits, humourless, pacifist and careful. These traits read very much like those of the classic stable introvert described in Furneaux's studies (1962).

The 1969 study by Child has already been described in Chapter Nine (pp. 205-- 206). Arts and natural science specialists were considered separately by sex. Their neuroticism scores showed a tendency for the means to decrease in the following order: arts women ($\bar{X}$ = 11,9; S.D. = 4,3), science women ($\bar{X}$ = 11,3; S.D. 4,7), arts men ($\bar{X}$ = 10,3; S.D. = 4,1), science men ($\bar{X}$ = 9,4; S.D. = 4,3). The arts women were more neurotic than men from either specialization (arts women versus arts men: $z = 2,3$, $p < 0,05$; arts women versus science men: $z = 4,1$, $p < 0,001$), and,at the other extreme,the science men were found to be more stable than the other three groups (science men versus arts men: $z = 2,0$, $p < 0,05$; science men versus science women: $z = 2,6$, $p < 0,01$; science men versus arts women: $z = 4,1$, $p < 0,001$). Arts and social science students ($\bar{X}$ = 10,9; S.D. = 4,2 for the sexes combined) were found to be more neurotic than the natural science and technology students ($\bar{X}$ = 9,6; S.D. = 4,2) ($z = 3,42$; $p < 0,001$) (p. 42).

Extraversion scores were very much alike for specializations and sexes with the exception of the female science students who were more extraverted when compared with the corresponding male group ($z = 1,98$, $p < 0,05$) (p. 42).

In a study described earlier in the report (pp. 309-311), Entwistle and Entwistle (1970) found that male student teachers from a college of education had a mean extraversion score of 14,4 ,as compared with a corresponding score of 13,0,for university males. The college of education females had a mean extraversion score of 13,8,as against 13,0,for university females (p. 135). They concluded that student teachers have "relatively high extraversion scores" (p. 134). They suggested that further research would be necessary to establish the generality of their finding.

A major weakness of this study was that the researchers did not carry out tests of statistical significance.

In a study described earlier in this report (pp. 166-167), Kanekar and Mukerjee (1972) found that science, as compared with arts students, scored significantly lower on extraversion ($t = 2,02$; $p < 0,05$) and neuroticism ($t = 2,82$; $p < 0,01$).

The study by Mohan and Kumar (1973) reported earlier (pp. 195-196), investigated the relationships between neuroticism and extraversion, on the one hand, and intelligence, on the other. No comparisons were made between the arts and science students on extraversion and neuroticism because such a comparison was not relevant to their study. However, they did provide the following information which enabled the present researcher to compare the arts and science scores of the Mohan and Kumar sample on extraversion and neuroticism (p. 166):-

	Arts (N=168)		Science (N=168)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Neuroticism scores	10,82	5,32	10,54	4,77
Extraversion scores	10,58	4,09	10,45	4,29

Since the authors had indicated that there were no significant differences in neuroticism and extraversion between the sexes (p. 169), the present author combined the males and females to compare the arts and science students on neuroticism and extraversion. The z[1] test revealed that there were no significant differences on both neuroticism ($z = 0,506$; $p > 0,05$)

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[1] The author used the formula given on p. 167.

and extraversion ($z = 0,284$; $p > 0,05$).

All the other studies (MacNitt, 1930; Hudson, 1963; Child, 1964; Hudson, 1966; Kanekar and Mukerjee, 1972), except the one by Mohan and Kumar (1973), have found that science students are more introverted than arts students. While the data from the Mohan and Kumar study (1973) revealed no significant differences in neuroticism between arts and science students, Child (1969) had found earlier that arts women were highest on neuroticism, followed by science women, arts men and, finally, science men.

(B) METHOD

As pointed out in Chapter One (p. 57), first-year students from the Faculties of Education, Arts and Science and the Department of Engineering from the University of Durban-Westville formed the sample of the present study. In the comparisons to be described below, between engineering and education students, and between arts and science students, the subjects were selected at random, by use of tables of random numbers where necessary, in such a way that balanced ANOVA factorial designs resulted for statistical analyses. For some analyses, the z test was used. Two main comparisons were undertaken, namely,

(a) *education versus engineering students on E, N and L, and*
(b) arts (English I) versus science (Chemistry I) students on E, N and L.

The sub-samples used in these comparisons are described below.

(a) Engineering and Education Students

(1) Total Group

For the comparisons between education and engineering students, 120 first-year males[1] were selected, 60 from the Faculty of Education and 60 from the Department of Engineering(mean ages = 18,207 and 18,206 years, respectively). Using the method described previously (pp. 66-67), the 60 students within each group were further subdivided into two equal high- and low-status groups. In this way, four sub-groups were created, namely, education high- and low- and engineering high- and low-status groups.

(2) Selected Group

After the high lie scorers (5 and above[2]) were excluded, there remained 32 education and 32 engineering students (mean ages = 18,091 and 18,167 years, respectively),16 in each of the four socio-economic groups.

(b) Arts and Science Students

(1) Total Group

For these comparisons there were 170 arts and 208 science students (mean ages = 18,292 and 18,233 years, respectively). The arts group comprised 74 males and 96 females (mean ages = 18,799 and 18,787 years, respectively), while there were 136 males and 72 females in the science group (mean ages = 18,256 and 18,190 years, respectively).

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[1] Female students were excluded because, in the year of testing, only two female students had enrolled in the Department of Engineering.

[2] See footnote on p. 88 for an explanation of the use of an L score of 4 or 5 as the cut-off point where inventory answers ceased to be acceptable.

When the F test was used to test the significance of the differences between the arts and science students on neuroticism (p. 362), the sample was reduced to 26 males and 26 females from the Faculty of Arts (mean ages = 17,924 and 17,895 years, respectively) and the same number of males and females from the Faculty of Science (mean ages = 17,843 and 17,927 years, respectively). Each sex group was further subdivided into equal numbers of high- and low-status subjects.

(2) Selected Group

When the high lie scorers (5 and above) were excluded, the selected group comprised 127 arts and 137 science students having mean ages of 18,229 and 18,270 years, respectively.

When the F test was employed to test the significance of the differences between the arts and science students on neuroticism (p. 362), the sample was reduced to 18 males and 18 females from the Faculty of Arts (mean ages = 17,982 and 17,922 years, respectively) and the same number of males and females from the Faculty of Science (mean ages = 17,903 and 17,839 years, respectively). Each sex group was further subdivided into equal numbers of high- and low-status subjects.

(C) RESULTS

As indicated earlier (p. 139), many authors (e.g., Entwistle and Cunningham, 1968; Eysenck and Cookson, 1969; Entwistle and Welsh, 1969; Finlayson, 1970) reported an age factor in extraversion and neuroticism. For this reason, as will be shown below, age was held constant in the present study.

(a) Preliminary Tests to Control for Age in the Four Comparison Groups

Tables CIII and CIV show that the four faculty-status sub-groups, namely, education high and low and engineering high and low, did not differ significantly in age within both the total and selected[1] samples.

TABLE CIII

ANOVA OF THE AGES OF THE FOUR COMPARISON GROUPS[2] (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	0,001	3	0,0003	0,001	> 0,05
Within groups	44,643	116	0,385		
Totals	44,644	119			

TABLE CIV

ANOVA OF THE AGES OF THE FOUR COMPARISON GROUPS[2] (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	1,110	3	0,370	1,069	> 0,05
Within groups	20,758	60	0,346		
Totals	21,868	63			

[1] See footnote on p.126 for definitions of "total" and "selected" groups.

[2] The source data from which these tables were derived are given in Appendix I.

(b) Main Comparisons of the Four Groups on E, N and L

The main comparisons were then made. Tables CV and CVI show that, within both the total and selected groups, the observed differences in extraversion between the education and engineering students and between high- and low-status groups were not significant.

TABLE CV

ANOVA OF THE EXTRAVERSION SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)[1, 2]

Source of Variation	SS	df	MS	F	P
A (Faculty)	57,408	1	57,408	3,700	> 0,05
B (S-E S)	3,008	1	3,008	0,194	> 0,05
AB	14,009	1	14,009	0,903	>0,05
Error	1799,567	116	15,514		
Totals	1873,992	119			

[1] The source data from which Tables CV to CX (inclusive) were derived are given in Appendix I.

[2] Tables CV to CX (inclusive) represent 2 X 2 ANOVA factorial designs for independent measures, adapted from Winer, 1971, pp. 452-463.

TABLE CVI

ANOVA OF THE EXTRAVERSION SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	8,265	1	8,265	0,403	> 0,05
B (S-E S)	0,390	1	0,390	0,019	>0,05
AB	6,892	1	6,892	0,336	>0,05
Error	1229,312	60	20,488		
Totals	1244,859	63			

The following two tables indicate that, for both the total and selected groups, there were no significant differences between the two faculties or the two status groups in neuroticism.

TABLE CVII

ANOVA OF THE NEUROTICISM SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	0,208	1	0,208	0,011	> 0,05
B (S-E S)	1,408	1	1,408	0,076	> 0,05
AB	114,075	1	114,075	6,160	< 0,05
Error	2148,234	116	18,519		
Totals	2263,925	119			

TABLE CVIII

ANOVA OF THE NEUROTICISM SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	0,14	1	0,14	0,010	$>0,05$
B (S-E S)	4,515	1	4,515	0,311	$>0,05$
AB	1,266	1	1,266	0,087	$>0,05$
Error	872,188	60	14,536		
Totals	878,109	63			

The results do indicate a significant faculty by socio-economic status interaction in neuroticism ($F = 6,160$; $p < 0,05$) (Table CVII). This is explained by the fact that, among the education students, the low status group had a higher mean neuroticism score ($\bar{X} = 11,400$) than the high status group ($\bar{X} = 9,233$), whereas, among the engineering students, the reverse held ($\bar{X} = 11,000$ and 9,367, respectively). However, this interaction ceased to be significant when the high lie scorers were excluded (Table CVIII).

Tables CIX and CX present the results of the total and selected groups of subjects, respectively, in lie scores. They indicate that there were no significant differences between the students from the two faculties or from the two social groups on this variable.

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TABLE CIX

ANOVA OF THE LIE SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	0,675	1	0,675	0,192	>0,05
B (S-E S)	0,208	1	0,208	0,059	>0,05
A X B	14,008	1	14,008	3,985	<0,05
Error	407,700	116	3,515		
Totals	422,592	119			

TABLE CX

ANOVA OF THE LIE SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	1,890	1	1,890	1,423	>0,05
B (S-E S)	0,140	1	0,140	0,105	>0,05
A X B	0,391	1	0,391	0,294	>0,05
Error	79,688	60	1,328		
Totals	82,109	63			

The results indicate that there was a significant faculty by status interaction in lie scores. Among the education students, the high socio-economic group had a higher lie score ($\overline{X}$ = 4,233) than the low-status group ($\overline{X}$ = 3,633), whereas, among the engineering students, the reverse held ($\overline{X}$ = 3,400 and 4,167, respectively). However, this interaction ceased to be significant when the high lie scorers were excluded (Table CX).

The present researcher next turned to the second major comparison mentioned earlier (p. 333), namely, arts (English I) versus science (Chemistry I) students on E, N and L. He decided against using the ANOVA technique to compare these groups because many students would have had to be rejected in the process of securing equal numbers of subjects for a balanced factorial design. There would have been only 13 and 9 subjects in each cell for the total and selected groups, respectively. These numbers would have been determined by the chemistry low-status female cell which had the lowest numbers. In order not to lose valuable data, the researcher decided to use the z test in preference to the F test.

However, before the main comparison was attempted, certain preliminary tests, as shown below, had to be made.

(c) Preliminary Tests to Control for Age within the Sex and Status Groups of the Faculty of Arts Samples

It was previously pointed out (p. 139) that age was a variable to be controlled. Tables CXI and CXII show that, for the total and selected groups, respectively, there were no significant age differences between male and female arts students.

TABLE CXI

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY AGE (TOTAL GROUP)

	MALES	FEMALES
$\bar{X}$	18,799	18,787
S.D.	0,817	0,598
N	74	96

$z = 0,105$; $p > 0,05$

TABLE CXII

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY AGE (SELECTED GROUP)

	Males	Females
$\bar{X}$	18,766	18,699
S.D.	0,785	0,461
N	57	70

$z = 0,563$; $p > 0,05$

Tables CXIII and CXIV indicate that, for the total and selected groups, respectively, there were no significant age differences between the high- and low-status arts students.

TABLE CXIII

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY AGE (TOTAL GROUP)

	High S-E S	Low S-E S
$\bar{X}$	18,547	18,447
S.D.	0,770	0,699
N	107	63

$z = 0,862$; $p > 0,05$

TABLE CXIV

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY AGE (SELECTED GROUP)

	High S-E S	Low S-E S
$\bar{X}$	18,503	18,381
S.D.	0,745	0,588
N	75	52

$z = 1,017$; $p > 0,05$

The preliminary tests (Tables CXI to CXIV, inclusive) show that there were no significant age differences between the sexes or between the social-status groups among the total and selected groups of arts students.

(d) Preliminary Tests to Control for Age within the Sex and Status Groups of the Faculty of Science Samples

As in the case of the arts groups, Tables CXV and CXVI reveal that, for the total and selected groups of science students, respectively, there were no significant age differences between the males and the females.

TABLE CXV

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY AGE (TOTAL GROUP)

	Males	Females
$\bar{X}$	18,256	18,190
S.D.	0,585	0,536
N	136	72

$z = 0,815$; $p > 0,05$

TABLE CXVI

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY AGE (SELECTED GROUP)

	Males	Females
$\bar{X}$	18,300	18,223
S.D.	0,607	0,515
N	83	54

$z = 0,794$; $p > 0,05$

Also, Tables CXVII and CXVIII, indicate that, for the total and selected groups, respectively, there were no significant age differences between the high- and low-status science students.

TABLE CXVII

COMPARISON OF THE HIGH AND LOW SOCIO-ECONOMIC STATUS SCIENCE STUDENTS BY AGE (TOTAL GROUP)

	High S-E S	Low S-E S
$\bar{X}$	18,158	18,177
S.D.	0,634	0,454
N	141	67

$z = 0,244$; $p > 0,05$

TABLE CXVIII

COMPARISON OF THE HIGH- AND LOW-STATUS SCIENCE STUDENTS BY AGE

(SELECTED GROUP)

	High S-E S	Low S-E S
$\bar{X}$	18,120	18,207
S.D.	0,641	0,491
N	99	38

$z = 0,779$; $p > 0,05$

The preliminary findings, given in Tables CXI to CXVIII, inclusive, show that there were no significant age differences between the sexes or between the socio-economic status groups among the total and selected groups of science students.

(e) Preliminary Tests of the Similarities/Differences in Extraversion between the Sexes and between the Status Groups within the Faculty of Arts Samples

Tables CXIX and CXX reveal that, for the total and selected groups, respectively, there were no significant differences in extraversion between the arts male and female students.

TABLE CXIX

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY EXTRAVERSION (TOTAL GROUP)

	Males	Females
$\bar{X}$	14,973	14,250
S.D.	3,541	3,963
N	74	96

$z = 1,244$; $p > 0,05$

TABLE CXX

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY EXTRAVERSION (SELECTED GROUP)

	Males	Females
$\bar{X}$	15,368	14,986
S.D.	3,522	3,568
N	57	70

$z = 0,599$; $p > 0,05$

There were also no significant differences in extraversion between the high- and low- status arts students as shown in Tables CXXI and CXXII for the total and selected groups, respectively.

TABLE CXXI

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY EXTRAVERSION

(TOTAL GROUP)

	High S-E S	Low S-E S
$\bar{X}$	14,701	14,333
S.D.	3,654	4,032
N	107	63

$z = 0,591$; $p > 0,05$

TABLE CXXII

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY EXTRAVERSION

(SELECTED GROUP)

	High S-E S	Low S-E S
$\bar{X}$	15,213	15,077
S.D.	3,391	3,772
N	75	52

$z = 0,206$; $p > 0,05$

(f) Preliminary Tests of the Similarities/Differences in Extraversion between the Sexes and between the Status Groups within the Faculty of Science Samples

Tables CXXXIII and CXXIV report that for the total and selected groups, respectively, there were no significant differences in extraversion between the science male and female students.

TABLE CXXIII

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY EXTRAVERSION (TOTAL GROUP)

	Males	Females
$\bar{X}$	12,272	11,264
S.D.	3,980	4,500
N	136	72

$z = 1,59$; $p > 0,05$

TABLE CXXIV

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY EXTRAVERSION (SELECTED GROUP)

	Males	Females
$\bar{X}$	12,795	11,759
S.D.	4,020	4,181
N	83	54

$z = 1,427$; $p > 0,05$

There were also no significant differences in extraversion between the high- and low-status science students, as shown by Tables CXXV and CXXVI, for the total and selected groups, respectively.

TABLE CXXV

COMPARISON OF THE HIGH- AND LOW-STATUS SCIENCE STUDENTS BY EXTRAVERSION (TOTAL GROUP)

	High S-E S	Low S-E S
$\bar{X}$	11,596	12,612
S.D.	4,301	3,875
N	141	67

$z = 1,69$; $p > 0,05$

TABLE CXXVI

COMPARISON OF THE HIGH- AND LOW-STATUS SCIENCE STUDENTS BY EXTRAVERSION (SELECTED GROUP)

	High S-E S	Low S-E S
$\bar{X}$	12,101	13,132
S.D.	4,179	3,847
N	99	38

$z = 1,356$; $p > 0,05$

In view of the fact that the preceding series of preliminary comparisons indicated that there were no significant differences in age (Tables CXI to CXVIII, inclusive) and extraversion between the sexes and status groups among both the arts and science groups (Tables CXIX to CXXVI, inclusive), the various sub-groups were combined under the categories of arts and science, irrespective of sex and status.

(g) Preliminary Tests to Control for Age between the Faculties of Arts and Science Samples

In keeping with the previous statements about the influence of age on EPI scores (p. 139), the ages of the arts and science groups were tested for similarity in Tables CXXVII to CXXXII, inclusive, below.

Table CXXVII shows that there was no significant age difference between the total arts and science groups, with the sexes combined.

TABLE CXXVII

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY AGE (TOTAL GROUP)

	Arts	Science
$\bar{X}$	18,292	18,233
S.D.	0,746	0,583
N	170	208

$z = 0,843$; $p > 0,05$

The table given below reveals that there was no significant age difference between the selected arts and science groups, with the sexes combined.

TABLE CXXVIII

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY AGE (SELECTED GROUP)

	Arts	Science
$\bar{X}$	18,229	18,270
S.D.	0,688	0,605
N	127	137

$z = 0,512$; $p > 0,05$

Tables CXXIX and CXXX, representing the total and selected groups, respectively, show that there were no significant age differences between males from the Faculties of Arts and Science.

TABLE CXXIX

COMPARISON OF THE ARTS AND SCIENCE MALE STUDENTS BY AGE (TOTAL GROUP)

	Arts	Science
$\bar{X}$	18,298	18,256
S.D.	0,817	0,585
N	74	136

$z = 0,389$; $p > 0,05$

TABLE CXXX

COMPARISON OF THE ARTS AND SCIENCE MALE STUDENTS BY AGE (SELECTED GROUP)

	Arts	Science
$\overline{X}$	18,266	18,199
S.D.	0,785	0,607
N	57	83

$z = 0,563$; $p > 0,05$

Tables CXXXI and CXXII, representing the total and selected groups, respectively, indicate that there were no significant age differences between the females from the Faculties of Arts and Science.

TABLE CXXXI

COMPARISON OF THE ARTS AND SCIENCE FEMALE STUDENTS BY AGE (TOTAL GROUP)

	Arts	Science
$\overline{X}$	18,287	18,190
S.D.	0,598	0,536
N	96	72

$z = 1,102$; $p > 0,05$

TABLE CXXXII

COMPARISON OF THE ARTS AND SCIENCE FEMALE STUDENTS BY AGE (SELECTED GROUP)

	Arts	Science
$\bar{X}$	18,199	18,223
S.D.	0,461	0,515
N	70	54

$z = 0,267$; $p > 0,05$

Tables CXXVII to CXXXII, inclusive, reveal that there were no significant differences in age between the arts and science males, females, and males and females combined, for the total and selected groups. Age was, therefore, controlled for the main comparisons between the arts and science groups by E, N and L, within the total and selected samples.

(h) Main Comparisons between the Faculties of Arts and Science Samples by Extraversion

The total and selected groups of arts students were then compared with the total and selected groups of science students, respectively, in extraversion. The tables below indicate that there were significant differences in extraversion between the arts and science students, males and females combined, the arts students in both the total and selected groups being significantly more extraverted than the science students ($p < 0,001$).

TABLE CXXXIII

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY EXTRAVERSION (TOTAL GROUP)

	Arts	Science
$\bar{X}$	14,565	11,923
S.D.	3,802	4,195
N	170	208

$z = 6,382$; $p < 0,001$

TABLE CXXXIV

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY EXTRAVERSION (SELECTED GROUP)

	Arts	Science
$\bar{X}$	15,158	12,387
S.D.	3,553	4,116
N	127	137

$z = 5,846$; $p < 0,001$

The comparison was also extended to the sex groups. The figures in Tables CXXXV and CXXXVI show that, for the total and selected groups, respectively, there were significant differences between the arts males and the science males in extraversion ($p < 0,001$), the arts males being more extraverted than the science males.

TABLE CXXXV

COMPARISON OF THE ARTS AND SCIENCE MALES BY EXTRAVERSION (TOTAL GROUP)

	Arts	Science
$\bar{X}$	14,973	12,272
S.D.	3,541	3,980
N	74	136

$z = 5,023$; $p < 0,001$

TABLE CXXXVI

COMPARISON OF THE ARTS AND SCIENCE MALES BY EXTRAVERSION (SELECTED GROUP)

	Arts	Science
$\bar{X}$	15,368	12,795
S.D.	3,522	4,020
N	57	83

$z = 3,977$; $p < 0,001$

The significant differences in extraversion observed between the arts and science males were also evident when the arts and science females were compared. As shown in Tables CXXXVII and CXXXVIII below, the comparison revealed that, in both the total and selected groups, respectively, the arts females were significantly more extraverted than the science females ($p < 0,001$).

TABLE CXXXVII

COMPARISON OF THE ARTS AND SCIENCE FEMALES BY EXTRAVERSION (TOTAL GROUP)

	Arts	Science
$\bar{X}$	14,250	11,260
S.D.	3,963	4,500
N	96	72

$z = 4,453$; $p < 0,001$

TABLE CXXXVIII

COMPARISON OF THE ARTS AND SCIENCE FEMALES BY EXTRAVERSION (SELECTED GROUP)

	Arts	Science
$\bar{X}$	14,986	11,759
S.D.	3,568	4,181
N	70	54

$z = 4,501$; $p < 0,001$

As evidenced by Tables CXXXIII to CXXXVIII, inclusive, the arts males, females, and males and females combined were significantly more extraverted than the corresponding groups of science students.

(i) Preliminary Tests of the Similarities/Differences in Neuroticism between the Sex Groups within the Faculties of Arts and Science Samples

In the same way as the arts and science groups were compared on extraversion, so were the groups next compared on neuroticism.

It has already been shown that there were no significant age differences between the groups (Tables CXI to CXVIII, inclusive).

Tables CXXXIX and CXL present the results of the total and selected groups, respectively, when the males and females from the faculty of arts were compared on neuroticism.

TABLE CXXXIX

COMPARISON OF THE MALE AND FEMALE ARTS GROUPS BY NEUROTICISM (TOTAL GROUP)

	Males	Females
$\bar{X}$	10,027	11,281
S.D.	4,913	7,323
N	74	96

$z = 1,326$; $p > 0,05$

TABLE CXL

COMPARISON OF THE MALE AND FEMALE ARTS GROUPS BY NEUROTICISM (SELECTED GROUP)

	Males	Females
$\bar{X}$	10,386	12,171
S.D.	4,905	4,408
N	57	70

$z = 2,115$; $p < 0,05$

The results above reveal that, while there was no significant difference between the males and females of the total group of arts students in neuroticism, the difference between the males and females of the selected group was significant ($p < 0,05$).

When this result was obtained, the researcher did not proceed to compare the socio-economic groups on neuroticism, as was previously done in the case of extraversion. Instead, he proceeded to test whether the observed significant difference among the arts students also held for the science group.

Tables CXLI and CXLII present the results of the total and selected groups, respectively, when the males and females from the faculty of science were compared on neuroticism.

TABLE CXLI

COMPARISON OF THE MALE AND FEMALE SCIENCE GROUPS BY NEUROTICISM (TOTAL GROUP)

	Males	Females
$\bar{X}$	11,066	12,819
S.D.	4,697	4,544
N	136	72

$z = 2,601$; $p < 0,01$

TABLE CXLII

COMPARISON OF THE MALE AND FEMALE SCIENCE GROUPS BY NEUROTICISM (SELECTED GROUP)

	Males	Females
$\bar{X}$	12,072	13,693
S.D.	4,565	4,466
N	83	54

$z = 2,042$; $p < 0,05$

The results given in Tables CXLI and CXLII indicate that, among the science students, there were significant differences between the males and females in neuroticism in both the total and selected groups.

In view of the above-mentioned significant differences, the male and female groups could not be combined. For completeness of results, and, in order to suit the trend of data, the researcher then changed his statistical style and resorted to the use of the F test,

in spite of his original decision, mentioned previously (p. 341), not to use the F test so as not to lose valuable data.

When the researcher had to use the F test, many students had to be rejected in the process of securing equal numbers of subjects for a balanced factorial design. The numbers, 13 and 9 subjects in each cell for the total and selected groups, respectively, were determined, as mentioned previously (p. 341), by the chemistry low-status female cell which had the lowest numbers.

Before the main comparisons were undertaken, certain preliminary tests to control for age between the eight sub-groups, as shown in Tables CXLIII and CXLIV below, had to be done.

(j) Preliminary Tests to Control for Age between the Eight Sub-Groups

ANOVA Tables CXLIII and CXLIV indicate that, for the total and selected groups, respectively, there were no significant overall differences in age between the eight sub-groups, viz., Faculty of Arts males and females of high- and low-status and corresponding groups from the Faculty of Science, that were to be compared on neuroticism.

TABLE CXLIII

ANOVA OF THE AGES OF THE EIGHT SUB-GROUPS (TOTAL GROUP)[1]

Source of Variation	SS	df	MS	F	P
Between groups	0,198	7	0,028	0,179	> 0,05
Within groups	15,003	96	0,156		
Totals	31,324	103			

[1] The source data from which Tables CXLIII to CXLVI (inclusive) were derived are given in Appendix I.

TABLE CXLIV

ANOVA OF THE AGES OF THE EIGHT SUB-GROUPS (SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
Between groups	0,315	7	0,045	0,246	>0,05
Within groups	11,718	64	0,183		
Totals	12,033	71			

(k) Main Comparisons of the Faculty, Sex and Status Groups by Neuroticism

The next two tables (CXLV and CXLVI) reflecting 2 X 2 X 2 ANOVA factorial designs for independent measures (adapted from Winer, 1971, pp. 453-463) show that, for both the total and selected groups, there were no significant differences between the arts and science students, between the males and females and between the high- and low- socio-economic status groups in neuroticism. However, Table CXLVI reveals that there was a significant faculty by sex by status interaction within the selected group.

TABLE CXLV

ANOVA OF THE NEUROTICISM SCORES BY FACULTY, SEX AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	81,385	1	81,385	3,382	> 0,05
B (Sex)	36,962	1	36 962	1,536	> 0,05
C (S-E S)	9,846	1	9,846	0,409	> 0,05
A X B	3,845	1	3,845	0,160	>0,05
A X C	4,654	1	4,654	0,193	>0,05
B X C	7,538	1	7,538	0,313	>0,05
A X B X C	32,347	1	32,347	1,344	>0,05
Error	2310,462	96	24,067		
Totals	2487,039	103			

TABLE CXLVI

ANOVA OF THE NEUROTICISM SCORES BY FACULTY, SEX AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP)

Source of Variation	SS	df	MS	F	P
A (Faculty)	78,125	1	78,125	3,630	> 0,05
B (Sex)	4,014	1	4,014	0,186	> 0,05
C (S-E S)	13,347	1	13,347	0,620	>0,05
A X B	21,125	1	21,125	0,982	>0,05
A X C	30,681	1	30,681	1,426	>0,05
B X C	30,680	1	30,680	1,426	>0,05
A X B X C	100,347	1	100,347	4,663	<0,05
Error	1377,334	64	21,521		
Totals	1655,653	71			

(1) Preliminary Tests of the Similarities/Differences in the Lie Scores between the Sexes and between the Social-Status Groups within the Faculty of Arts

In the same way as the arts and science groups were compared on extraversion and neuroticism, so were the groups next compared on the lie scores. The need to control the factor of age has already been discussed (p. 139) and it has been shown that the effects of this variable were controlled (Tables CXI to CXVIII, inclusive). The z test was employed to test the significance of the observed differences. Reasons for the choice of this technique have already been given (p. 341).

Tables CXLVII and CXLVIII indicate that, for the total and selected groups, respectively, there were no significant differences in the lie scores between the arts male and female students.

TABLE CXLVII

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY LIE SCORES (TOTAL GROUP)

	Males	Females
$\overline{X}$	3,040	3,500
S.D.	1,969	1,826
N	74	96

$z = 1,554$; $p > 0,05$

TABLE CXLVIII

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF ARTS BY LIE SCORES

(SELECTED GROUP)

	Males	Females
$\bar{X}$	2,228	2,614
S.D.	1,325	1,150
N	57	70

$z = 1,723$; $p > 0,05$

There were also no significant differences in the lie scores between the high- and low-status arts students, as indicated in Tables CXLIX and CL, for the total and selected groups, respectively.

TABLE CXLIX

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY LIE SCORES

(TOTAL GROUP)

	High S-E S	Low S-E S
$\bar{X}$	3,579	2,825
S.D.	1,938	1,742
N	107	63

$z = 1,952$; $p > 0,05$

TABLE CL

COMPARISON OF THE HIGH- AND LOW-STATUS ARTS STUDENTS BY LIE SCORES (SELECTED GROUP)

	High S-E S	Low S-E S
$\overline{X}$	2,573	2,250
S.D.	1,202	1,284
N	75	52

$z = 1,417$; $p > 0,05$

(m) Preliminary Tests of the Similarities/Differences in the Lie Scores between the Sexes and between the Social-Status Groups within the Faculty of Science

Tables CLI and CLII, reflect that, for the total and selected groups, respectively, there were no significant differences between the male and female science students in the lie scores.

TABLE CLI

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY LIE SCORES (TOTAL GROUP)

	Males	Females
$\overline{X}$	2,573	2,250
S.D.	1,202	1,284
N	75	52

$z = 1,417$; $p > 0,05$

TABLE CLII

COMPARISON OF THE MALES AND FEMALES WITHIN THE FACULTY OF SCIENCE BY LIE SCORES (SELECTED GROUP)

	Males	Females
$\overline{X}$	3,912	3,583
S.D.	1,942	1,762
N	136	72

$z = 1,228$; $p > 0,05$

There were also no significant differences between the high- and low-status science students in the lie scores as shown in Tables CLIII and CLIV, for the total and selected groups, respectively.

TABLE CLIII

COMPARISON OF THE HIGH- AND LOW-STATUS SCIENCE STUDENTS BY LIE SCORES (TOTAL GROUP)

	High S-E S	Low S-E S
$\overline{X}$	2,638	2,796
S.D.	1,188	1,177
N	83	54

$z = 0,760$; $p > 0,05$

TABLE CLIV

COMPARISON OF THE HIGH- AND LOW-STATUS SCIENCE STUDENTS BY LIE SCORES (SELECTED GROUP)

	High S-E S	Low S-E S
$\overline{X}$	2,667	2,524
S.D.	1,137	1,484
N	99	42

$z = 0,552$; $p > 0,05$

(n) Main Comparisons between the Faculties of Arts and Science Samples by Lie Scores

In view of the fact that the preceding preliminary comparisons indicated that there were no significant differences in age(Tables CXI to CXVIII,inclusive) and in the lie scores between the sexes and between the status groups, these sub-groups,within each faculty,were combined. It has also been shown that, for both the total and selected groups, there were no significant differences in age between the combined sex groups from the Faculties of Arts and Science, between the arts and science males, and between the arts and science females (Tables CXXVII to CXXXII, inclusive). The total and selected groups of arts students, with the sexes combined, were then compared with the corresponding total and selected groups of science students, on the lie scores.

The figures given in Tables CLV and CLVI reveal that, for the total and selected groups, respectively, no significant differences in the lie scores were observed between the arts and science students.

TABLE CLV

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY LIE SCORES (TOTAL GROUP)

	Arts	Science
$\bar{X}$	3,300	3,798
S.D.	1,903	1,888
N	170	208

$z = 2,541$; $p > 0,05$

TABLE CLVI

COMPARISON OF THE ARTS AND SCIENCE STUDENTS BY LIE SCORES (SELECTED GROUP)

	Arts	Science
$\bar{X}$	2,441	2,701
S.D.	1,246	1,186
N	127	137

$z = 1,722$; $p > 0,05$

The figures presented in Table CLVII show that, for the total group, there was a significant difference in the lie scores between the arts and science males, the former scoring significantly lower than the latter ($p < 0,01$).

TABLE CLVII

COMPARISON OF THE MALES WITHIN THE FACULTIES OF ARTS AND SCIENCE BY LIE SCORES (TOTAL GROUP)

	Arts	Science
$\bar{X}$	3,040	3,912
S.D.	1,969	1,942
N	74	136

$z = 3,070$; $p < 0,01$

However, Table CLVIII below indicates that, when the high lie scorers were excluded (viz. for the selected group), the significant difference in the lie scores between males from the Faculties of Arts and Science was no longer evident.

TABLE CLVIII

COMPARISON OF THE MALES WITHIN THE FACULTIES OF ARTS AND SCIENCE BY LIE SCORES (SELECTED GROUP)

	Arts	Science
$\bar{X}$	2,228	2,638
S.D.	1,325	1,188
N	57	83

$z = 1,864$; $p > 0,05$

Tables CLIX and CX reveal that there were no significant differences in the lie scores between the females from the Faculties of Arts and Science for the total and selected groups, respectively.

TABLE CLIX

COMPARISON OF THE FEMALES WITHIN THE FACULTIES OF ARTS AND SCIENCE BY LIE SCORES (TOTAL GROUP)

	Arts	Science
$\bar{X}$	3,500	3,583
S.D.	1,826	1,762
N	96	72

$z = 0,296$; $p > 0,05$

TABLE CLX

COMPARISON OF THE FEMALES WITHIN THE FACULTIES OF ARTS AND SCIENCE BY LIE SCORES (SELECTED GROUP)

	Arts	Science
$\bar{X}$	2,614	2,796
S.D.	1,150	1,177
N	70	54

$z = 0,854$; $p > 0,05$

(D) DISCUSSION OF RESULTS

No significant difference was observed between males from the education and engineering faculties on extraversion. Results on neuroticism and the lie scores were similarly negative.

This study revealed that the arts students were significantly more extraverted than the science students. The finding not only applies to the combined sex groups of arts and science students, but also to the separate groups of males and females from these faculties. These results confirm those obtained by MacNitt (1930), Hudson (1963), Child (1964), Hudson (1966) and Kanekar and Mukerjee (1972). Therefore, the discovery by these researchers, that arts students were significantly more extraverted than science students, can also be extended to apply to Indian South African students.

Results of the comparisons between the sex groups, between the high- and low- socio-economic status groups and between the arts and science faculties on neuroticism and the lie scores, for both the total and selected groups, were negative.

(E) CONCLUSION

The hypothesis that student teachers and engineering students differ significantly in introversion-extraversion (p. 57) was not confirmed for males.

The hypothesis that students of the language subjects (arts) differ significantly from students of the science subjects (science) in introversion-extraversion (p. 57) was confirmed.

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CHAPTER FOURTEEN

GENERAL CONCLUSIONS AND RECOMMENDATIONS

(A) GENERAL CONCLUSIONS

In this final chapter, certain general conclusions will be discussed. Specific conclusions relating to the hypotheses of the research, as formulated in Chapter One, will not be discussed here as this has already been done in the previous chapters and they will be brought together again in the next section, i.e., the summary.

Together with concepts such as "intelligence" and "inferiority complex", introversion-extraversion is among the most widely used psychological term among intelligent laymen. The conclusion from the present investigation is that the concept is also fairly accurately understood by the lay public. This became evident when, with a little assistance to teachers, a very high degree of agreement appeared between EPI and school teachers' classifications of high school boys and girls into introverts and extraverts during the course of the present research.

The construct of introversion-extraversion has a reputable developmental history when compared with the age-old practice of creating traits, types and factors by fiat, i.e., by simple introspective contemplation of reality as it presents itself to the author in question. It is the latter practice which has been responsible for the low regard in which personality research is held by experimental psychologists. Where there are hundreds of claimants in the field, all suggesting different solutions, the experimentalist may, with reason, be doubtful about the rigor with which these different results have been attained. The outstanding fact about systems such as those of Cattell and Guilford, as outlined in Chapter One of this report, is not that they are objective, and based on correlation and factor analysis as often

believed, but rather that they are, in reality, subjective, and based on arbitrary and intuitive judgements.

The building stones of a questionnaire are the items, and objectivity demands that factor analysis should begin at that level, i.e., with the intercorrelation and factor analysis of items. Yet this has, in fact, not been done. Although Guilford, for instance, began by establishing factors on the basis of small-scale factor analyses of some 20 or 30 items, he constructed his inventories on the basis of adding to these items others not selected on the basis of factor analysis, but by intuition and hypothesis. At no time did Guilford or Cattell intercorrelate all the items in their scales in one single analysis to establish the fact that the postulated factors did, in fact, exist, and emerge with the correct items having high loadings on these, and only these, factors.

Only E and N escape this criticism. There are now many studies in the literature based on intercorrelations between items which yield these two factors, and it can be documented that identical items go to make up each factor on different occasions.

Also important, from a fundamental point of view, is the contribution which personality factors may make to the furtherance of personality theory, and the understanding and explanation of human conduct. It is only the higher-order factors which have been found to be capable of integration with our existing knowledge of psychological and physiological facts; both E and N can be understood in terms of such well-established concepts and structures as the limbic system, the visceral brain and the ascending reticular formation (Eysenck, 1967b).

There is little doubt that some higher-order concept, such as introversion-extraversion, is needed to describe the way in which large numbers of simple, first-order traits like sociability, impulsiveness, activity and responsiveness hang together.

Of all the personality factors that have been examined by researchers, only introversion-extraversion and neuroticism have been identified with high consistency in studies carried out on male and female subjects; they appear in different age groups, down to the age of 7; they are replicable in different European and non-European countries; they have appeared in groups of subjects differing widely in education and intelligence. They have been prominent in the psychological literature for about 2000 years, and many researchers, in many countries, using many different types of tests and measures, have unearthed evidence regarding their nature and existence (Eysenck, 1960a).

There is still no agreement about the usefulness, and need for, a psychological understanding of the nature of the tests and factors used in psychological work. Some psychometrists apparently think that statistical expertise in item manipulation can make up for lack of theoretical explanation, but it seems almost self-evident that without such theoretical explanation little improvement can be expected in the sad state of our present knowledge of personality. It is for this reason, more than any other, that it is felt that the factors of extraversion and neuroticism hold far more promise than any of the primary factors mentioned in Chapter One. Extraversion and neuroticism find a ready explanation in theoretical psychology and experimental physiology; primary factors do not offer this advantage.

Introversion-extraversion seems to play in important part in many social areas, school and university attainment, parent-child interaction, vocational choice, academic choice, etc. Researchers have shown all these areas to be susceptible to introversion-extraversion differences and it seems likely that more concentrated work in the future will put the findings on a more secure footing.

The investigation also revealed that the E scale of the EPI, designed by Eysenck and Eysenck to measure extraversion ~~and neuroticism~~, is reliable and valid for use with Indian South African standard 9 students in the 15-18 year age range.

The information presented in the preceeding paragraphs indicate that introversion-extraversion is a viable and measurable trait. It is also worth measuring because it is a significant determinant of behaviour.

(B) RECOMMENDATIONS

(a) More Cross-Cultural Research

In psychological research, greater confidence in, or wider generality for, research findings can be established by producing supporting evidence from a wide variety of samples. The present research produced evidence which corroborated some previous findings, contradicted others, and broke new ground in still other areas. To some extent, this research has demonstrated that not all conclusions derived from Western and certain Eastern cultures are directly applicable to Indian South Africans. In this regard, it is strongly recommended, in view of the dearth of information in the field, that in-depth researches into key personality characteristics, such as introversion-extraversion, be conducted among this ethnic group. This is particularly important because, according to the cultural model of normality, what is accepted as a normal personality characteristic in one culture, need not be so in another.

(b) Reliability and Validity of Measures

It is fairly common for investigators to administer psychological instruments, based on acceptable measures of reliability and validity obtained on other cultures, when conducting researches among Indian South Africans. However, it must be pointed out that the same acceptable degree of reliability and/or validity may not apply to Indian South African samples.

The author recommends that future researchers should determine the reliabilities and validities of all "non-indigenous" personality tests before deciding to administer such tests to this ethnic group. This would lend greater credibility to their findings. It would also contribute to pioneering work in the establishment of a library of "foreign" tests of proven reliability and validity that could be used with Indian South Africans, with little or no modification.

(c) Lie Scores

It has already been pointed out that no previous report on the EPI gave two sets of results, one set including the responses of high lie scores and the other excluding them. Only one categorically stated that the responses of high lie scorers had been excluded from consideration. The results obtained in the present investigation indicated that, in most sets of tables which included and excluded high lie scorers ("total" and "selected" groups, respectively) there were differences in the probability values[1] associated with the two groups. Thus, one must be sceptical about the validity of EPI results that have been derived from samples which included high lie scorers. In this regard, it is recommended that in future research with the EPI, high lie scorers either be excluded or their presence in the sample recognized and allowed for.

It was neither the aim of the present research nor within its scope to make a detailed investigation into the significance of high and low lie scores. However, after the pointers given by the present research, it is suggested that systematic investigations be conducted in this regard.

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[1] These differences appeared in spite of the fact that the total groups included both the high and low lie scorers. It is almost certain that the differences might have been more pronounced, and also perhaps statistically significant, if only the high lie scorers had been compared with only the low.

It could help to clarify the issue of "faking good" on personality questionnaires. Also, it could provide empirical information that may cast new light on the validity of all personality questionnaires, tests and inventories that do not contain built-in "lie detectors".

(d) Parental Interest

The present study indicated that the less extraverted (i.e., the introverted) high school and university boys and girls, combined and separately, perceived their fathers as significantly less interested in their academic standing than their more extraverted counterparts. It is possible that this negative view of their fathers' interest in their studies, held by the introverts, could affect their studies adversely. Further research is called for in order to understand and rectify this situation, if necessary.

(e) Age and EPI

Since age is a significant factor in the pattern of the relationships between introversion-extraversion and academic performance, it is recommended that this relationship be investigated in other age groups as well, for example, children under 12 years old. To date, only one such study has been conducted among Indian South Africans. Balkisson (1980) found consistently positive and significant associations between extraversion and musicality among her sample *of standard 5 boys and girls (mean age = 12,71 years)*.

(f) Neuroticism and Study Habits

This research has shown that psychological factor of neuroticism has an important influence on the study habits and attitudes of high school students. For example, the more neurotic students, boys and girls combined or separately, report significantly less avoidance of delay in their studies and significantly

poorer study habits than the less neurotic, while the more neurotic boys report significantly poorer study methods, education acceptance, study attitudes and study orientation than the less neurotic ones. These aspects need to be researched intensively and appropriate remedial measures adopted, particularly within the educational system.

(g) Neuroticism and Social Service

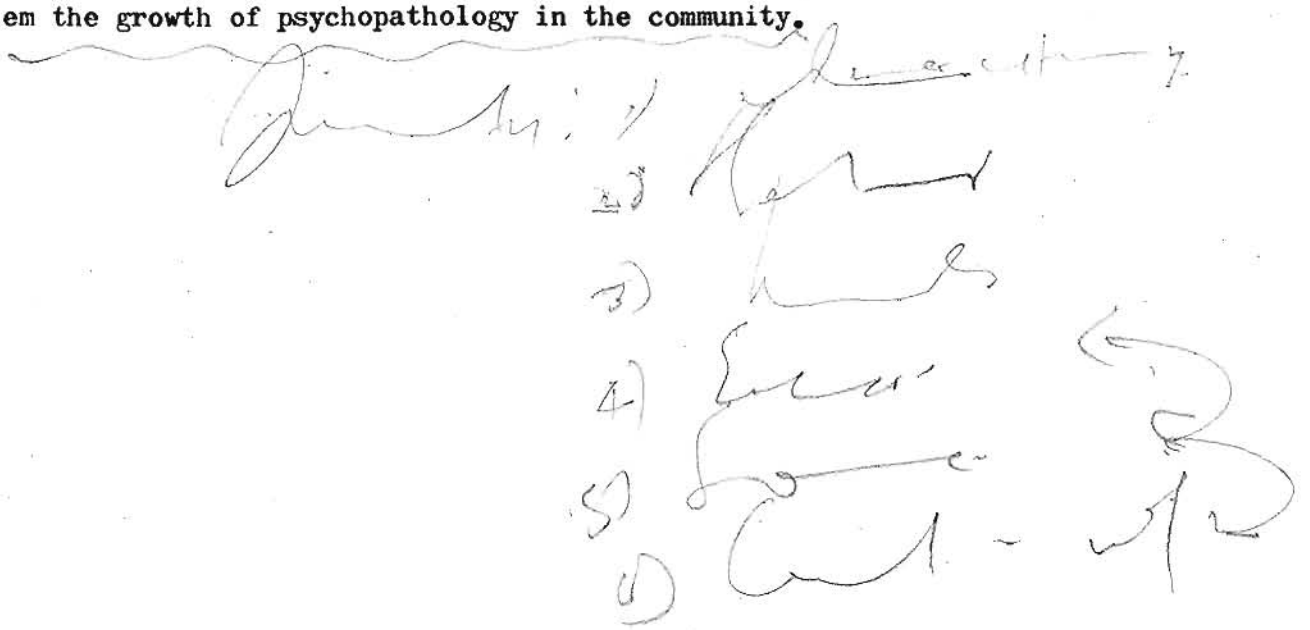
This investigation revealed a high positive correlation between neuroticism and social service. If the personality factor of neuroticism is influencing individuals to choose occupations in the social service area, one could justifiably question the quality and efficacy of the service rendered by such individuals. Therefore, this disturbing finding calls for intensive research in the public interest.

(h) Neuroticism and Mental Health

One set of results in this investigation showed that females had significantly higher neuroticism scores than males. It was speculated that it might be that females were more willing than males to disclose neurotic tendencies. However, if this not the case, and if females are, in fact, more susceptible than males to neurotic reactions, then this possibility has very disturbing implications, some of which are outlined below.

Determined mainly by biological factors, it is the female who remains at home to raise the family. If she is characterized by neurotic tendencies or reactions, which can be transmitted through learning, this does not augur well for the mental health of the family. It is also possible that such a neurotic condition could be the forerunner to the schizophrenogenic mother, particularly if one conceptualizes personality to be on a continuum with normality at one end and psychoticism at the other. It is urged that

priority be given to intensive research, perhaps on a national scale, considering that the family is the heart of a nation and that the rates of psychopathology are ever increasing. Such research may promote mental health and thereby stem the growth of psychopathology in the community.



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SUMMARY

This report describes an investigation into certain correlates of introversion-extraversion among Indian South African high school and university students.

The samples on which the numerous hypotheses were tested were selected, in various combinations, from a pool of more than 500 standard 9 pupils, aged 15 to 18 years, and 600 first-year university students. The subjects were drawn from high schools in and around Durban and the University of Durban-Westville.

The psychological instruments used in the testing were a biographical inventory, Eysenck Personality Questionnaire (EPI), Survey of Study Habits and Attitudes (SSHA) and the Interest Questionnaire for Indian Pupils (IQIP).

Since the EPI and SSHA were "foreign" tests, the researcher took the precaution of first establishing that these tests were reliable and valid for use with his samples, before embarking on the testing of his hypotheses.

In Project One of the research, the problem posed for investigation was: Among Indian students, are there significant relationships between introversion-extraversion, on the one hand, and linguistic and religious affiliation, sex, social status, IQ, family size, parental interest in their children's academic standing, birth order, vocational interests, academic success, study habits and choice of academic discipline, on the other? The corresponding hypotheses were that there were significant differences in introversion-extraversion between the linguistic, religious, sex and social status groups of the samples. Also, it was hypothesized that there were significant relationships between introversion-extraversion and the remaining variables mentioned above.

The testing of these hypotheses revealed that there were no significant differences in introversion-extraversion between (a) Hindi- and Tamil-

speaking high school students, (b) Christian, Hindu and Muslim high school students, (c) male and female high school and university students, and (d) subjects from smaller and larger extended families.

However, when the size of the immediate family was considered, the less extraverted among the high school girls, the university males and females combined and the university males separately, tended to come from larger families than the more extraverted to a significant extent.

It was found that, among high school girls, the more extraverted had significantly higher IQ's than the less extraverted, confirming, for this group, the hypothesized significant relationship between introversion-extraversion and IQ. Also, among both the high school and university students, for the sexes combined and separately, the more extraverted subjects perceived their fathers as being significantly more interested in their academic standing than the less extraverted. The same relationship with regard to the mothers, was not statistically significant for any of the groups.

The investigation revealed that, among university males, the earlier-born subjects were less extraverted than the later-born.

The more extraverted high school boys and girls combined, in comparision with the less extraverted, expressed significantly greater preference for occupations related to the arts, while the more extraverted high school boys expressed significantly greater interest in occupations related to mechanics, than the less extraverted.

In Project Two, the problem investigated was: Among Indian students, are there significant relationships between introversion-extraversion, on the one hand, and academic performance, study habits and attitudes, and choice of academic discipline, on the other? The corresponding hypotheses took the form of affirmative answers to the questions posed above.

The data indicated that, among high school students, the more extraverted females performed significantly better in English (Higher Grade) and Afrikaans (Standard Grade), than the less extraverted, the less extraverted boys performed significantly better in science than the more extraverted, while, among the girls, the situation was reversed.

In regard to study habits and attitudes, the more extraverted girls reported significantly better work methods and study habits than the less extraverted. The more extraverted boys spent significantly less time on their studies than the less extraverted.

The conclusion, with regard to choice of academic discipline, was that the arts university students, male and female combined and separately were significantly more extraverted than their science counterparts.

Although the investigation did not discover any conclusive evidence with regard to introversion-extraversion, the general conclusion was that it is a viable construct that can be measured with a high degree of reliability and validity, even among Indian South Africans. It is also a characteristic that needs to be measured because it is a significant determinant of behaviour.

Following from the findings of the present study, recommendations were made for in-depth research into the cultural influences on personality, reliability and validity of personality tests, the significance of the lie scores on the EPI, parental interest in the academic standing of introverted and extraverted children, the influence of age on the EPI responses, and the influence of neuroticism on study habits. The role of neuroticism on the mental health of individuals in the community, in general, and in the social services field, in particular, also needs intensive investigation.

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APPENDIX A

LIST OF ABBREVIATIONS

AO/EA	....	education acceptance
CPI	....	California Psychological Inventory
DZ	....	dyzygotic
E	....	extraversion
EPI	....	Eysenck Personality Inventory
GT 33	....	Group Test 33 of the National Institute of Industrial Psychology of Great Britain
H.G.	....	Higher Grade
H.S.R.C.	....	Human Sciences Research Council
IQIP	....	Interest Questionnaire for Indian Pupils
JEPI	....	Junior Eysenck Personality Inventory
JMPI	....	Junior Maudsley Personality Inventory
K-R 20	....	Kuder Richardson Formula 20
L	....	lie
MMPI	....	Minnesota Multiphasic Personality Inventory
MMQ	....	Maudsley Medical Questionnaire
MPI	....	Maudsley Personality Inventory
MZ	....	Monozygotic
N	....	neuroticism
OAS	....	Occupational Aspiration Scale
OG/TA	....	teacher approval
OIE	....	Occupational Introversion-Extraversion Scale
PEN	....	Psychoticism-Extraversion-Neuroticism Scale
PEPI	....	Persian form of the Eysenck Personality Inventory
16PF	....	Cattell's 16 Personality Factor Scale
PSI	....	Lanyon's Psychological Screening Inventory
S-E S	....	socio-economic status
S.G.	....	standard grade

APPENDIX A (CONTINUED)

SG/SH	....	study habits
SH/SA	....	study attitudes
SO	....	study orientation
SSHA	....	Survey of Study Habits and Attitudes
SVIB	....	Strong Vocational Interest Blank
VU/DA	....	delay avoidance
WM/WM	....	work methods
YMCA	....	Young Men's Christian Association

APPENDIX B

INFORMATION AND INSTRUCTIONS CONCERNING THIS RESEARCH PROJECT

Your co-operation is required for this research project which is expected to yield information that could be used to assist present and future high school and university students in their studies.

Kindly respond truthfully to all statements and questions. Your answers will be entirely confidential and used for research purposes only.

If you find difficulty in answering any question or do not understand the meaning of any item, please raise your hand without disturbing the others and you will be helped. This, of course, applies if you are working in a group.

Thank you for your co-operation.

2.

BIOGRAPHICAL INVENTORY

1. Name (Surname First): _____

2. Marital Status: _____

3. Kindly place a cross (X) in the box below that applies to you.

I am a (an)	AFRICAN	COLOURED	INDIAN	WHITE

4. Today's Date: _____

5. Date of Birth: _____

6. Age Today: _____ Years _____ (Completed Months)

7. Sex: _____

8. Faculty: _____

   or

   Standard: _____ Division: _____

9. Institution: _____

10. Examination Subjects this Year: _____

    _____

    _____

    _____

    _____

    _____

    _____

11. Father's Religion: _____

12. Mother's Religion: _____

13. Your Religion: _____

14. Father's Mother Tongue (e.g., Hindi, Tamil, etc.): _____

15. Mother's Mother Tongue (e.g., Hindi, Tamil, etc.): _____

3/...

3.

16. Father's Occupation:

(a) Give this in some detail. Write, for example, worker in a factory, machinist, foreman in a factory, clerk, bookkeeper, salesman in a shop, teacher, gardener, commercial traveller, sales rep., hawker, taxi owner, taxi driver, doctor, male nurse, bus owner, bus driver, carpenter, waiter, lawyer, shop owner, barman, building contractor, bricklayer, wine steward, estate agent, motor mechanic, priest, painter, motor car salesman, Corporation worker, policeman, detective, commission agent, lorry, truck or van driver, laboratory assistant, market stall owner, furniture salesman, insurance agent, company director, manager in a firm, etc. Give sufficient details to enable one to tell exactly what father does, e.g., if he is a salesman, state what he sells. If father is not living or is not working, please write what his last work was:-

_____

_____

(b) If you have mentioned some kind of business activity above, place a tick (✓) in the box next to one of the following (but if you have not mentioned a business, do not make any mark at all):

(i) Father has his own business ☐

(ii) Father works for someone else ☐

17. Are you an adopted child?
Answer "yes" or "no". _____

4/...

4.

18. Complete the table below with respect to all <u>living</u> members of your <u>immediate</u> family (including yourself) in order of birth, starting with the eldest. Do not give names but state FATHER, MOTHER, BROTHER, SISTER, SELF. (Don't include any other relatives).

MEMBERS OF THE FAMILY	SEX
(i)	
(ii)	
(iii)	
(iv)	
(v)	
(vi)	
(vii)	
(viii)	
(ix)	
(x)	
(xi)	
(xii)	
(xiii)	
(xiv)	
(xv)	

19. Altogether, how many members of your immediate and extended family (including not only brothers and sisters but others also, e.g., uncles, cousins, grandmother, etc.) live in your home?

_____

5/...

5.

20. In the scale below cross (X) the description which best indicates your father's interest in your studies. (If your father died when you were very young and you cannot remember your father's interest in your studies, write "TOO YOUNG TO REMEMBER" across the table given below.)

1	2	3	4	5	6	7
VERY INTERESTED	INTERESTED	SOMEWHAT INTERESTED	NEITHER INTERESTED NOR UNINTERESTED	SOMEWHAT UNINTERESTED	UNINTERESTED	VERY UNINTERESTED

21. In the scale below cross (X) the description which best indicates your mother's interest in your studies. (If your mother died when you were very young and you cannot remember your mother's interest in your studies, write "TOO YOUNG TO REMEMBER" across the table given below).

1	2	3	4	5	6	7
VERY INTERESTED	INTERESTED	SOMEWHAT INTERESTED	NEITHER INTERESTED NOR UNINTERESTED	SOMEWHAT UNINTERESTED	UNINTERESTED	VERY UNINTERESTED

22. This section is intended to find out how many hours per week, on an average, you <u>normally</u> spend on your studies. The grid below has been designed to help you remember. Please include all types of studying (reading, writing-up practicals, assignments, homework, etc.) but not time spent in the classroom attending practicals, lectures or lessons. We are interested in your <u>typical (usual) study pattern</u>. Don't describe a week in which you have to study for long hours preparing for examinations because such a week is not typical. Indicate your approximate study pattern <u>without exaggerating</u>. Draw a ring around the number of hours worked (even if it is nought) for each part of each day. <u>Please make sure that you draw a circle around one figure for each row of figures, that is, altogether you must draw 21 circles.</u>

D A Y	NUMBER OF HOURS WORKED		
	MORNING (4 a.m. - 12 noon)	AFTERNOON (12 noon - 6 p.m.)	EVENING (6 p.m. - 12 midnight)
SUNDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
MONDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
TUESDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
WEDNESDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
THURSDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
FRIDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6
SATURDAY	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4 5 6

Now please go through this inventory to check for any item you may have missed.

THANK YOU.

APPENDIX C

BAB/bb

DEPARTMENT OF PSYCHOLOGY

21 August 1979

Professor J.J. Eysenck
University of London
State House
LONDON WC 1E 7HU

Dear Professor Eysenck,

For research in which I am currently engaged, I am using, among other instruments, Form A of the Eysenck Personality Inventory. This has been administered to Standard nine high school boys and girls and first-year university students, about 1 500 subjects in all.

The response of about 20 of the subjects to question 25, "Can you usually let yourself go and enjoy yourself a lot at a gay party?", is interesting. I noticed that these subjects had underlined the word "gay". Upon questioning them later, I learnt that they were not sure as to whether "gay" party referred to a "homosexual party" or to a "happy, lively party". It was not possible to determine how many other subjects had similar doubts but did not underline the word "gay".

I would appreciate your comments in regard to the aforementioned response of some of the subjects particularly in so far as such responses may influence the validity of the test. Also, I would like your kind permission to quote your comments in my report.

I am looking forward to hearing from you shortly.

Yours sincerely,

B. A. Balkisson

BERNARD A. BALKISSON
SENIOR LECTURER, CLINICAL AND
COUNSELLING PSYCHOLOGIST.

APPENDIX D

SOURCE DATA FOR THE POINT-BISERIAL AND BISERIAL r

(a) BOYS (TOTAL GROUP)

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
23	0	1	1
22	0	1	1
21	0	0	0
20	0	6	6
19	2	1	3
18	4	11	15
17	4	9	13
16	5	12	17
15	7	13	20
14	9	10	19
13	5	4	9
12	9	2	11
11	12	9	21
10	8	5	13
9	8	3	11
8	5	1	6
7	2	1	3
6	1	0	1
5	0	0	0
4	2	0	2
3	2	0	2
2	1	0	1
	86	89	175

ΣfY : 2351

ΣfY^2 : 34147

$\Sigma Yf(1)$: 1329

(b) BOYS (SELECTED GROUP)

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
23	0	1	1
22	0	1	1
21	0	0	0
20	0	6	6
19	1	1	2
18	1	11	12
17	3	6	9
16	4	8	12
15	4	9	13
14	5	7	12
13	3	2	5
12	6	2	8
11	5	4	9
10	3	4	7
9	4	3	7
8	2	1	3
7	1	0	1
6	1	0	1
5	0	0	0
4	1	0	1
3	0	0	0
2	1	0	1
	45	66	111

ΣfY : 1563

ΣfY^2 : 23623

$\Sigma Yf(1)$: 1014

(c) GIRLS (TOTAL GROUP)

Y	f(0) Introverts	f(1) Extraverts	(f)
21	0	1	1
20	0	3	3
19	1	4	5
18	3	10	13
17	8	13	21
16	5	11	16
15	5	11	16
14	5	7	12
13	13	12	25
12	9	6	15
11	10	3	13

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
10	6	4	10
9	10	1	11
8	9	1	10
7	7	1	8
6	3	0	3
5	1	1	2
4	2	0	2
3	1	0	1
2	1	0	1
1	1	0	1
	100	89	189

ΣfY : 2456

ΣfY^2 : 34860

$\Sigma Yf(1)$: 1327

(d) GIRLS (SELECTED GROUP)

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
21	0	0	0
20	0	3	3
19	1	4	5
18	3	8	11
17	5	11	16
16	4	9	13
15	3	8	11
14	0	5	5
13	5	9	14
12	3	4	7
11	6	1	7
10	3	0	3
9	6	1	7
8	7	0	7
7	5	0	5
6	2	0	2
5	0	1	1
4	0	0	0
3	0	0	0
2	1	0	1
1	0	0	0
	54	64	118

ΣfY : 1614

ΣfY^2 : 23858

$\Sigma Yf(1)$: 991

(e) BOYS AND GIRLS COMBINED (TOTAL GROUP)

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
23	0	1	1
22	0	1	1
21	0	1	1
20	0	9	9
19	3	5	8
18	7	21	28
17	12	22	34
16	10	23	33
15	12	24	36
14	14	17	31
13	18	16	34
12	18	8	26
11	22	12	34
10	14	9	23
9	18	4	22
8	14	2	16
7	9	2	11
6	4	0	4
5	1	1	2
4	4	0	4
3	3	0	3
2	2	0	2
1	1	0	1
	186	178	364

$\sum fY$: 4807

$\sum fY^2$: 69007

$\sum Yf(1)$: 2656

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(f) **BOYS AND GIRLS COMBINED (SELECTED GROUP)**

(Table Continued)

Y	f(0) Introverts	f(1) Extraverts	(f)
23	0	1	1
22	0	1	1
21	0	0	0
20	0	9	9
19	2	5	7
18	4	19	23
17	8	17	25
16	8	17	25
15	7	17	24
14	5	12	17
13	8	11	19
12	9	6	15
11	11	5	16
10	6	4	10
9	10	4	14
8	9	1	10
7	6	0	6
6	3	0	3
5	0	1	1
4	1	0	1
3	0	0	0
2	2	0	2
1	0	0	0
	99	130	229

$\sum fY$: 3177

$\sum fY^2$: 47481

$\sum Yf(1)$: 2005

APPENDIX E

SOURCE DATA FOR TABLES XVIII TO XXVII, INCLUSIVE

(a) TABLE XVIII

SUMS OF AGES (TOTAL GROUP)

(n = 40 in each cell)

Linguistic Group	BOYS		GIRLS	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Hindi	674,10	674,74	671,49	678,02
Tamil	674,42	679,33	670,67	678,41

$\sum X^2$ = 91271,688

(b) TABLE XIX

SUMS OF AGES (SELECTED GROUP)

(n = 22 in each cell)

Linguistic Group	BOYS		GIRLS	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Hindi	369,42	373,49	371,24	369,34
Tamil	371,84	370,57	365,99	370,91

$\sum X^2$ = 49926,456

(c) TABLE XX

SUMS OF IQ'S (TOTAL GROUP)

(n = 80 in each cell)

Linguistic Group	Boys	Girls
Hindi	9 370	9 373
Tamil	9 334	9 391

$\sum X^2$ = 4426076

(d) TABLE XXI

SUMS OF IQ'S (SELECTED GROUP)

(n = 44 in each cell)

Linguistic Group	Boys	Girls
Hindi	5 176	5 220
Tamil	5 158	5 314

$\sum X^2$ = 2493706

(e) TABLE XXII

SUMS OF EXTRAVERSION SCORES (TOTAL GROUP)

(n = 40 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	524	527	502	495
Tamil	557	529	542	447

$\sum X^2$ = 57045

(f)

TABLE XXIII

SUMS OF EXTRAVERSION SCORES (SELECTED GROUP)

(n = 22 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	296	307	273	277
Tamil	299	288	281	259

$\sum X^2$ = 31296

(g)

TABLE XXIV

SUMS OF NEUROTICISM SCORES (TOTAL GROUP)

(n = 40 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	469	477	405	497
Tamil	451	487	442	529

$\sum X^2$ = 50473

(h)

TABLE XXV

SUMS OF NEUROTICISM SCORES (SELECTED GROUP)

(n = 22 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	287	269	251	287
Tamil	262	264	266	291

ΣX^2 = 29827

(i)

TABLE XXVI

SUMS OF LIE SCORES (TOTAL GROUP)

(n = 40 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	164	152	166	138
Tamil	153	146	155	151

ΣX^2 = 5767

(j)

TABLE XXVII

SUMS OF LIE SCORES (SELECTED GROUP)

(n = 22 in each cell)

Linguistic Group	High S-E S		Low S-E S	
	Boys	Girls	Boys	Girls
Hindi	59	63	61	52
Tamil	68	57	60	58

$\sum x^2 = 1532$

APPENDIX F

SOURCE DATA FOR TABLES XXVIII TO XXXVII, INCLUSIVE

(a) TABLE XXVIII

SUMS OF AGES (TOTAL GROUP) (n = 40 in each cell)

Religious Group	Boys		Girls	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Christian	683,13	684,57	681,08	682,52
Hindu	681,41	681,23	681,90	681,34
Muslim	680,68	688,57	678,57	680,10

ΣX^2 = 139726,448

(b) TABLE XXIX

SUMS OF AGES (SELECTED GROUP) (n = 21 in each cell)

Religious Group	Boys		Girls	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Christian	357,72	360,58	356,75	359,44
Hindu	360,91	356,49	354,41	354,68
Muslim	355,41	360,32	354,98	357,93

ΣX^2 = 73091,946

(c) TABLE XXX

SUMS OF IQ'S (TOTAL GROUP) (n = 80 in each cell)

Religious Group	Boys	Girls
Christian	9 205	9 195
Hindu	9 181	9 199
Muslim	9 181	9 190

ΣX^2 = 6414069

(d) TABLE XXXI

SUMS OF IQ'S (SELECTED GROUP)(n = 42 in each cell)

Religious Group	Boys	Girls
Christian	4 787	4 817
Hindu	4 820	4 946
Muslim	4 847	4 965

$\sum X^2$ = 3420086

(e) TABLE XXXII

SUMS OF EXTRAVERSION SCORES (TOTAL GROUP)(n = 40 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	515	545	516	482
Hindu	523	545	508	471
Muslim	498	479	512	478

$\sum X^2$ = 83481

(f) TABLE XXXIII

SUMS OF EXTRAVERSION SCORES (SELECTED GROUP)(n = 21 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	271	281	287	262
Hindu	271	284	277	259
Muslim	268	261	285	267

$\sum X^2$ = 45991

(g) TABLE XXXIV

SUMS OF NEUROTICISM SCORES (TOTAL GROUP) (n = 40 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	439	516	448	528
Hindu	420	513	382	520
Muslim	454	520	418	520

$\sum X^2 = 75730$

(h) TABLE XXXV

SUMS OF NEUROTICISM SCORES (SELECTED GROUP) (n = 21 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	252	288	255	267
Hindu	243	261	237	292
Muslim	244	251	247	242

$\sum X^2 = 41621$

(i) TABLE XXXVI

SUMS OF LIE SCALE SCORES (TOTAL GROUP) (n = 40 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	158	143	157	154
Hindu	169	139	159	147
Muslim	158	137	175	131

$\sum X^2 = 8585$

(j) TABLE XXXVII

SUMS OF LIE SCALE SCORES (SELECTED GROUP) (n = 21 in each cell)

Religious Group	High Socio-Economic Status		Low Socio-Economic Status	
	Boys	Girls	Boys	Girls
Christian	51	62	53	60
Hindu	64	55	58	54
Muslim	53	52	61	52

$\sum X^2 = 2163$

APPENDIX G

SOURCE DATA FOR TABLES XXXVIII TO LXII, INCLUSIVE

(a) TABLE XXXIX

SUMS OF AGES (TOTAL GROUP) (n = 11 in each cell)

S-E S	Males	Females
High	197,09	196,84
Low	197,17	196,76

ΣX^2 = 14113,474

(b) TABLE XL

SUMS OF AGES (SELECTED GROUP) (n = 9 in each cell)

S-E S	Males	Females
High	163,08	160,42
Low	164,09	160,84

ΣX^2 = 11688,772

(c) TABLE XLI

SUMS OF EXTRAVERSION SCORES (TOTAL GROUP) (n = 11 in each cell)

S-E S	Males	Females
High	123	141
Low	161	113

ΣX^2 = 7190

(d) TABLE XLII

SUMS OF EXTRAVERSION SCORES (SELECTED GROUP) (n = 9 in each cell)

S-E S	Males	Females
High	103	107
Low	108	98

$\sum X^2 = 5342$

(e) TABLE XLIII

SUMS OF NEUROTICISM SCORES (TOTAL GROUP) (n = 11 in each cell)

S-E S	Males	Females
High	111	139
Low	99	150

$\sum X^2 = 6685$

(f) TABLE XLIV

SUMS OF NEUROTICISM SCORES (SELECTED GROUP) (n = 9 in each cell)

S-E S	Males	Females
High	95	122
Low	104	144

$\sum X^2 = 6857$

(g) TABLE XLV

SUMS OF LIE SCORES (TOTAL GROUP) (n = 11 in each cell)

S-E S	Males	Females
High	45	39
Low	52	40

$\sum X^2 = 836$

(h) TABLE XLVI

SUMS OF LIE SCORES (SELECTED GROUP) (n = 9 in each cell)

S-E S	Males	Females
High	26	25
Low	26	23

$\sum X^2 = 322$

(i) TABLE XLVII

SUMS OF AGES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	559,69	560,08
Low	561,73	548,16

$\sum X^2 = 41499,515$

(j) TABLE XLVIII

SUMS OF AGES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	393,43	385,91
Low	390,25	383,08

ΣX^2 = 28739,183

(k) TABLE XLIX

SUMS OF EXTRAVERSION SCORES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	434	404
Low	461	404

ΣX^2 = 26233

(l) TABLE L

SUMS OF EXTRAVERSION SCORES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	310	302
Low	306	297

ΣX^2 =18713

(m) TABLE LI

SUMS OF NEUROTICISM SCORES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	273	314
Low	319	337

$\sum X^2 = 15881$

(n) TABLE LII

SUMS OF NEUROTICISM SCORES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	201	224
Low	242	236

$\sum X^2 = 11363$

(o) TABLE LIII

SUMS OF LIE SCORES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	93	117
Low	73	93

$\sum X^2 = 1564$

(p) TABLE LIV

SUMS OF LIE SCORES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	49	61
Low	45	53

$\sum X^2 = 632$

(q) TABLE LV

SUMS OF AGES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	557,05	556,26
Low	556,26	558,90

$\sum X^2 = 41603,677$

(r) TABLE LVI

SUMS OF AGES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	389,64	390,84
Low	389,52	381,57

$\sum X^2 = 28742,387$

(s) TABLE LVII

SUMS OF EXTRAVERSION SCORES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	435	415
Low	386	421

$\Sigma X^2 = 24665$

(t) TABLE LVIII

SUMS OF EXTRAVERSION SCORES (SELECTED GROUP) (n = 21 in each cell)

S-E S	Males	Females
High	303	291
Low	273	296

$\Sigma X^2 = 17245$

(u) TABLE LIX

SUMS OF NEUROTICISM SCORES (TOTAL GROUP) (n = 30 in each cell)

S-E S	Males	Females
High	298	333
Low	315	372

$\Sigma X^2 = 17420$

(v) TABLE LX

SUMS OF NEUROTICISM SCORES (SELECTED GROUP)(n = 21 in each cell)

S-E S	Males	Females
High	229	244
Low	236	273

$\Sigma X^2 = 13336$

(w) TABLE LXI

SUMS OF LIE SCORES (TOTAL GROUP)(n = 30 in each cell)

S-E S	Males	Females
High	101	106
Low	114	90

$\Sigma X^2 = 1875$

(x) TABLE LXII

SUMS OF LIE SCORES (SELECTED GROUP)(n = 21 in each cell)

S-E S	Males	Females
High	55	55
Low	57	51

$\Sigma X^2 = 706$

APPENDIX H

(a) SOURCE DATA FOR TABLE LXXXII

SUMS OF YEAR MARKS OF THE FOUR SUB-GROUPS OF THE PSYCHOLOGY I STUDENTS (TOTAL GROUP)

Groups	N	Total Marks
Unstable Introverts	48	2668
Unstable Extraverts	48	2728
Stable Introverts	46	2662
Stable Extraverts	55	3227

$\Sigma X^2 = 659809$

(b) SOURCE DATA FOR TABLE LXXXIII

SUMS OF YEAR MARKS OF THE FOUR SUB-GROUPS OF THE PSYCHOLOGY I STUDENTS (SELECTED GROUP)

Groups	N	Total Marks
Unstable Introverts	35	2008
Unstable Extraverts	26	1472
Stable Introverts	42	2408
Stable Extraverts	40	2319

$\Sigma X^2 = 480933$

APPENDIX I

SOURCE DATA FOR TABLES CIII - CX AND CXLIII - CXLVI, INCLUSIVE

(a) TABLE CIII

SUMS OF AGES BY FACULTY AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

(n = 30 in each cell)

Faculty	High S-E S	Low S-E S
Education	546,08	546,34
Engineering	546,11	546,24

ΣX^2 = 39821,477

(b) TABLE CIV

SUMS OF AGES BY FACULTY AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

(n = 16 in each cell)

Faculty	High S-E S	Low S-E S
Education	286,82	292,09
Engineering	291,76	289,58

ΣX^2 = 21055,931

(c) TABLE CV

SUMS OF EXTRAVERSION SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (TOTAL GROUP) (n = 30 in each cell)

Faculty	High S-E S	Low S-E S
Education	401	390
Engineering	339	369

ΣX^2 = 09500

(d) TABLE CVI

SUMS OF EXTRAVERSION SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP) (n = 16 in each cell)

Faculty	High S-E S	Low S-E S
Education	205	192
Engineering	183	191

ΣX^2 = 10533

(e) **TABLE CVII**

SUMS OF NEUROTICISM SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(TOTAL GROUP) (n = 30 in each cell)

Faculty	High S-E S	Low S-E S
Education	277	342
Engineering	333	281

ΣX^2 = 14933

(f) TABLE CVIII

SUMS OF NEUROTICISM SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS

(SELECTED GROUP) (n = 16 in each cell)

Faculty	High S-E S	Low S-E S
Education	165	178
Engineering	168	172

ΣX^2 = 8167

(g) TABLE CIX

SUMS OF LIE SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (TOTAL GROUP)

(n = 30 in each cell)

Faculty	High S-E S	Low S-E S
Education	127	109
Engineering	102	125

ΣX^2 = 2209

(h) TABLE CX

SUMS OF LIE SCORES BY FACULTY AND SOCIO-ECONOMIC STATUS (SELECTED GROUP)

(n = 16 in each cell)

Faculty	High S-E S	Low S-E S
Education	46	45
Engineering	38	42

ΣX^2 = 539

(i) TABLE CXLIII

SUMS OF AGES (TOTAL GROUP) (n = 13 in each cell)

Faculty	Males		Females	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Arts	232,68	233,33	232,68	232,59
Science	231,33	232,59	232,85	233,26

ΣX^2 = 33327,46

(j) TABLE CXLIV

SUMS OF AGES (SELECTED GROUP) (n = 9 in each cell)

Faculty	Males		Females	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Arts	161,67	162,00	161,59	161,01
Science	160,50	161,75	160,26	160,84

ΣX^2 = 23110,918

(k) TABLE CXLV

SUMS OF NEUROTICISM SCORES (TOTAL GROUP) (n = 13 in each cell)

Faculty	Males		Females	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Arts	121	142	139	145
Science	159	140	158	182

ΣX^2 = 16012

(l) TABLE CXLVI

SUMS OF NEUROTICISM SCORES (SELECTED GROUP) (n = 9 in each cell)

Faculty	Males		Females	
	High S-E S	Low S-E S	High S-E S	Low S-E S
Arts	92	121	96	106
Science	134	97	115	144

ΣX^2 = 13031

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