VALUES AND PERSONALITY FACTORS ASSOCIATED WITH ATTITUDES TOWARDS SCIENTIFIC RESEARCH AS A CAREER

by

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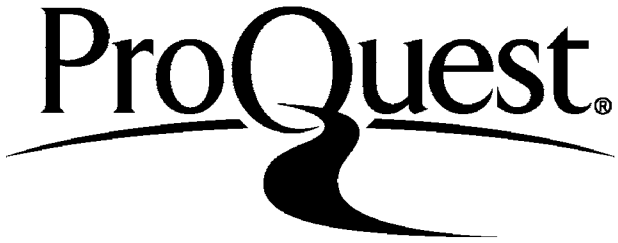

ABSTRACT

The Occupational preferences of a sample of undergraduate science students from two Colleges in London were explored by means of an Occupational Preferences Questionnaire.

The study was intended to explore the relation of the preference for Research or Non-Research Occupations to other dimensions of Psychological relevance: Intelligence, Personality Factors, Values, Orientations to work satisfaction and Conformity.

A classification of occupations in Science, according to the Research - Non-Research criterion was obtained by means of a Principal Components Analysis. Persons who preferred the Research Occupations tended to be more reserved, detached, critical and cool, rather than easy-going persons; to like things or words rather than dealing with people, to enjoy working alone but at the same time liking intellectual companionship and to be self-sufficient rather than group-dependent and accustomed to making their own decisions.

The mean personality profile (16 P.F.) for those who preferred the Research Occupations was found to be very similar to the "Typical Profile" of the research scientists. However, no very strong differences in personality factors were found between those who preferred research occupations and those who preferred other occupations. The main difference between these groups was on their conformity scores as measured by a conformity test developed by the researcher. Thus, those who preferred research occupations scored significantly lower in

conformity than those who liked teaching, administration, sales, etc. Refinement of the Conformity Test is suggested as it may be a useful instrument in selection procedures.

The general pattern of occupational values expressed by this sample was found to be similar to those reported for College Students in previous literature. Persons who preferred Research Occupations valued the interest of the work most highly while those who had other occupational preferences placed a higher value on meeting or working with people.

TO MY PARENTS

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CHAPTER ONE

SCOPE AND BACKGROUND OF THE STUDY

1. Introduction:

The present research plans emerged as a result of experience gained during employment on the selection of research workers for the "Venezuelan Institute of Scientific Research".* In 1966 this Institute was engaged in the recruitment of young Science students and the main factor that was taken into account was the IQ of the students; strangely enough a high percentage of the highly intelligent students who were accepted to work at the Institute did not seem to enjoy doing research and many abandoned the work.

A few months later, bearing this experience in Venezuela in mind, it seemed a useful approach to look into the question of attitudes towards scientific research as a career. It seemed likely that a positive attitude towards doing research had to be accompanied by some social and psychological factors, that surely were not considered in the case of the students mentioned above.

At the time, the problems of the "swing away from Science to the Arts" and of creativity were fashionable; and it is in these research areas that this study has its background; although other

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areas such as personality have also been taken into account.

However, the main concern of the research is with Science occupations and within these with the distinction between different kinds of work, which have been classified according to the criterion of Research and Non-Research occupations.

In relation to the creativity area the present study does not deal with the measurement of creativity by means of psychological tests, but rather, with the concept of Creativity. It has been assumed that scientific research involves creativity and it is on this assumption that many of the hypotheses put forward here are based.

The present study is intended to explore the relation of the choice of research or non-research occupations to other dimensions of psychological relevance: Intelligence, Personality factors, values, conformity and Orientations to work satisfaction. It is hoped to show how in choosing a career, a science student responds to forces, both social and within his own personality.

Two lines of research were undertaken:

First, a study of the relation of the occupational preferences of Science undergraduates to the psychological variables already mentioned.

Second, an investigation of the perception which students have of research and non-research occupations in Science, giving special attention to negative attitudes towards scientific research.

One source of information about factors that influence preference for research or non-research occupations is the literature on certain psychological variables related to occupational preferences and occupational choices.

The interest of psychologists in this problem dates back to the early part of the twentieth century and it is reflected in the emergence and development of Industrial Psychology.

Much of the early work dealt with the measurement of aptitudes and abilities, and with the utilization of these measurements in improving the selection of occupations by persons and the selection of persons by organizations. Few principles or generalizations emerged from the voluminous literature dealing with the relationships between aptitudes and intelligence tests and performance criteria. However, it is common to observe that guidance and selection procedures rely heavily on the measurement of intellectual factors.

The psychologists' interest in the motivational implications of work, has two principal historical antecedents according to Vroom (1964). The first of these was the work on vocational interests by Cowdery (1926), Strong (1929), Kitson (1930), Fryer (1931) and Kuder (1946) and on the other hand Elton Mayo and his followers in the human relations movement; and from the research of Kurt Lewin and his associates in group dynamics.

While the study of motivation and personality in relation to occupational behaviour has been gaining importance in the last few years, almost none of the different approaches has been integrated into a cohesive theoretical approach to occupational behaviour; rather each

stands for a stream of research or a fragment of an idea concerning some aspect of occupational behaviour. Nor have the results of these researches been integrated into the practices of selection and guidance.

An outline of some of the studies which have demonstrated the importance of the measurement of intellectual and non-intellectual factors in Occupational Psychology, will be given, and then two main problems that appear in this kind of research will be discussed:

- The problem of establishing the criteria of achievement in a given occupation, and
- the problem of choosing or devising the right predictors of the achievement criteria.

The second chapter will deal with the occupation of Scientific Research itself, presenting first its importance in the social context, then summarizing some studies which have indicated characteristic personality factors of research scientists, and finally, focusing on research as a creative activity.

2. Importance of the Measurement of Non-Intellectual Factors in Occupational Psychology

2.1 Personality and Occupations

The idea that specific personality traits differentiate people in one occupation from those in another has had appeal for many years. The rationale underlying the trait-factor approach to the study of personality and career is simple. It is assumed that because of the inherent differences in the roles that occupations require people to play, the ideal personal characteristics of members of various occupational groups vary. At the same time, recognising that most people are not rigidly shaped at the time of occupational entry, it is also assumed that exposure to the activities and climate of any given occupation will exert an influence upon an individual's manner of behaving and personality. Consequently, the trait factor approach has as its goal the increasing accuracy of identification of distinctive personality attributes inherent in membership of various careers. The point of view is fundamentally research oriented.

In an early paper, Darley (1941) reviewed the relationship between aptitudes, achievement, personality, and vocational interests. He concluded that business contact interests were correlated with economic conservatism, social aggressiveness, and physical robustness; that technical interests were correlated with immaturity, masculinity and limited social skill; that men with verbal interests could be construed as feminine, and that men with welfare interest were mature, socially aggressive, liberal and slightly feminine. This early study

was the prototype of research design that has dominated the trait factor approach to the study of personality and careers for more than 20 years. The research strategy has been to study a group of variables and their relation to occupational membership or preference in the hope that some connection between occupation and personality traits will become evident.

Roe was one of the first theorists to include in detail the notion of the role that personality plays in vocational behaviour. She became involved in the field of career development through her research on the personality traits of artists; her studies on the personality factors related to artistic creativity led her to conduct a major series of investigations into the characteristics of eminent scientists (Roe, 1951 a 1951 b, 1953). From her findings, Roe concluded that major personality differences exist between physical-biological and social scientists, primarily in the type of interactions they have with people and things. A second conclusion she drew was that the personality differences which do exist between various kinds of scientists are in some part the result of influences of child-rearing practices.

In Roe's theory a major personality theme which appears is "need" theory, specifically, Maslow's (1954). Maslow assumes that the needs of humans may be arranged in a hierarchy, with the need for the satisfaction of lower-order needs, such as hunger, thirst, and oxygen being greater than the need for such high-order satisfactions as love, affection, knowledge, and self-actualization. A prerequisite to the

expression of a need is the satisfaction of the needs which are more basic in the needs hierarchy.

For Roe, genetic factors and need hierarchies combine to influence the selection of a vocation; the degree of motivation towards an occupation is a product of the arrangement and intensity of the individual's particular need structure which depends on factors of the early environment. The scheme is basically in terms of the degree to which an individual is oriented towards persons or not. Thus, according to Roe's (1957) occupational classification, people in service occupations are primarily oriented towards persons and probably come from a home which generated a loving, overprotecting environment, while scientists tend not to be oriented towards persons and come from a cold home atmosphere, where rejection and avoidance of the child predominated.

This theory has stimulated considerable research, but the results have not supported the specifics of Roe's model. Even the "person or non-person orientations" in the choice of careers has been questioned by Roe and Siegdman (1964) . It may be that Roe's propositions account for so little of the actual variance involved in career development that they fail to possess practical significance. Thus, the theory has few applied implications in its current state.

Another author who has studied personality in relation to occupation is Holland (1962) whose theory evolves a modal personality orientation of vocational selection can be summarized as follows: a person gradually which leads him at the appropriate points in time, to make educational decisions which have implications for a specific occupational environment.

As he takes steps to implement his decisions, the level hierarchy that he has developed over the years leads him to gravitate toward a career within the appropriate occupational environment that is at a skill level equivalent to his abilities and achievements. The adequacy of his decisions and the amount of difficulty he encounters in the process of making them are related to his knowledge about himself and the world of work.

Holland proposes to use responses of like versus dislike to occupational titles as projective data about the respondent on the assumption that vocational preferences represent a major facet of his personality. The most typical way an individual responds to his environment is his modal personal orientation. The six orientations proposed by Holland are:

The Realistic Orientation: characterized by aggressive behaviour, interest in activities requiring motor coordination, skill and physical strength, and masculinity.

The Intellectual Orientation: characterized by persons that think rather than act, organize and understand rather than dominate or persuade, and by asociability rather than sociability.

The Social people seem to satisfy their needs for attention in a teaching or therapeutic situation.

The Conventional style is typified by a great concern with rules and regulations, great self-control, subordination of personal needs, and strong identification with power and status.

The Enterprising: people are verbally skilled and they use their

verbal skills to manipluate and dominate people.

The Artistic Orientation: manifests strong self-expression and relations with other people indirectly through their artistic expression.

Holland's theory leads to the prediction that individuals will choose occupations consistent with their personal orientations. For example, Realistic people will select careers in a Realistic occupational environment. Using career choice, instead of career attainment as the dependent variable, Holland (1962) studied the relationship between the category of personal orientation and the occupational environment of the field for which a person stated preference.

The data strongly indicate that the personal orientations are related to familial patterns, particularly parental behaviours, beliefs, ambitions and goals for their offspring. The data in this sphere are a source of insight into the development of the personal orientations. These have a strong relationship to the vocational choices the students make and they relate closely, in combination with other variables, to the stability of their vocational choices.

A comprehensive test of several aspects of Holland's theory was conducted by Osipow, Ashby and Wall (1966). Their first prediction was that subjects would express occupational preferences consistent with their major personal orientation. A sample of College students was required to rank six personality descriptions which they thought matched their behaviour. These descriptions were based upon the six personal orientations described by Holland. The students' occupational preferences

were for occupational environments which were in most cases consistent with the major personal orientation. The results supported Holland's theory.

As Osipow (1968) has presented a summary of the main findings on personality traits characteristic of specific occupational groups, his table is reproduced here (See page 23).

The many studies of personality traits and occupational membership or potential membership typically involve an objectively scored personality inventory or a projective test of personality that is administered to a student sample (occasionally an occupational sample). These procedures seem to present several shortcomings, since the personality measures employed have serious limitations, and inferences drawn from responses to those inventories may have questionable validity. Many of the instruments have a psychopathological basis which is usually inappropriate and inadequate for the understanding of normal behaviour. The sampling represented in these studies is very limited; and the results of personality tests passed on students who are considering majoring in various academic fields, or correlating personality test scores with other variables are procedures very far removed from the observation of personality differences in members of diverse occupational groups.

The studies presented in this section do not seem to be free from the above criticisms; however, the results in relation to the personality of scientists show certain similarities or common traits. Further research findings on this topic will be presented in a later chapter dealing specifically with the personality of the research scientist.

TABLE 1

PERSONALITY TRAITS OF ENGINEERS AND SCIENTISTS (Osipow, 1968)

Investigator	Subjects	Method	Findings
Izard (1960)	Engineers compared with men in general.	EPPS	Engineers earned high scores on need for achievement, deference, order, dominance, and endurance; and low scores on needs affiliation, intraception, succorance, abasement nurturance, and heterosexuality.
Harrison et al (1955)	Engineers		emotionally stable, free of psychopathology, uninterested in people, insensitive, unimaginative, and not introspective, goal oriented, energetic, serious, conscientious, self-sufficient and straight forward.
Steiner (1953); Moore & Levy (1951)	Engineers		authoritative, independent, self-directing, orderly, object-oriented tense, irritable, possessing few friendships, and possessing a positive attitude towards authority.
Thumin (1965)	Engineers vs Advertising men	MMPI	engineers lower on psychopatic deviant masculinity-femininity, paranoia, psychastenic, and schizophrenic scales and higher on the social introversion scale. The shape of the profiles for the two groups was the same.
Korn (1962)	Engineers vs physical science students	CPI	Physical Science students higher on femininity, capacity for status, responsibility, achievement through independence, and flexibility, and lower in sociability, social presence and communality.
Nadler & Krulee (1961)	Engineering students	questionnaire	Found to be exocathecting-extraceptive
Roe (1961)	Eminent Scientists	interviews & tests	Oriented to action, independent, self-sufficient, like to bring about order out of disorder, tolerant of ambiguity, have strong egos, not highly compulsive strong impulse control, low intensity in interpersonal relations, not gregarious, preoccupied with things rather than people, and take calculated risks with natural,not interpersonal events.

2.2. Values and Occupations

Human beings postulate a variety of concepts around which to orientate their lives. These concepts which typically include religious beliefs, the place of material goods in life, and how interpersonal relations should be conducted, have been formalized by a number of psychologists.

It has seemed reasonable enough to many people to suppose that these personal values underlie occupational choice and attainment. It has been reasoned that men whose main value in life is spiritual will choose different careers and behave differently in them than other men whose primary value is economic.

The lack of exploration into needs and values within occupations themselves, prevents the counselor from suggesting occupations that might be emotionally satisfying to the client. A review of the literature tends to support the point of view that psychological values and needs in occupations have not received a thorough exploration, although some studies seem to support the possibility that certain occupations do attract entirely different kinds of people.

An early paper was presented by Stone (1933) who determined the preferred occupations of a group of college students and related them to their scores on the Allport-Vernon Study of Values. The various occupational preferences and associated values are expressed in table 2.

Vernon and Allport (1931) compared the scores on the Allport-Vernon Study of Values of persons majoring in, or working in a number of

TABLE 2

CHARACTERISTIC ALLPORT-VERNON VALUES FOR COLLEGE STUDENTS INDICATING PREFERENCES FOR DIFFERENT CLASSES OF OCCUPATIONS. (STONE 1933)

Business	High Economic, low Theoretical and Aesthetic
Banking	High Economic, low religious
Medicine	High Theoretical, low Economic and Political
Education	High Aesthetic, low Economic
Law	High Political, low Theoretical
Literature	High Aesthetic and Religious, low Economic

different specialties. In general, the distinctive values of each of these groups were congruent with the nature of their chosen professions. Those in Economics, Business and Engineering had strong Economic values; those in Law and Politics had strong Political values; those in Literature and Languages had strong Aesthetic values; and those in Science, Medicine and Psychology had strong Theoretical values.

Seashore (1947) compared the scores on the same test of 452 college men who were majors in health and physical education with 252 men majoring in the applied social sciences. The former group had high scores on the scales of social, religious, and political values, and low scores on economic and aesthetic values while the applied social science majors had high social and religious values and low political, economic and aesthetic values.

Cantril and Allport (1933) found male commercial students to be high in economic and low in aesthetic values; whereas male salesmanship students were high in economic and political and low in aesthetics and religious values. Female students of literature were high in aesthetic, and low in theoretical values; female students of science were high in theoretical and low in economic values.

Comparable evidence regarding differences in Allport-Vernon values of College students in different fields of study has been reported by Pintner 1933; Duffy and Crissey, 1940; Kelly and Fiske, 1950; Allport, Vernon and Lindzey, 1951; and Conrad and Jaffe, 1960.

Among the most extensive studies of occupational values is one reported by Rosenberg (1957). Using several thousand Cornell University students enrolled during the early 1950's as his basic sample, he asked questions about the fundamental reasons for their selection of an educational objective. He found that three basic values were expressed: working with people in a helping manner; earning large amounts of money, social status and prestige, and having the opportunity to be creative and use special talents. These values seemed to be continuous, ranging from the desire to express creativity and originality on one end of the scale to the desire for a stable and secure future on the other.

Rosenberg found that the expression of values of students in different fields varied systematically. For example architecture, journalism, drama and art students valued self-expression more than other groups, while students in sales fields, hotel and food studies, real estate, and finance valued self-expression the least. Social work majors, premedical students, and education majors were highest on the desire to help and work with people, while engineering, natural science and agriculture students were lowest in this value. The real estate, finance, hotel and food, and sales students scored highest on extrinsic reward values, while the social work, teaching and natural science students scored lowest in this scale.

Rosenberg studied the reliability of occupational values over time. He found that a number of changes in both the values and the occupational preferences occurred over a two year period. Where subjects' values and occupational choices changed, the changes generally reduced the disparity between choices and values. In examining the differences between the occupational values of men and women, Rosenberg observed that both sexes desired to use their special talents, but that women seemed more inclined to value "working with people" whereas men leaned more towards seeking security in their jobs. Career oriented women were found to express values more similar to those of career oriented men than women oriented to marriage and family.

Astin and Nichols (1964) mailed questionnaires concerning life goals to National Merit Finalists and Commendation Winners. A factor analysis of the responses revealed 7 factors: self-esteem, personal comfort, artistic motivation, scholarship, science-technology, prestige and altruism. With the exception of prospective clergymen, who scored high on altruistic values; most of the students were high on altruistic and personal comfort factors regardless of their orientation. This finding does little to clarify occupational motivation; probably the nature of the sample studied imposes limitations on the conclusions to be drawn from it.

Gray (1963) using the Edwards Personal Preference Schedule and the Miller Occupational Values Indicator tried to test the hypothesis that there is no difference in needs and values between three occupational groups: teachers, accountants, and mechanical engineers. The values measured by the Miller Occupational Values Indicator are: Career satisfaction, security, social rewards and prestige. Occupational values as measured by the Miller O.V.I. yielded significant differences between all three groups. In comparing teachers and accountants, teachers yielded a higher score on social rewards, while accountants yielded higher value scores on career satisfaction and prestige. In comparing accountants and mechanical engineers, accountants scored significantly higher on prestige with no significant differences recorded between the other three variables.

Miller (1956) studied the relationship between value preferences and the presence or absence of an occupational choice without regarding the occupation chosen. She used sixteen items grouped into the following categories: security, career satisfaction, prestige, and social rewards. The results indicate that highest security scores seemed characteristic of the no-choice group; the highest social rewards scores of the definite choice group.

In developing concepts of career development, Super proposed the idea of work values and developed a WORK VALUES INVENTORY (WVI) designed to reflect a preference variable in vocational choice somewhat different from and perhaps more general than the concept of interests (Super, 1957). The work value concept has in itself been subjected to considerable research. O'Connor and Kinnane (1961) factor analysed the WVI. The analysis yielded six factors: I Security-economic-material, II Social-artistic, III Work conditions and associates, IV Heuristic-creative, V Achievement-prestige, VI Independence-variety.

Kinnane and Pable (1962) tried to determine the relationship between family background factors and work-value orientation. They tested several hypotheses concerning the relationship between the factors reported by O'Connor and Kinnane (1961) and familial factors. The predictions were that students scoring highest on a given factor would report a family background consistent with that factor.

A biographical inventory developed by Super and Overstreet (1960) for use in the Career Pattern Study was used to measure cultural

stimulation, family cohesiveness, social mobility, and adolescent independence. A scale for the measurement of materialistic atmosphere in the home was developed to assess the family background relevant to factor I. These inventories plus a modified WVI were administered to 121 eleventh grade boys between the ages of 16 and 18 years. The results supported many of the predictions that Kinnane and Pable made. Factor I was found to be positively related to the degree of materialistic atmosphere in the home; Factor II was significantly correlated to the amount of cultural stimulation in the home, but not with family cohesiveness. Factor III was significantly related to family cohesiveness, and also with materialism in the home; Factor IV was found to be significantly correlated to cultural stimulation in the home and also with family cohesiveness. Factor V expected to be related to the upward social strivings of the family, was not found to be significantly correlated to any of the family background variables. Finally, Factor VI reflected the predicted relationship with independence fostered by the family.

In another study, Kinnane and Gaubinger (1963) studied the relationship between the scores of the Allport-Vernon-Lindzey Inventory of Values and of the WVI. They found significant correlations between:

A-V-L		W V I
Theoretical	&	Factor IV - Heuristic-creative
Economic	&	Factor I - Security-economic-material
Social	&	Factor II - Social-artistic
Aesthetic	&	Factor VI - Independence-variety
Religious	&	Factor II - Social-artistic

Another problem that should be mentioned is that of Changes in Occupational Values occurring over time. In an attempt to answer the question of what changes in occupational values occur in individuals at different stages of development, Wagman (1965) compared the values of groups of high school and university students on Centers' Job Values and Desires Scale. The results of Centers' Studies (1949) also provided an adult comparison group. Attending only to the high school and college student samples, a number of differences were evident. The high school students preferred jobs which offer security and independence while the college sample valued interesting work most highly. The difference could be an outgrowth of socio-economic differences between high school and college students. The age difference might also be related to the findings that the younger group was more concerned with matters of independence.

Gordon and Mensh (1962) explored the changes in values of medical students as they progressed through their professional training. Gordon's Survey of Interpersonal Values was administered to all students in the first through fourth year of medical training in a large mid-Western school. Gordon and Mensh found that the desire for support from others rose significantly; desire for recognition and independence increased, and leadership remained unchanged. Although it is easy to infer that medical training influenced these changes, other factors might result in similar value changes over the same four year period out of the context of medical school.

A final study noting age changes in values was conducted by Gribbons and Johnes (1965). They elicited adolescent vocational values by means of interviews with a group of students starting in 1958, conducted again in 1961 and once again in 1963.

Satisfaction with and interest in work consistently headed the list of occupational values over the five year period. Generally, the correlations, ranging from 0.46 between eighth and twelfth grade girls and 0.95 for eighth and tenth grade girls, reflected considerable stability of values over the junior high and high school years.

From the review of the literature on values and occupations, it seems that some values recur in most of the studies, although with somewhat different names; interest in work, satisfaction, and self-expression are three commonly occurring values that appear variously named.

The results of studies of changes in occupational values over time suggest that the values are generally stable for individuals, although subject to some changes. As a result of cultural influences, the relationship of any particular value to any one occupational group is open to question. For the most part, the values reflect those that are widely held by the specific society in which the studies are carried out. Nevertheless, statistical differences between some occupations on certain values have been reported.

Another important conclusion on the review of the literature on values is that the family plays a critical role in the formation of

the individual's values. The empirical evidence obtained by Super and Overstreet (1960) seems to tie up with Roe's findings about the family background of scientists and artists.

2.3 Motives and Occupations

It is typically assumed that people's occupational choices are determined by their motives. To the extent to which this is true, we should be able to predict and explain differences in the occupational preferences, choices and attainments of people through assessment of individual differences in motives. Below, we will examine the research evidence bearing on this hypothetical relationship. Most investigations of the role of motivational variables in occupational preference have used paper and pencil inventories of the motivational variables. The subject is asked to indicate the extent to which he likes or derives satisfaction from various objects or activities. These responses are scored according to some logically or empirically derived system and the resultant scores are related to stated preferences among occupations.

Astin (1958) constructed his own test of needs on the basis of a cluster analysis of scores on 21 items answered by 200 college freshmen. The test was scored to yield measures of the strength of three needs: 1 - Managerial-aggressive need, 2 - Status need; defined as a concern for monetrary and social prestige outcomes of work, and 3 - Organization need; defined as a desire to structure and organize

both the work and the job environment. Students stating a preference for careers in sales, managerial, and persuasive occupations obtained the highest scores on the managerial-aggressive need; whereas, those who were vocationally undecided as well as those who preferred the occupations of farmer and engineer, had the lowest scores on this need. The status need measure did not discriminate among those preferring different occupations, whereas those with the highest scores on the organization need preferred scientific occupations.

Some people's motives are related to the satisfaction they derive from a high level of performance on a task, even though no externally mediated reward is forthcoming, and they may experience dissatisfaction from a low level of performance even though no punishment is administered. A number of different terms have been used to describe this phenomenon including pride in work, ego-involvement and internalized motivation.

One approach to this problem is provided by McClelland et al (1953), and by Atkinson (1958). They developed a mothod of measuring the strength of the individual's need for achievement which they defined as a predisposition to derive satisfaction from success in competition with some standard of excellence.

McClelland (1955) reported a study of the relationship between the strength of achievement motive and occupational preferences. College freshmen with various achievement motive scores were asked to state whether they liked, disliked, or were indifferent to 100 diverse

occupations. The top 20 per cent on need for achievement were found to express significantly greater liking for the following six occupations: stockbroker, office manager, sales manager, buyer of merchandise, real estate salesman, and factory manager. Apparently, a high level of achievement motivation tends to be associated with a preference for business occupations.

Other studies have indicated a tendency for persons with high need for achievement to prefer activities involving intermediate degrees of risk. Burnstein (1963) found a tendency for persons with high need for achievement and low fear of failure to aspire to more prestigeful occupations, where the probability of attainment is less than certainty, than persons with low need for achievement and high fear of failure. However, individuals with high need for achievement and low fear of failure were less likely to aspire to occupations like United States Supreme Court Justice and State Governor where the risk was very great. An analysis of variance indicated that fear of failure, measured by the Mandler-Sarason Test, contributed more to these results than need for achievement.

Meyer et al (1961) obtained scores on the same motivational variables of a group of managers and a group of specialists employed by the same organization. These two groups were matched in age, education and level in the organization. The managers were found to have a higher level of need for achievement than the specialists. No significant differences were obtained on needs for affiliation and power.

Veroff, Atkinson, Feld and Gurin (1960) used the Thematic Apperception Method to obtain scores on needs for achievement, affiliation, and power from a large sample of men employed in different occupations. They found that strength of need for achievement was positively related to the status of the occupation. Sixty per cent of the men working in the professions, and 59% of the managers and proprietors obtained scores which were above the median on this variable, as compared with only 45% of the unskilled workers and 44% of the farmers. Needs for affiliation and power were not systematically related to occupational status, although there were differences in scores received by those in different occupations. The managers and proprietors and semi-skilled workers obtained relatively high scores on the need for power, while the professionals and clerical workers had relatively low scores. A strong need for affiliation was also characteristic of the managers and proprietors, but not of the farmers and unskilled workers.

This study illustrates the great overlap in 'motivation' which occurs between members of different occupations and so highlights the difficulty of using motivational differences as a tool in vocational guidance or selection, even though significant differences appear in the mean scores obtained by those in different occupations.

Another approach to the subject of motivations associated with occupations has been developed by Herzberg (1966) on his motivation-hygiene theory. He maintains that human beings have two categories of needs. One stems from his animal disposition and is centered on

the primary needs such as avoidance of loss of life, hunger, pain and sexual deprivation. The other is man's compelling urge to realize his own potentiality by continuous psychological growth.

Herzberg (1957, 1959) found that five factors stand out as strong determiners of job satisfaction - achievement, recognition, work itself, responsibility and advancement. These five factors appeared very infrequently when the respondents described events that paralleled job dissatisfaction feelings. An entirely different set of factors appeared in relation to job dissatisfaction events. The major dissatisfiers were: company policy and administration, supervision, salary, interpersonal relations and working conditions. As we can see, one cluster of factors relates to what the person does; and the other, to the situation under which he does it. The former are denominated by Herzberg motivators, since they are effective in motivating the individual to superior performance and effort; and the latter, are the hygiene factors since they are "preventive and environmental". The principal result of the analysis of this data was to suggest that the hygiene events led to job dissatisfaction because of a "need to avoid unpleasantness"; the motivator events led to job satisfaction because of a "need for growth or self actualization". Herzberg (1966) claims that his theory of motivation opens the door wide for reinterpretation of industrial relations phenomena. "Job attitudes must be viewed twice. What does the employee seek? What makes him happy? Then a separate question arises that is not deducible from the first: What does he wish to

avoid? What makes him unhappy?"

As an alternative to the theoretical formulation of Herzberg et al (1957, 1959) that certain job factors are either satisfiers or dissatisfiers, Smith (1963) proposes that job satisfaction is a function of the perceived characteristics of a job in relation to an individual's frame of reference. Thus, job satisfaction is not an absolute phenomenon but is relative to the alternatives available to the individual.

Other theoretical approaches, while not holding strictly to a dichotomous position, do stress in line with Herzberg the importance of social and psychological rewards as satisfiers.

The importance of psychological needs is also a vital part of Vroom's (1962) theoretical approach. He asserts that jobs which afford exercise of individual judgment and initiative, provide for the use and development of aptitudes, permit some knowledge of results of a person's performance and are more ego-satisfying than those which do not have these characteristics.

2.4 Abilities and the Occupational Choice Process

Individual differences in aptitudes and abilities have been the subject of study by industrial and educational psychologists for over a half century. Although the primary purpose of this activity has been the development and application of measures of these variables to increase the rationality of programs of selection, placement, and guidance of workers and students, there is some evidence concerning

the role of these variables in the occupational choice process. In the following section we will briefly consider the data dealing with the relationship between tests of mental ability or intelligence and occupational preferences.

Byrns (1939) analysed the scores on a test of mental ability of 42,479 girls and 34,472 boys expressing various vocational preferences. There were marked relationships for both sexes. Boys indicating a preference for being a writer had the highest median percentile score (87.9) and those expressing a preference for being a chemical engineer were next (82.2). The lowest median percentile scores were obtained by boys indicating a preference for being a barber (31.0) and dairying or cheesemaking (30.0). Similarly, the girls preferring the occupations of writing and journalism had the highest median percentile scores (84.4 and 84.3) while those preferring to be a retail clerk or to work in beauty culture obtained the lowest scores (34.0 and 33.5).

Livesay (1941) obtained similar results in a study of the ACE scores on high school seniors indicating an interest in various occupations. Those preferring the professions had the highest scores while those preferring the skilled trades had the lowest. Teaching, business, semiprofessional occupations and agriculture, in that order, were intermediate between the two extremes. Additional evidence for the relationship of intelligence to occupational preference was obtained in an early study by Fryer (1924) and by Terman in his classic study of gifted children (Terman, 1925).

These findings suggest a rough correspondence between the intelligence of persons and the intellectual requirements of the occupations which they prefer. Individuals with a high level of mental ability tend to prefer occupations which seem to require a high level of this ability, while those with less mental ability tend to prefer simpler, less demanding occupations. At this point we shall include two different concepts: actual ability and perceived ability.

A number of investigators (Thorndike, 1917; King and Adelstein, 1917; Fryer, 1927) have found extremely high relationships between individuals reports of their preferences among activities and their estimates of their ability to perform these activities. The activities which are most highly preferred tend to be those in which the person believes himself to possess the greatest ability.

Rosen (1961) obtained some experimental evidence regarding the effect on occupational preferences of the subject's perceived ability to perform the jobs. Subjects rated the valence of an occupation before and after they were given information regarding the extent to which they had the aptitudes which it required. This information, while supposedly based on an aptitude test which the subjects had taken, was falsified. One third of the subjects, chosen at random, were told that they had very little chance of performing well in the occupation; another third were told that they had a moderate aptitude, and the remaining third were told that they had an excellent ability for the occupation.

The information about the extent to which subjects possessed the aptitudes required by the occupation produced systematic changes in their ratings of its valence. When the occupation about which they received information was initially highly valent, 50 per cent of the subjects who were told that their lack of aptitude gave them little chance of entering it lowered their ratings, as compared with 17 per cent of those who were told that they had a moderate chance and 9 per cent of those who were told they had an excellent chance. On the other hand, when the occupation was initially low in valence, the greatest change in valence occurred among persons who were told that their aptitudes, gave them an excellent chance of entry. Ninety-one per cent of this group rated the occupation as more attractive as compared to 48 per cent of the moderate and 22 per cent of the low probability groups.

Differences in abilities among people who are members of or who are in training for different occupations are attributable, at least in part, to different criteria of selection used by social institutions charged with selecting occupational members; there remains the question of the relative role of self-selection and institutional selection mechanisms.

However, relationships between measured ability and stated preferences among occupations cannot be so easily accounted for. Conceivably, possession of an ability by a person, or to be more exact, believed possession of an ability, strengthens his desire to enter occupations which he believes that will permit him to use it.

We have seen in this section some evidence supporting this view. Investigators have found marked correlations between reports of preferences among activities and estimates of ability to perform these activities; however these studies are correlational and subject to the traditional limitations of such research. However, there is at least one experimental finding supporting the same interpretation. Rosen (1961) has shown that an occupation is rated as less attractive by a person after he has been told that he does not have the abilities which it requires and that it is rated as more attractive after he is told that he does have the necessary abilities.

3. Evaluation of the Literature

The extensive nature of the literature is impressive, reflecting an awareness of problems in vocation development theory and a widespread interest in the characteristics and development of scientists. However, too many studies have dealt with only a limited number of characteristics presumed to affect the success of college students in science courses, or presumed to differentiate between curricular groups. Too few are well designed studies of occupational groups.

Theory has not been altogether lacking, although it has not been a major concern. Much of the literature is based on subjective and non-quantified observation such as personal experience and impressionistic biographical study. This non-scientific approach to research on scientists is obviously somewhat incongruous.

Too large a proportion of the studies deal with factors related to success in the college study of the sciences rather than with the determinants of the choice of a career. While success in courses is a prerequisite to and perhaps a determinant of choice, it needs to be treated as such, not as an end in itself. Obviously not everyone who succeeds in a course enters a related occupation.

Super says "It appears questionable whether studies of heterogenous samples of natural scientists, mathematicians, or engineers can yield maximally useful research results. Studies of more specific fields, such as chemistry, biology or physics, or better still, studies

of more specific occupations such as sales or design engineering, physical or biochemistry, applied or theoretical mathematics, would be more rewarding. Further functional subdivisions reflecting level and type of operation would probably yield even richer results."

The criteria of scientific achievement used in many studies seem inadequate. Scientific achievement is too frequently equated with academic achievement in scientific studies. There is over-emphasis on intellectual factors, but there are too few studies investigating such factors as personality traits and motivation with objective instruments. Most studies are cross-sectional; factors contributing to vocational success at some point in time are emphasized rather than the sequence of prevocational and vocational decisions which constitute a career.

The present study emphasises the dynamic interaction of the individual with the social systems which impinge on him, and the interaction of these social systems on one another.

Essentially, vocational choice is seen as a compromising or synthesizing process of interaction between the individual, his personality, interests, values, abilities, etc, and the social systems in which he operates. The individual traits and factors are not viewed only as requirements of particular occupations but also as determinants of a series of decisions at the various stages of a career. Work satisfaction and life satisfaction depend upon the extent to which the individual can find adequate outlets for his abilities, interests, values and personality traits in his job.

4. Some Problems in Occupational Psychology Research

4.1 The Problem of Establishing the Criteria of Achievement in a Given Occupation

The literature contains hundreds of studies that have predicted some aspect of achievement, operationally defined, in widely diverse areas. For the most part, such operational definitions have consisted of a single achievement index. Probably the most obvious example is the prediction of some sort of rating of job performance, progress under Psychotherapy, child adjustment or any possible area of human activity. The assumption has been that any achievement can be represented by some sort of number or descriptive phrase, and that persons involved can be placed on a continuum with the prediction attempting to specify that place.

Another method of assessing achievement has been to select some single facet of the performance and to define this as the achievement. For example, the production rate of an industrial worker is taken as the criterion and all other aspects are ignored. It is well known that prediction using such simple definitions of achievement has left something to be desired ~~for~~ in published studies.

Despite the early recognition (Kingsbury, 1933) of various dimensions of achievement, and in particular, of differing levels of achievement among various individuals, it is only in recent years that any attempt has been made to isolate and define achievement dimensions.

Kahneman and Ghiselli (1962) have presented a study with important implications for achievement prediction with three diverse occupational groups - executives, office workers, and autobus repairmen - they trichotomized the groups on the basis of both criterion and test scores. Using a relationship statistic, "theta", the authors were able to show that "....in all three cases, success and failure are due to quite different patterns of traits". The study clearly indicates that achievement is differentially predicted at different levels of performance and that the relations of predictors and performance measures are not necessarily the commonly assumed linear and homoscedastic ones.

One of the pioneering studies in an attempt to reformulate the prediction paradigm was that of Rush (1953). This investigation was concerned with salesmen of office equipment. The study involved establishing acceptable criteria in terms of relevance, freedom from bias or contamination and reliability. For selling, such criteria as per cent of quota achieved, average number of sales, and average monthly volume were all corrected by a base sales figure; in addition, grades in training programs and supervisory ratings on a nine-point scale were obtained. The predictors were personal-history data, aptitude tests, and a personality inventory. All data were intercorrelated and from the matrix four factors were extracted. Using the predictor scores, Rush then predicted each factor using multiple correlation. Three of the factors were predictable at a significant level, whereas the fourth was not. One of the most

interesting findings was that in the prediction of supervisory ratings, per cent of sales quota achieved had a negative beta weight. Such ratings were best predicted by the personality inventory.

This study could serve as a model in that there are careful attempts to set up adequate achievement criteria and a wide selection of predictors, to determine the dimensions of achievement, and finally to relate various predictors to the separate dimensions in the achievement area. It was also suggested that the evaluation of performance can be quite crucial because the study contains actual achievement in terms of objective indices negatively related to supervisory opinion. This same phenomenon was encountered by Ronan (1964) when two factor scores as determined within a structure of four performance factors were negatively correlated at a significant level. It is possible that in the evaluation of performance, quality of performance on one dimension relating negatively to such quality in another might be a rather common occurrence. Only the most fragmentary evidence exists that this may be the case, but there is some evidence and it requires attention.

Morrison et al (1962) and Sprecher (1959) were both concerned with creativity in the work of technical personnel. The former used supervisory ratings of creativity and general performance and five-year patent disclosures as criteria. The correlations of actual patent disclosures with the two ratings were +0.18 and +0.14, indicating lack of agreement between rated and actual performance. Sprecher

used simulated problem situations, patent disclosures, supervisory ratings and peer ratings as measures of creativity. He says, "Little agreement between performance ratings and the more objective overall evaluations exist". In general, these studies indicate that there are dimensions of performance and evaluations of them, but often, little or no agreement among the different evaluations.

A most comprehensive attack on the problem of the dimensionality of performance and its prediction has been conducted by the University of Utah group, as reported by Taylor, et al (1964) and Richards, et al (1965).

These investigators are involved in a long term, extremely complex investigation of physicians; both academic and practitioners.

Taylor (1964) reported a study in which some eighty measures of physician performance were gathered by interviews, questionnaire listings in compendia, peer evaluations, medical college files, and a variety of other sources. The data were of such nature that some could be used as performance predictors or as achievement measures. All the data were intercorrelated and factor-analysed, and for general practitioners in the sample, thirty performance factors emerged. In effect, it was possible to evaluate the achievement of these professional people on thirty different dimensions. Aside from this performance complexity, which the authors believed to be a conservative estimate of the total possibilities, one of the more interesting findings was that grades in premedical or medical school did not predict later achievement.

A final point from the Utah studies made by the authors was that with 30 performance dimensions to predict, only a very limited amount of the variance could be related to any one predictor. Indeed, they showed that in such a situation, "the maximum correlation that could be obtained between a predictor and each of the performance dimensions would be $\sqrt{.03}$ or .18".

One must recognize that the criterion is not only multi-dimensional but also that conflicting demands in a complex occupation may produce what Cattel has called "internal cancellation". "That is to say, any occupation breaks down into an appreciable number of sub-activities or critical activities and there is every prospect since occupations are not designed in some psychological heaven, that what the occupation demands for one sub-procedure will be different from and sometimes imcompatible with what is demanded by another. For example, creativity in research is strongly associated with introversion, but acquaintance with obtaining research grants may be associated with extraversion. The fact remains that good occupational guidance and selection faces attenuation of its prospective power by the internal cancellation principle." (Cattell and Butcher, 1968)

4.2 The problem of Choosing or Devising the Right Predictors of the Achievement Criteria

Although the prediction of achievement has not yet achieved the scientific status now deemed possible, certain gross successes have been achieved on the measurement of intelligence. However beyond the matter of abilities lies the question of how the person will utilize

them. Personality and motivation aspects of prediction have clearly been insufficiently explored and this is particularly true when one is concerned with true prediction. Part of this is because replicable measurement of the relevant personality and motivation dimensions has not been possible until recent years. It is, of course, very easy, given a substantial data bank to pull out of it all the test data describing persons in a certain occupational category, to compare the obtained mean profile with that of the normative group, and perhaps even to calculate highly sophisticated regression equations making these findings applicable to attempts at vocational prediction. Similarly, administration of a large number of items describing interests and attitudes to a sample of persons in a selected occupation, isolation of those items answered differently than by the general population, cross validation upon a second sample, and publication of the residual items as a vocational interest scale constitutes a feasible technique within the limits of cross-sectional experiment.

Much more difficult and therefore less often performed is the task of gathering data upon a large sample of persons and waiting for the outcome. One hindrance in this area has been the fact that reasonable knowledge regarding the dimensionality of vocational performance has not been available, nor is it available at present. It might seem that a proper classification of occupations into types, perhaps with prior investigation of the dimensionality in the occupational field, could be most helpful. If a dimensional structure

of occupations were first defined, it would then be possible to calculate the similarity between the job predicted and the one eventually obtained; present knowledge of the field does not permit such sophistication.

Despite the rather primitive state of affairs described above, some data do exist that suggest that the validity of occupational prediction can be enhanced by consideration of personality and motivation characteristics. A study of Heron (1952) utilized cognitive and personality measurements to attempt prediction of a productivity count and of "the extent to which a man is a source of concern to his supervisors". Factor analysis of the predictors yielded four factors: general mental ability, hysteric tendencies, emotional instability and speed of approach to a task. The third factor correlated -0.45 with the job adjustment criterion, suggesting that good predictions with personality measures may be possible when the criterion is relevant. The Heron study would appear to indicate the need to define just exactly what aspects of achievement are related to, and can be predicted from personality measures.

The personality area, more than any other, has suffered from lack of agreement among scientists regarding which concepts should be measured, as well as even greater lack of agreement regarding the method of measurement.

Two notable attempts to bring standardization of concepts into personality Psychology have been those of Guilford and Zimmerman on the one hand and those of Cattell and his co-workers on the other.

Neither of these theoretical systems, nor the test materials based upon them have yet been utilized in Applied Psychology to the degree that their position in the field might be said to deserve.

The data tend to be of that type most easily obtained. Rarely have studies been conducted relating personality characterstics, however measured, to clearly defined criteria. Even more rarely have the predictive data actually been obtained before the performance whose achievement was to be predicted took place. Almost never has there been given to the analysis of the various criteria the same careful attention that routinely is utilized in the analysis of items. Because of these facts, much of the data that can be reported are fragmentary and suggestive rather than detailed and definitive. Still, suggestive data are better than none at all.

The Handbook for the Sixteen Personality Factor Questionnaire (Cattell and Eber, 1957) contains profiles describing the personality tests scores of large samples in over forty occupations. In many instances the data have permitted the development of linear regression equations that give different type of information. The measurement of 500 persons in a given occupation and the comparison of the mean scores with the means of the reference group does not really constitute true prediction of vocational achievement. In the first place, a variety of true achievement is represented within any occupational category, all the way from those individuals who are the true leaders in the occupation down to those who are discharged the day after testing because of their failure to meet job requirements.

Besides the people in any occupation, even those successfully employed, always represent a compromise between what the occupation might ideally need and what it can command in a competitive society.

Despite these problems, however, once the question is asked whether there may be some characteristic or set of characteristics that are helpful to success in any given occupation, then it is certainly reasonable to look for those characteristics among persons who are successful in that occupation.

When such persons, on the average, exhibit known traits to a stronger degree than persons in general, the inference that these are of value seems essentially obvious. However, this is not the place to end the testing of hypotheses but rather the place to begin. The published data from the 16 PF thus represent only a beginning in the personality area. It has been shown that the profiles describing the mean scores of highly homogeneous occupational groups usually differ from those of the general population simultaneously on eight to twelve factors, each at an acceptable level of confidence. Thus the probability that the particular occupational group is really different from the population at large approaches certainty.

Some profiles will be given (See figures 1 & 2) which show the typical personality profile of research scientists on the 16 PF and a comparison between the mean 16 PF Profile of Basic and Applied Researchers.

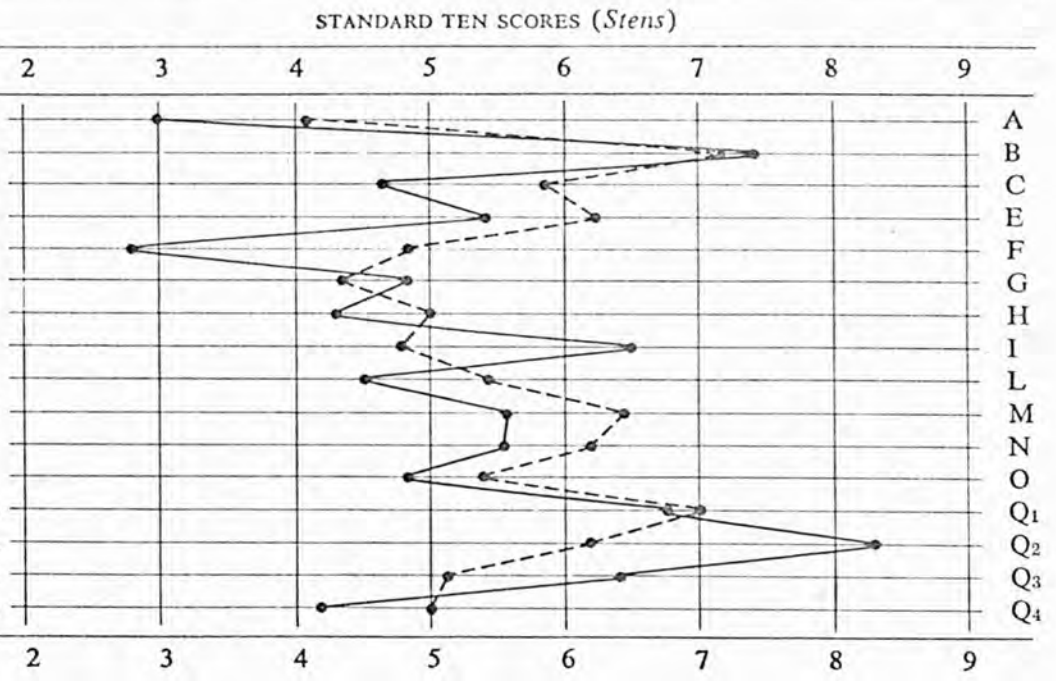
Figure 1

Mean 16 PF profile of eminent researchers (N = 144) in physics, biology, and psychology

Personality dimension label at lower pole	*Mean stens*	PLOTTED MEAN STEN SCORES 1 2 3 4 5 6 7 8 9 10	*Personality dimension label at upper pole*	
A— Sizothymia	3.36		Affectothymia	A+
B— Low intelligence	7.64		High intelligence	B+
C— Low ego strength	5.44		High ego strength	C+
E— Low dominance	6.62		High dominance	E+
F— Desurgency	3.15		Surgency	F+
G— Low group superego	4.10		High group superego	G+
H— Threctia	6.01		Parmia	H+
I— Harria	7.05		Premsia	I+
L— Low protension	5.36		High protension	L+
M— Praxernia	5.36		Autia	M+
N— Simplicity	5.50		Shrewdness	N+
O— Low guilt-proneness	4.38		High guilt-proneness	O+
Q_1— Conservatism	7.00		Radicalism	Q_1+
Q_2— Low self-sufficiency	7.52		High self-sufficiency	Q_2+
Q_3— Low self-sentiment	6.44		High self-sentiment	Q_3+
Q_4— Low ergic tension	4.91		High ergic tension	Q_4+

*Profile of Basic and Applied (Industrial) Researchers**

Personality source trait (labeled in the mean researcher direction)	*Means on Source Traits*	
Sizothyme	3.36	A
Intelligent	6.78	B
Ego strong	6.88	C
Dominant	7.24	E
Desurgent	3.50	F
Superego	3.40	G
Threctic	6.65	H
Premsic	7.10	I
Alaxic	4.12	L
Autistic	5.52	M
Shrewd	5.50	N
Not guilt-prone	3.76	O
Radical	6.20	Q_1
Self-sufficient	6.54	Q_2
Strong self-sentiment	6.78	Q_3
Low frustration	5.12	Q_4



Academic creative researchers ——
Industrial, applied creative researchers - - - - - -

CHAPTER TWO

SCIENTIFIC RESEARCH AS A CAREER

1. Importance of Scientific Research in the Social Context

2. The Social Image of the Scientist

3. The Choice of Science as a Career

4. Problem of Establishing Criteria of Achievement in Scientific Research

5. Intellectual, Motivational and Personality Characteristics of Scientists

CHAPTER TWO

SCIENTIFIC RESEARCH AS A CAREER

1. Importance of Scientific Research in the Social Context

Talcott Parsons, whose interest stems from the most general theoretical concerns for Sociology as a whole, shows why science of some sort must exist in every society; why there can be no social action without a certain amount of rational empirical knowledge of the physical, the biological and the social worlds. He defines the basic characteristics of scientific ideas as a structure in their own right and indicates how these several characteristics vary in different societies. The characteristics of systematization and generalization, for example, are very much greater in "modern" science than in the science of primitive or ancient civilized societies. He points out that for social reasons, greater systematization and generality in science are hard to achieve, but this achievement is aided by certain kinds of social norms and by the development of specialized, professional, full-time roles for the scientist.

Parsons (1951) has described the norms, and other elements of the Western cultural tradition that have been particularly powerful supports for the development of modern science. He speaks about the "institutionalized role" of the scientists, with its center of gravity in the university, which he considers, both through its general

prestige and sometimes through specific administrative action, as a mean for protecting his freedom to carry out his function in the face of forces in the society which tend to interfere with it. He discusses some of the problems of the scientific role, giving special attention to what he has called the "communication gap", based on the dependence of the scientist on "laymen" for support and for the provision of facilities; the basic problem being that the "layman" is not technically competent to judge what the scientist is doing, he has to take it "on authority". The general situation, he explains, is accentuated by the fact that there is often a large gap between the frontiers of scientific investigation and the practical results which the practical man can most readily understand, appreciate and use. Parsons thinks that this is particularly so, because the cognitive structure of science is such that the ramifications of scientific problems cannot be restricted to the solution of the kind of applied problem area in which a practical man is interested, so from his own perspective often he does not have the basis for seeing that what the scientist is doing is "of any use".

Parsons also indicates as a problem of the professionalization of the scientific role, the disturbing impact of scientific discoveries on a variety of social, economic and religious vested interests.

Robert Merton and Barber have also presented their views about the social nature of science and the scientific role. Merton (1957) in seeking to explain this phenomenon says "...like other social institutions, the institution of science has its characteristic values, norms, and organization. Among these, the emphasis on the value of

originality has a self-evident rationale, for it is originality that does much to advance science. Like other institutions also, science has its own system of allocating rewards for the performance of roles." He believes that these rewards are largely honorific arguing that the pursuit of science is culturally defined as being primarily a disinterested search for truth and only secondarily, a means of earning a livelihood. He explains that in line with the value emphasis, rewards are to be meted out according to the measure of accomplishment; hence, he concludes, when the institution operates effectively, the augmenting of knowledge and the augmenting of personal reward are tied together. In explaining this fact he observes that these institutional values have their defects, because the institution can get partly out of control, as the emphasis upon originality and its recognition is stepped up, and then he concludes, "the more thoroughly scientists ascribe an unlimited value to originality, the more they are in this sense dedicated to the advancement of knowledge, the greater is their involvement in the successful outcome of enquiry and their emotional vulnerability to failure".

Merton points out that like men in other institutional spheres scientists tend to develop the values and to channel their motivations in directions the institution defines for them.

In considering the interaction between science and society, Merton has set down some sources of support and hostility to science, he believes that conflict arises when the social effects of applying scientific knowledge are deemed undesirable, when the scientist's

scepticism is directed towards the basic values of other institutions, when the expansion of political or religious, or economic authority limits the autonomy of the scientists, when anti-intellectualism questions the value and integrity of science and when non-scientific criteria of eligibility for scientific research are introduced.

B. Barber (1953) in seeking to explain how many different factors have had, and continue to have, an important influence on science, notes that no one of the several alternative factors is necessarily and under all conditions more important than the others. He says "the intellectual, the religious, and the political factors, for example, are no less, and of course no more influential always than the economic factor." He argues that because of all these factors working together, it is difficult to analyse their influence and proposes that this analysis should be a proper task for the Sociology of Science. Barber agrees with Merton in considering science as a process of action of its own with an internal structure and believes that "Society including science is a web of interacting structures in which the effects ramify and re-trace themselves time and again".

2. The Social Image of the Scientist

The two studies by Mead and Metraux (1957) and by Beardslee and O'Dowd (1961) are descriptions of the images of the scientist that are held by American High School and College students.

Mead and Metraux (1957) took their data from a nation-wide sample of essays written by high school students who were allowed to produce the images that they had of scientists, in response to semi-structured questions. This study was based on qualitative data, and the material reflected the way individuals felt and thought about science and scientists. Mead has emphasized the value of a qualitative study arguing that when "the problem is one of delineating a shared aspect of a society-wide set of images - rather than of answering questions on which or how many students may be expected to respond in a given way - a qualitative study is preferable."

In general this study showed that while an official image of the scientist - that is, an image that is the correct answer to give when the student is asked to speak without personal career involvement - had been built up very positively, this was not so when the students' personal choices were involved. Science in general was represented as a good thing: "without science we would still be living in caves; science is responsible for progress, is necessary for the defense of the country, is responsible for preserving more lives and for improving the health and comfort of the population".

However, when the question became one of personal contact with science, as a career choice or involving the choice of a husband's career, the image was overwhelmingly negative. Mead tried to explain this result saying that "while the rejection in the negative image is of course immediately clear, the positive image of very hard, only occasionally rewarding, very responsible work is also one which, while it is respected, has very little attraction for young Americans today". The authors suggested that the young did not wish to commit themselves to long time perspectives, to dedication, to single absorbing purposes, to an abnormal relationship to money, or to the risks of great responsibility, because these requirements would be too demanding.

Mead and Metraux (1957) concluded by saying that to the extent that any career is seen as antithetical to the contemporary set of values, it will repell students as a career choice, and finally they suggested a number of ways in which the images about the rewards of being a scientist might be changed, so that more people might want to become scientists and so that everyone would understand them better and thus facilitate their work.

The Beardslee and O'Dowd study (1961) made comparisons between scientists and other occupational types. They applied a questionnaire in which students were asked to indicate the appropriateness of a series of terms to each of 15 occupations, including that of the scientist; the terms were arranged in semantic differential scales.

In summary, the scientist, according to college students, was a "highly intelligent individual devoted to his studies and research

at the expense of interest in art, friends, and even family. The scientist derives great personal satisfaction, a sense of success, reasonably high status in the community, and a modest income from his work. He serves mankind in a selfless way, almost unaware that he is doing so; he serves others by serving himself. In public matters the scientist is influential, but he may be somewhat naive. He is extreme in his views on social matters, and he tends to become emotionally involved with issues outside his realm of professional competence. The scientist is coldly intellectual in his professional area but excitable in the public political sphere."

The authors noted that this was a clearly stable image that was shared among college students with varied histories and experience.

When the students were asked to rate some occupations in terms of how much they would like to be in them, the most desirable occupation seemed to be that of the College Professor, the lawyer, the doctor and the business executive; the occupation of scientist came next.

Beardslee and O'Dowd pointed out the effect of the "image" in recruiting a certain type of person and discouraging others, arguing that for the potential recruit the image would mean that he should have a certain set of personal qualities and that he could expect a particular kind of social life etc.; so if these features of the life of the scientist did not fit with the student's beliefs about himself or his hopes for the future he would not be likely to commit himself to a career in science.

In trying to find a solution to this problem these authors suggested that the "public image" should be changed, but they discussed on the other hand, that if the public image represents the characteristics of American scientists, to change it would be to hide the reality and be dishonest. Their study did not give any data as to the actual characteristics of scientists. Beardslee and O'Dowd suggested that perhaps "the discipline" of science does narrow a man's interest, does create a group who do not meet the cultural ideal of the broadly educated man. They concluded by saying that probably scientists have "over-conformed" to their own image of what a scientist is, and finally they consider the possibility that to be a scientist is indeed to be different.

Hirsch (1958) using the content analysis method on science fiction material, has shown that here too there is a negative shade, but he noticed both critical and utopian treatment of the present and future position of the scientist.

In Hall's study (1962) of the images that politicians in America had of scientists, there was an important departure from the approach of the previous researches. Hall focused on a selected group of great and direct importance on the scientific enterprise, rather than on the larger groups of high school and college students or readers of science fiction. An extremely significant dimension of the politician's perception of science as a major social force was the dynamic and progressively expanding character which they ascribed to it. They also considered scientists as an exclusive in-group, a tightly-knit

fraternity of dedicated theoreticians and visionaries; and that science was international in scope in terms of its jurisdiction, activities and membership.

3. The Choice of Science as a Career

3.1 The Choice of Arts or Science

When a student gets to a certain age he must make a choice of specialization, either on scientific subjects such as Physics, Mathematics, etc., or on Social Sciences or Arts. The age at which students have to make such a decision varies according to different educational systems; many authors have been concerned with some factors that influence this choice.

Lovell and White (1958) obtained evidence suggesting that:

a - the subjects which male students read at the training college were those which they enjoyed most or felt they did best in, during the later years of Grammar School course.

b - there was a significant association between the clearly displayed interests of the parents and the subjects which the son preferred to study later.

c - there was a significant association between studying Science subjects at a training college and attitude towards, or performance in Arithmetic in the junior school.

d - the influence of the immediate environment and of the scientific atmosphere in which the subjects had been reared, did not seem to be of much consequence in affecting their choice of subjects.

Brown M.N. (1953) investigated some influences in the choice of a Science career and found that girls who took up this type of career:

a - were good at Arithmetic

b - took more Science subjects in the school certificate examination, in which they were more successful.

c - were estimated more frequently by their schools as able to do advanced work in Science subjects only or in both Arts and Science subjects.

d - and more often had fathers who were "brainworkers".

A more recent research carried out in this country was that of L. Hudson (1965) whose primary concern has been with differences in intellectual type, particularly to discover why one boy goes onto the Arts side of the Sixth Form, while another opts for Physical or Biological Science. He found that it was relatively simple to predict on the basis of a handful of mental test scores, whether a boy would choose the Arts or the Physical side. The future Arts specialists tended to have rather low scores on intelligence tests, to display a verbal rather than a numerical or diagrammatic bias of ability on mental tests; to work inaccurately; and to have "cultural" rather than practical or mechanical interests. Conversely, the potential Physical scientist tended to have high intelligence test scores, a diagrammatic or numerical bias of ability; to work with a consistently high level of accuracy; and to have practical and mechanical interests. His second chief finding was that there was little relation between the level of boys' accomplishment in their school work and the level of their accomplishment on the tests.

Similar results were obtained by McKinnon (1962) who reported that distinguished scientists, mathematicians, engineers and novelists were not differentiated from their less successful and less original contemporaries by their mental test scores. He argued that above a certain level, somewhere in the region of IQ 115-125, conventional intelligence has little bearing on subsequent intellectual achievement.

Hudson (1965) tried to see if there was any connection between the American tests of "creativity" (Guilford, 1950, 1951) and academic achievement, but the results again showed no relation at all. However, on these creativity tests he found a sharp Arts-Science discrimination. Arts specialists seemed to find open-ended tasks - suggesting uses for objects, for example - congenial and relatively easy to do. The same applied to many specialists in the Biological Sciences. "But nearly all young Physical Science specialists, gifted and weak alike, found these tasks antipathetic. When presented with the Uses of Objects test, young men doing imaginative, elegant work in Mathematics and Physical Science gave not a variety of solutions, but one or two solutions only. Their suggestions were usually highly conventional."

Hudson (1965) tries to find an explanation to this phenomenon and suggests that scientific education in this country does not encourage young scientists to free-associate, to think in a wide ranging manner around practical or intellectual problems, but to search methodically for the correct, the best solution - in other words to "converge". In contrast, he says "Arts specialists seem prone to think 'divergently' and are probably encouraged by their teachers to do so."

He concludes "Scientific education may be seen as inculcating 'convergent' habits of thought; the Arts as encouraging 'divergent'."

Butcher (1969) conducted a Longitudinal study of a large proportion of children in one age-group in order:

a - to condense from the mass of available information a single estimate of the suitability of each pupil for a career in Science, taking into account both aptitude and interest at age 13, and

b - to discover how far subject choice at later ages and scholastic performance correspond with the estimates of their suitability; paying particular attention to those students who specialize in subjects other than science, although apparently science-oriented at an earlier stage. A Factor Analysis was carried out on 70 variables which included measures of:

- Ability: Thurstone's Primary Mental Abilities IQ at transfer to secondary school. Teachers estimate of probability of entering University.
- School Attainment: Standarized marks at end of first year in secondary school.
- Personality: Cattell's HSPQ + 2 second order factors.
- General Interests: Kuder Preference Record.
- Other measures of interests (designed in particular to assess degree of interest in Science):

  Pupil Ratings of school subjects

  Pupil Ratings on subject teachers

Differential vocabulary test

Pupil rating on careers

Essay on "What I expect to be doing in five years' time"

Teacher estimate of direction of specialization

- Biological measures:

Position in family, number of brothers and sisters

Father's occupation and status, number of relatives scientists

Teacher's estimates of background advantage or deprivation

Course chosen in third year

The ten major factors were interpreted as follows:

1 - Temperamental Stability

2 - Interest in and aptitude for Science

3 - Practical-mechanical interest (or aptitude for applied science)

4 - General Scholastic Attainment

5 - Introversion-Extraversion

6 - Verbal reasoning

7 - Mathematical-computational aptitude

8 - Literary Interest

9 - Interest in Social Work

10- Aesthetic Interest

No very strong relation was found between personality factors and subject orientation. Table 3 shows the variables which had positive loadings of .35 or higher on factor 2 or Science Orientation.

TABLE 3

THE SCIENCE/ARTS ORIENTATION FACTOR (Factor 2) (Butcher, 1969)

Description of Measure	Factor Loading
Composite rating of the Careers of research chemist, physicist and science teacher	.87
Rating of the career of research chemist	.84
Rating of science as school subject	.83
Kuder Preference Record (scientific interest)	.73
Rating of science teacher	.59
Teacher's estimate of scientific orientation	.49
Essay ("What I shall be doing in five years")	.48
School marks in science	.44
Differential vocabulary test (Knowledge of scientific terms)	.42
Course taken in third year	.40
Rating of career of engineer	.35

On Factor 3, "Practical-mechanical Interest" (or aptitude for Applied Science) the highest positive loadings were:

Kuder Sub-scale on mechanical interest

Rating of the career of engineer

Essay on future career

Kuder scientific interest

Kuder outdoor interest

Science course taken in third year

Rating of science as school subject

Science score on differential vocabulary test

The highest negative loadings are on the "Tender-mindedness" factor of the HSPQ,

Kuder Clerical interest

Rating of career of teacher

Kuder social service interest, and

Kuder persuasive interest

The author pointed out that the appearance of the tough-minded dimension was related to the applied scientist and not to the 'Pure Scientist', concluding that ".....the picture of the 'tough-minded' engineer or applied scientist is no mere stereotype, but represents a pattern of interest and temperament formed 'Early in Life'."

3.2 Historical Notes

The expansion of higher education has been very rapid, ten years ago there were frequent announcements of plans for building more schools, more university departments, more technical college accommodation and it seemed natural that a large part of this expansion should be devoted to the scientific disciplines, so the demand for highly trained scientists and technologists appeared to be quite insatiable.

The problem of the shortage of scientists seems to be accentuated in the last years. At a Symposium held at the Annual Meeting of the British Association for the Advancement of Science in 1967, on the subject of Why choose Science?, it was pointed out that the country's demand for engineers, technologists and scientists over the period 1965-68 was estimated at 7.4 per cent, whereas the available stock over the same period was calculated to be 4.6 per cent. It was suggested that this overall shortage is aggravated by a marked imbalance of such trained manpower as it was available: "Higher education and research continues to attract the largest proportion of first and second degree graduates to the detriment of Industry, and most particularly the Science and Mathematics departments in Schools."

An interesting phenomenon was mentioned at this Symposium, namely a "swing away from Science" among young students. In 1967 1.600 places in university Science and Engineering Departments went unfilled, while 6.000 eligible candidates for Social Sciences or the Arts just could not be accommodated. Lord Bowden made clear that this swing away from Science among young people was a new phenomenon and by no means confined to the United Kingdom; it has been distinguished for example in the United States, in Australia and in Germany. Klaus Tuchel indicated that in Germany the recruitment figures fell from 21 per cent in 1956 to 16.5 per cent in 1964.

The participants on this Symposium suggested several factors as being responsible for this "aversion of students to entering certain fields" where a case for need has been clearly established. A summary

of these factors is presented below:

a - "Science is a hard grind, particularly in learning. In each science there is an apparent number of facts not only to be learned but to be collated into the mental picture of the particular world that each scientist must carry. The Humanities by contrast involve either fewer facts and more opinions or facts which alter only slowly or not at all. It is little wonder that the intelligent boy or girl sees the choice as between a hard and a soft option."

b - Challis pointed out that a negative factor was the growth of the cult of uselessness. He said that a "school of thought has grown up in science which desires that the results of the satisfaction of intellectual curiosity about the nature of the physical world shall not be useful".

c - A negative image of the research scientist.

d - The quality of Science education. Challis believes that the way in which Science is taught tends to "repress both curiosity and imagination".

Other participants pointed out that there were not enough good Science teachers; this being of special importance because of its direct effect of creating an enthusiasm and understanding of the subject and because of its implications in the recruitment of teachers for the future.

e - The lack of support and facilities for "Creative Hobbies" for boys in this country.

In the last paragraph we have been dealing with some new phenomena that we are observing in this country, namely, the "swing away from Science" and "an aversion of scientists" to entering the teaching career and Industry. However, the situation is quite different in some other countries, and as we would expect, the development of scientific research is different among various countries, as well as the attitudes towards the several fields of occupation in Science.

4. Problem of Establishing Criteria of Achievement in Scientific Research

What makes a successful research scientist? In other words, which are the achievement criteria for doing research?

There is a strong tendency to regard the whole issue as something that can be settled by a discussion of IQ levels. If all the people with IQ above a certain minimum figure could be located and persuaded to go into scientific careers then the problem would be solved. However, as a number of studies have shown that the correlation between IQ and University success is rather low, this line of reasoning seems to be based on a mistaken assumption. Terman (1947) and his follow-up studies of gifted children demonstrated that the pattern of University success and failure is a very complicated one, and that IQ is only one of the ingredients.

Rowlands (1959) points out that "the programme of English education has become so largely bound up with 'creaming', or progressive selection that people tend to think that this is its main purpose". He considers that the work of schools and universities is conceived to be that of ensuring that only people with the appropriate IQ do, in fact, enter the various occupations. For Rowlands this argument involves the following assumptions which he considers of very "doubtful validity":

a - that IQ is something completely fixed and unchangeable

b - that any desired percentage can be "creamed off" from the top end of the IQ scale

c - that success at school and university depends almost entirely

on intelligence

d - that intelligence is not required in occupations for which academic training is unnecessary.

He concludes, that much more knowledge is required concerning the factors that contribute to the making of scientists and gives emphasis to the educational values.

One of the main difficulties for establishing achievement criteria in research is that scientific research is a very complex activity, and we do not know exactly what is involved in it. Certainly creativity has been one of the most studied aspects on the nature of research; however, the definition and criteria for creativity are also a very complicated question. (Harmon, 1963). Cattell (1968) has pointed out that although a high level of creativity must depend on a high level of intelligence, because the final capacity to educe relations depends on fluid ability, and although special reasoning and ideational fluency measures contribute significantly to prediction, the selection in any professional group of the more creative persons "depends decidedly more upon personality characteristics". And he continues: "Creativity in a one-hour examination-like situation may depend more on abilities, but creativity over years, in the life situation, is clearly more determined by personality as a way of life, and by motivation factors yet to be measured".

Another difficulty that one encounters on the establishment of criteria is that revealed by Taylor's study (1957) in which he shows that there is practically zero correlation among different sources of

criterion evaluation, such as the following:

a - Originality and significance of reports as rated by experts.

b - Creativity as seen by head people in the same organization

c - Ratings on personal qualities of flexibility, independence, cooperativeness as made by immediate supervisors

d - Productivity rated in the laboratory by peers

e - Creativity counted by publications

f - Awards, participation in conference papers, number of people supervised

g - Quality of finish in organizational reports

h - Popularity and likeableness.

The above analysis is based on 166 scientists at government basic research centres. As Taylor observes, the feature that strikes one most is the poor agreement even between such sources of evaluation as supervisor and laboratory chiefs.

As well as this performance complexity or multidimensionality of the criteria, one has to consider the fact that a scientist plays different roles in a society, which are described by Barber (1953) as: "to develop conceptual schemes, to train other people to develop conceptual schemes, and to apply conceptual schemes to the realization of various social purposes".

In American society, he says, these different functions are typically performed by scientists in three different types of social organization: the University and College, Industrial research groups and government research groups. Barber points out that there are

close interdependent relations among these three types of social organization, arising from the concrete overlapping of the functions in each of them. This brings us to the "internal cancellation" phenomenon referred to in Chapter One, so an occupation may have conflicting demands and what it requires from one activity is different and sometimes incompatible with what is demanded by another.

5. Intellectual, motivational and personality characteristics of scientists

A highly consistent picture of the productive scientist has emerged from the researches of Roe (1952), McClelland (1963), Barron (1963), Saunders (1963), Knapp (1963) and Cattell (1955, 1963); though the methods employed in these researches are highly varied, ranging from clinical interviews and projective techniques through empirically developed biographical inventories to factor-based tests. This or that investigator may use slightly different terms, depending upon his theoretical preferences, but so consistent is the common core of observation that little is needed in the way of translation from one terminology to another.

A. Roe devoted a large part of her work to determining whether there were differences in personality and life history patterns between research scientists that would be related to vocational choice. The factors the author found most important in family background were the value placed upon learning for its own sake, and position in the family as the oldest child. A most important factor in the decision to become a scientist was the experience of doing research and the knowledge that one can find out things for oneself. She also found a high evidence of death of a parent among mathematicians and physicists. Roe suggests that this loss can serve to increase early independence, which seems important in becoming a successful scientist.

Roe draws a number of conclusions regarding the meaning of this study. She says that scientists, contrary to some popular opinion, are not rational automatons. Their greatest difference from other people is not in special abilities, but in the things they do and the kind of activities that give them satisfaction. She believes that there is no completely differentiating factor, either between scientists and non-scientists, or between various fields of science; but certain patterns emerge from their life histories, intellectual abilities and personality structures which are characteristic. From their life histories what emerges is the frequency of professional fathers and intellectual values in the home. They developed an early independence and intense private interests which, except for the social scientists, were shared with very few others. They tended to read widely and enjoy school and studying. The patterns of intellectual functioning, which were very high for the group as a whole, revealed the social scientists and theoretical physicists to be higher in verbal than non-verbal abilities; the experimental physicists were the reverse of this; and anthropologists were relatively low in mathematical ability. The biologists relied heavily upon rational controls while the other two groups tended to be uncritical. The physicists were not interested in people, avoided interpersonal relationships and were often anxious. The social scientists were differentiated from the other two groups by their deep concern about human relations.

The type of needs satisfied by scientific activities are formulated and related to life history and personality dynamics. Intellectual

abilities were satisfying to the curiosity that stemmed from many different sources. Also outstanding was the need for independence and personal mastery of the environment. Research represented for all of them a way of accomplishing, on their own, something that really mattered to them personally. The strength of their needs and the high degree of satisfaction their work provided for them was attested to by the tremendous amount of work and high concentration of which these men were capable and which they constantly expended.

Now, we will examine the work of Cattell (1955, 1963) on the personality of scientists. He defines effective research as "...a product, first of a socio-cultural climate; second of a sufficiency of individuals gifted with an uncommon combination of abilities and character qualities; third of a satisfactory economic-administrative matrix; fourth, of special acquired research skills and thought processes; and last, of dayly working conditions, which, at the least, must not hamper creative minds."

Cattell concerns himself with the personality and dynamics of the research worker, trying to answer such questions as: How does the personality of the average research worker differ from that of the average man? How does his personality differ from that of people of equal general intelligence and similar college education who have made a name in administration or teaching rather than in research? How is his personality profile related to that of the creative, innovating, constructive personality, eminent for performance in radically different media, such as literature and the decorative arts?

This author found that the personality profile (16 PF) of the research worker is very different indeed from that of the average man; no fewer than five factors from the 16 Personality Factor Questionnaire deviating at P=.01 significance or beyond. The research worker was found to be decidedly more schizothyme, more intelligent, more dominant and more inhibited. He is also significantly more emotionally sensitive, more radical and somewhat more given to controlling his behaviour by an exacting self-concept.

Analysing the profiles of physicists, biologists and psychologists, Cattell found that they are close together and form one family. However there were some minor differences - for example, that the physicists are even more schizothyme than other research workers, and the psychologists, more dominant and less desurgent.

Cattell also found that there is a good deal in common between the eminent researchers and those who have achieved outstanding reputations for teaching or administration. However at the 1% significance level, research workers were more schizothyme, less emotionally stable, more self-sufficient, more Bohemian, and more radical than were successful administrators and teachers. Considered in relation to the general college population from which they came, research workers were significantly more schizothyme, and more intelligent, more self-sufficient, more withdrawn, more paranoid and anxious, and more inhibited.

Turning now to the third question, namely, "To what extent are creative persons in science, like those in the arts, or in other words,

is the creative personality a recognizable type despite differences of area of operation?"; Drevdahl and Cattell (1958) found a profile of writers of imaginative literature on the 16 Personality Inventory, very similar to the profiles of the creative scientists and the same was found to be true of artists taken from persons listed in "Who's who in American Art". Cattell concludes that in all the creative groups, the personality test scores show more schizothymia, more intelligence, more dominance, more desurgency, more radicalism, and greater self-sufficiency.

Barron (1963) has summarized some characteristics of a group of scientists studied by tests and clinical interview. The conclusions are as follows: the young scientists are of superior measured intelligence, exceptionally independent in judgment and resistant to group enforced opinions, marked by a strong need for order and for perceptual closure and an interest in what may appear as disorder, contradiction, imbalance, or very complex balance whose ordering principle is not immediately apparent; unusually appreciative of the intuitive and non-rational elements in their own nature; distinguished by their profound commitment to the search for aesthetic and philosphic meaning in all experience.

It is possible to give a summary of some of the characteristics which productive scientists have been said to have:

a - A high degree of autonomy, self-sufficiency, and self-direction.

b - A preference for mental manipulations, involving things rather than people; a somewhat distant attitude in interpersonal

relations, and a preference for intellectually challenging situations rather than socially challenging ones.

c - High ego-strength and emotional stability.

d - A liking for method, precision and exactness.

e - A preference for such defense mechanisms as repression and isolation in dealing with affect and instinctual energies.

f - A high degree of personal dominance, but a dislike of personally toned controversy.

g - A high degree of control of impulse, amounting almost to over control : relatively little "talkativeness", gregariousness and impulsiveness.

h - A liking for abstract thinking, with considerable tolerance of cognitive ambiguity.

i - Marked independence of judgment, rejection of group pressures towards conformity in thinking.

j - Superior general intelligence.

k - An early, very broad interest in intellectual activities, in the structure of things.

l - A drive towards comprehensiveness in explanation.

Some of these traits are descriptive of the productive scientists in general, while others are associated to the appearance of originality specifically in the scientists who are productive.

Taylor (1963) points out that productivity need not require originality, although creativity involves both: "the creative scientist produces a high volume of unusual ideas which work effectively." This

point has been made by other authors such as Knapp (1963) who considers that there is little correspondence between the characteristics of scientists and the qualities of "the creative personality". He suggests that perhaps the "creative" scientist is a rather special type of scientist in background and personality attributes - that creativity in science requires an especially fortunate combination of qualities only rarely associated in a single individual. His own views on the question of whether scientists may be considered a relatively homogeneous body of men or whether, on the other hand they constitute a very wide and diverse variety of personality types; are that "although there are undoubtedly differences between scientists in different fields of endeavour, nevertheless there are probably certain abiding and common characteristics that warrant our treating them as a single population..."

In this section we have been concerned with some characteristics of Research Scientists.

Now we shall concentrate on the motivations towards research. For this purpose we shall consider scientific research as a complex activity that involves certain creative acts and we will follow Crutchfield's Theory (1962) which explains that there are certain kinds of Motivations which lead to Creative Acts.

This author distinguishes two types of motivations, the ego-involved or extrinsic motivations in which the achievement of the creative solution is a means to an ulterior end, rather than the end in itself and on the other hand the task-involved motivations which have to do with the intrinsic value in the attaining of the creative

solution itself; here the problem is perceived as inherently challenging, "the person is caught by it and compelled to be immersed in it, and with the achievement of a solution the creator is 'by joy possessed'." Here the creative act is an end, not a means.

For Crutchfield (1962) the crucial significance of the distinction between ego-involved and task-involved motivations for the creative act is expressed in his hypothesis that the quantity and quality of creative acts will be higher under conditions of task-involvement than under conditions of ego-involvement. This author explains that ego-involved motivations are detrimental both to the ability of the creator to free himself from the constraints of old ways of thought and to his capacity to produce original insights. Moreover, he thinks that this could explain why conformity pressures may be injurious to creative thinking: ".....the outer pressure and inner compulsion to conform arouse extrinsic, ego-involved motives in the problem solver....the solution of the problem itself becomes of secondary relevance and his task-involved motivation diminishes....his cognitive processes become less flexible, his insights less sensitive." He concludes saying that persons who are specially susceptible to conformity pressures, and to the extrinsic motivations they evoke tend to have other personality characteristics that are detrimental to creative thinking.

In relation to the problem of the individual and intellectual authority Hudson (1968) argues that: "In all constructive brainwork, tension exists between the need to innovate and the weight of established principle and precedent."

Kuhn (1963) has also pointed out to this in scientific research: "....only investigations firmly rooted in the contemporary scientific tradition are likely to break that tradition and give rise to a new one. That is why I speak of an 'essential tension' implicit in scientific research. To do his job the scientist must undertake a complex set of intellectual and manipulative commitments. Yet his claim to fame if he has the talent and good luck to gain one, may finally rest upon his ability to abandon his net of commitments in favour of another of his own invention. Very often the successful scientist must simultaneously display the characteristics of the traditionalist and of the iconoclast."

Hudson (1968) points out that this confrontation with intellectual authority is especially acute at school and at University, where the largely unavoidable insistence on authoritative knowledge faces the student with an unenviable choice: that of knuckling under and being right; or of being individualistic, self-sufficient and wrong. This author conducted an experiment using a test in which the questions were accompanied by alternative answers which had been arranged so that the first alternative was the most popular one among University graduates and so on. The results indicate that convergers tend to shift their ground under pressure, more than divergers do. This suggests that low mental fluency may well be linked to a more general susceptibility to pressure from authority: "that the individual with a taste for the 'one right answer' both in answering mental tests and in his life's work, is particularly susceptible to information about what his elders

and betters think correct." (Hudson 1968).

This experiment tends to support Kuhn and Crutchfield's theories, in the sense that innovation, creativity or simply mental fluency tends to be accompanied by self-sufficiency, or independence rather than conformity or dependence on intellectual authority.

However, it is possible to argue that of the students who specialize in Science (Convergers according to Hudson) those who are motivated towards scientific research or creative work rather than to other occupations in science, probably will show a tendency to be independent from intellectual authority as has been found for Arts specialists. We will see later that this argument constitutes the basis for one of our hypotheses.

CHAPTER THREE

FORMULATION OF THE PROBLEM

1. Aims of the Study

2. Some Definitions

3. Hypotheses

CHAPTER THREE

THE FORMULATION OF THE PROBLEM

1. Aims of the Study

The present research is designed to try to give some answers to the following questions:

1) Can a person who is highly motivated towards scientific research as a career be distinguished from those who have other occupational preferences, in terms of some non-intellectual factors?

2) Why do people want to go into research?

3) Why do persons think they will dislike this occupation?

The aims of this study can be outlined as follows:

- Exploration of reasons for the preference for scientific research as a career.
- Exploration of the negative implications or "disadvantages" of Scientific Research as a career, as seen by Science College Students.
- Exploration of some personality factors in relation with the preference for research as a career, trying to relate this preference to the typical personality profile of the "Research Scientist".
- Exploration of some Interpersonal Values associated with the preference for research as a career.
- Exploration of some motivations or orientations involved in the

preference for research as a career. (Task, Self and Interaction Orientations.)

- Exploration of Conformity and its relation to preference for research as a career.

In order to meet the first question it was decided to use as subjects a group of Science College Students who manifested different occupational preferences and to obtain from them various psychological measures on variables, which according to the literature seemed relevant to the performance and success in Scientific Research; mainly non-intellectual factors such as personality factors, interpersonal values, motivational factors and conformity.

The dimensions to be studied were chosen, not at random, but on the strength of certain assumptions about the nature of scientific research and its relation to creativity.

- Personality factors: It seemed necessary to include in our battery of tests a personality inventory, because of the relevance of these factors to occupational preferences. An objective, non-clinical test was needed, that could be used in guidance and selection procedures and the answer to this was Cattell's Sixteen Personality Factor Questionnaire which has been used in this field.

- Values: As we have tried to show how certain values have been found to be associated with certain occupational preferences, it seemed reasonable that some similarity of values might underlie the occupational preference for research. However on this point a different approach from that of the reported literature has been adopted; in the

sense that we have not used the most common inventories of values, assuming that in the study of future research scientists, it is more important to concentrate on exploring values which involve the individual's relationship with other people or in other words "Interpersonal Values", as this seemed an important dimension on which scientists have been found to differ from other people.

- Motivations or Orientations: Following Roe's (1952) research it seemed important to obtain some measures of the extent to which future research scientists preferred relationships with people or with things. We searched for a standardized test which would be related to these dimensions and it was decided to use the Bass (1962) Inventory which is concerned with the measurement of self, task and interaction orientations.

- Conformity: Finally, conformity was included, with the aim of giving some empirical evidence on Crutchfield's theory (1962) about the motivations towards creativity in research and the role that conformity plays here.

In order to explore the overt reasons for liking and disliking research as an occupation, the subjects were asked direct open-ended questions and also as far as disadvantages of research were concerned a list to be ranked was offered to them.

In the thesis some terms will be used in a specific way, and the definitions of them are as follows.

2. Some Definitions:

Occupational Preference: "For any given person at a given time, occupations may be assumed to differ in their valence or attractiveness. Some occupations may be positively valent, and still others the object of indifference. The preferred occupation of a particular individual at a given time is defined as the occupation which at that time has the highest positive valence." (Vroom, 1964)

Occupational Preference for research: An operational definition of this main variable of the study is as follows:

An occupational preference for research is a low rating on Question 9 of the "Occupational Preference Questionnaire" on the items that correspond to Pure and Applied Research.

Occupational Choice: "....the process of selection among occupations. The chosen occupation is the result of this process and is the occupation that the person is attempting to enter." (Vroom, 1964)

Occupational Attainment: Choices of occupations are necessary but not sufficient conditions for the successful attainment of occupations. "....attainment reflects the ability of the individual to implement his selection." (Osipow, 1968)

Conformity: Conformity has been one of the most active research areas in Social Psychology. Interest in this problem dates from Terman's (1904) investigations. However the impetus to the research on group influence is probably due to the classic studies

of Sherif (1935) and Asch (1951). Sherif's experiment served as a paradigm for the formation and change of social norms, while Asch's study demonstrated that influence of the group extended even to matters of undisputed fact.

The term conformity has acquired a variety of meanings, some of which were intended to be explanatory and the others only descriptive. Sometimes the term is used to "explain" an instance of agreement of a person with a group. This type of explanation has been common in the past. However in present research there is a tendency to use the term to describe behaviour which is influenced by a group, the result being to create congruence between the individual and the group.

Conformity has been often contrasted with non-conformity or independence, terms implying the failure of attempted group influence. To regard conformity as the opposite of non-conformity as Walker and Heynz (1962) do, or of independence as Asch (1952) does, assumes a continuum with conformity at one end and its opposite at the other. Such unidimensional formulations are inadequate according to some writers (Krech et al, 1962; Willis and Hollander, 1964) who argue that non-conformity consists of two conceptually distinct types of behaviour. Non-conformity may reflect independence, or it may actually be anti-conformity (or as Crutchfield calls it, counterformity). These three types of behaviour- conformity, independence and anticonformity - are related to each other as

the apexes of a triangle.

When the term conformity is used, it is understood that we mean conformity to something. In studying the influence of a group, Social Psychologists usually deal with the effect of social pressure in producing conformity to a group norm or standard. A norm, usually refers to a set of expectations held by members of a group concerning how one ought to behave (Rommetveit, 1955). However, Allen (1965) points out that most research on conformity deals with the majority or consensus among group members, and has little to do with these "ought" or morally obligatory qualities. Nevertheless, pressure is generally placed on the individual member to adhere to the group consensus.

According to Allen (1965) the term social pressure in some studies means that group members oppose a person, either actively or passively, in some cases the individual is the object of active social pressure communicated by face-to-face oral or written discussion in which others may urge him to change his position. In other experiments social pressure is passive, consisting only of the naive subject's awareness that other group members disagree with him.

In the Conformity Test of the present research the social pressure can be said to be passive, in the sense that there are no face-to-face discussions; rather, the subject is informed of opinions of other people, which actually consist of

fictitious group opinions. These "norms" (fictitious group opinions) in the present research are informational rather than normative. These terms will be explained below.

Two functions of group norms, comparative and normative have been distinguished by Kelly (1952). Group norms provide information for purposes of self comparison; they also specify how a person ought to behave. Deutsch and Gerard (1955) also discussed two functions of group norms, in terms of different types of social influence. Conformity to the group because of positive expectations of the group (and of oneself) is normative influence. Conforming to the group because its behaviour is taken as evidence about reality, the tendency to accept the responses of others as evidence about reality is informational influence.

Another research finding on which the Conformity Test is based is that of Crutchfield (1955) who found that more conformity occurred when ambiguous stimuli were used rather than items which had objectively correct answers. Other studies that have found social influence to be more effective when ambiguous stimuli are used are those of Luchins, 1945; Luchins and Luchins, 1955; Walker and Heynz, 1962 and Wiener, 1958.

In summary, the term conformity will be used here as: The tendency to accept or agree with the responses of others (fictitious group opinion) as evidence about the stimuli presented to the individual.

And Independence will be taken to mean the process in which the individual is through inner conviction and self confidence capable of holding to and expressing his own independent responses, unimpaired by the opposition of the responses of others (fictitious group opinion).

One problem that should be mentioned here and that has been given little attention in the research on conformity is the question of the generality of conformity. Although there have been a few studies on this problem (Allen and Crutchfield, 1963 and Walker and Heynz, 1962), it is difficult to know if a person who shows high conformity in the experimental situation will behave accordingly in outside situations, in real life.

The remaining technical terms will become clear in the next chapter in which a description of the instruments used and the definitions of the variables which they measure will be presented.

Conformity and Independence will be dealt with in two ways:

-as actual behaviour, measured by the conformity Test (defined in the two last parragraphs)

-as values, or in other words theimportance that an individual places on them in interpersonal relationships (defined in page 107) measured by the Survey of Interpersonal Values.

3. Hypotheses

The hypotheses of this study can be briefly listed as follows:

Hypothesis 1: There is a similarity among the personality profile (16 PF) of students who show an occupational preference for research and the typical personality profile of researchers.

Hypothesis 2: High values on independence are positively related to the occupational preference for research.

Hypothesis 3: Low values on conformity are positively related to the occupational preference for research.

Hypothesis 4: There is a positive relationship between "task-involved motivations" and the occupational preference for research.

Hypothesis 5: Low scores on the "interaction orientation" are positively associated with the occupational preference for research.

Hypothesis 6: Low scores on "self-orientation" are positively associated with the occupational preference for research.

Hypothesis 7: There is a positive relationship between low scores on conformity and the occupational preference for research.

CHAPTER FOUR

METHOD

1. General Points on the Methodology

2. The Sample

3. The Instruments

4. Procedure

CHAPTER FOUR

METHOD

1. General Points on the Methodology

The present research has employed different methodological approaches at different phases, trying to use the results of one to inform and refine the others. It has used survey and experimental techniques, as will become evident on the following pages.

A mention should be given to the specific type of survey which has been used,namely the analytic or relational type of Survey (Oppenheim, A.N., 1966), "Set up specifically to explore the relationships between particular variables.....it is less oriented toward representativeness and more toward finding associations and explanations, less toward description and more toward prediction, less likely to ask "how many" or "how often" than "why" and "what goes with what"."

A series of tests were used in order to obtain a set of measures which can be referred to as the independent variables, however, strictly speaking these measures are not in any sense under the control of the experimenter. The term independent is used because it is believed that these variables act as causal agents of the occupational preferences which have been, in turn, named the Dependent variables.

2. The Sample

The total sample consisted of 102 students, 47 women and 55 men, doing first, second or third year of first degree courses in Biochemistry, Chemistry and Physics at two Colleges in London University.

The 102 students represented 33 per cent of the total population to whom an initial approach was made. They were volunteers and therefore self selected. Of these 102 students, 53, that is, 54 per cent, completed all the battery of tests.

It should be pointed out that there was a differential loss in respondents from the original sample and an attempt to find differences between the original 102 and the "experimental sample" was made through some statistical analyses. Results are shown in Table 4 and indicate that some statistically significant differences appeared for the two groups. The 53 students who took all the tests showed a more positive attitude towards the teaching and research occupations and a more negative attitude towards sales and administrative work than those who did not complete all the tests. The composition of the 53 students in terms of age, sex and course is given in Tables 5, 6 & 7.

The criteria that were considered in selecting the population to be approached were:

- Students should have been attending an undergraduate Science Course. Post-graduate students were not considered because they are already engaged in research, whereas undergraduates still have an

occupational choice to make.

- The likelihood of the sample yielding a wide range of occupational preferences.
- Convenience in administration of the various tests.

These criteria were considered to have been satisfied in the selection of the initial population since it consisted of Undergraduate students attending Chemistry, Biochemistry and Physics at College level, in two different Colleges in London.

The results for the self-selected sample who responded will give evidence on the second criterion, however, It would not be surprising if there were a bias towards a preference for a research career among the respondents so long as a sufficient number preferred some other career, however, factors associated with preference for research can be examined.

A further word of caution is necessary on the nature of the sample. It is clearly unrepresentative of British College Students as a whole, for it consists of students from only two Colleges in one city. This fact was due, mainly to practical reasons, to the difficulty of carrying out such a large research project as would have been needed to study a representative sample, and to the difficulty of getting volunteers for this kind of research. However, as has been pointed out in section one, and above, the immediate aims of the study should not be seriously hampered by the nature of the sample, though before generalizations could be made further work in other places would obviously be required.

3. The Instruments

The instruments used in this research, which will be briefly described later in this section, were:

- The 16 Personality Factor Questionnaire
- The AH5 High Grade Intelligence Test
- The Survey of Interpersonal Values
- The Orientation Inventory
- The occupational Preferences Questionnaire
- The Conformity Test

The two last ones were developed by the researcher, and the other psychological tests are commonly used in Psychological practice.

3.1. The 16 Personality Factor Questionnaire

This personality inventory has been described elsewhere (Cattell, 1956, 1957). It gives reliable information about a number of personality traits in a short time and it has been applied to various occupational groups of which representative profiles have been specified. In the present study we used Form C, mainly because it is the shortest form; covering 106 items, which take more or less 20 minutes to complete.

The majority of the questions in the 16 P.F. are indirect, asking about interests which the subject does not necessarily perceive to be related to the trait in question.

The test was administered to groups of subjects. They were asked to read the front page and to fill in name etc., in the separate answer sheet they were given. The subjects were then asked to complete a few examples before beginning the test. Any difficulty in comprehending the instructions or of the way in which the answer sheet had to be filled in, was cleared up with each subject before the actual test began.

The 16 Personality Factors are described (Cattell, 1957) in bipolar terms:

Factor A	Cyclothymia	Vs.	Schizothymia
Factor B	General Intelligence	Vs.	Mental Defect
Factor C	Emotional Stability or Ego Strength	Vs.	Dissatisfied Emotionally
Factor E	Dominance or Ascendance	Vs.	Submission
Factor F	Surgency	Vs.	Desurgency
Factor G	Character or Superego Strength	Vs.	Lack of Rigid Internal Standards
Factor H	Parmia	Vs.	Threctia
Factor I	Premsia	Vs.	Harria
Factor L	Protension	Vs.	Relaxed security
Factor M	Autia	Vs.	Praxernia
Factor N	Shrewdness	Vs.	Naivete
Factor O	Guilt-Proneness	Vs.	Confident adequacy
Factor Q1	Radicalism	Vs.	Conservatism of temperament
Factor Q2	Self Sufficiency	Vs.	Group dependency

Factor Q3	High self sentiment formation	Vs.	Poor self sentiment formation
Factor Q4	High ergic tension	Vs.	Low ergic tension

3.2. The AH5 High Grade Intelligence Test

This test has been described in detail elsewhere (Heim, 1966) It is a group test of general intelligence, designed to discriminate within selected groups of highly intelligent subjects. It is considered inappropriate for use with subjects of average, or below average intelligence or below 13 years of age. The test is in two parts; Part I consists of problems presented in verbal and numerical form and in Part II the items are represented diagrammatically. The reasoning is mainly deductive and the answers are either right or wrong. Before each part of the test the subject has to complete correctly, a set of examples.

These examples embody the main types of principles encountered in the test proper. The answers to alternative questions in the examples are printed on the answer sheet. The subject is asked to see that he understands and agrees with the answers given and then to work out the remaining examples for himself. Any difficulty in comprehending the instructions or the worked examples is cleared up with each subject individually, before the actual test begins.

Each part of the test has a time limit of 20 minutes, the maximum score for the tests is 72, since there are 36 questions in

each part. The test was given as a group test.

3.3. The Survey of Interpersonal Values

(See Appendix 1)

This survey has been developed by Gordon,(1960). It is based on the assumption that a measure of the individual's values can be obtained from what he considers to be important. The SIV is a self administering test, which was group administered. It measures ".....certain critical values involving the individual's relationships to other people or their relationship to him." (Gordon, 1960)

The six values measured are:

S. Support: "Being treated with understanding, receiving encouragement from other people, being treated with kindness and consideration."

C. Conformity: "Doing what is socially correct, following regulations closely, doing what is accepted and proper, being a conformist."

R. Recognition: "Being looked up to and admired, being considered important, attracting favorable notice, achieving recognition."

I. Independence: "Having the right to do whatever one wants to do, being free to make one's own decisions, being able to do things in one's own way."

B. Benevolence: "Doing things for other people, sharing with others, helping the unfortunate, being generous."

L. Leadership: "Being in charge of other people, having authority over others, being in a position of leadership or power."

The test requires about 15 minutes to complete, its scales were developed through the use of factor analysis. It consists of 30 sets of 3 statements and by forced choice the subject indicates of each triad one statement as representing what is most important to him and one statement as representing what is least important to him.

Within each triad, three different value dimensions are represented.

3.4 The Orientation Inventory

The Orientation Inventory developed by Bass, (1962) is concerned with the kinds of satisfactions and rewards a person seeks on a job. (See Appendix 2)

S. Self-Orientation: "Reflects the extent a person describes himself as expecting direct rewards of what he does upon others working with him." "A person with a high score on self-orientation is more likely to be rejected by others, to be introspective, to be dominating and to be unresponsive to the needs of others around him. He is concerned mainly with himself, not with co-workers needs or the job to be done."

I. Interaction-Orientation: "Reflects the extent of concern with maintaining happy, harmonious relationships in a superficial type of way.....Interest in group activities is high but not ordinarily conducive to the progress of the group in completing tasks."

T. Task-Orientation: "Reflects the extension to which the person is concerned about completing a job, solving problems, working persistently, and doing the best job possible."

The inventory consists of 27 statements or questions regarding attitudes and opinions to which the subject responds by choosing both the most and the least preferred of three alternatives.

It is self-administering, taking about 20 minutes to be completed. It was given to groups of students in this study.

3.5 The Occupational Preference Questionnaire

This questionnaire was developed (See Appendix 3) in order to explore some occupational preferences with special interest in research occupations.

Questions were included about the reasons that students have for their occupational preferences. They were then asked about some negative implications or "disadvantages" which they might consider research occupations to have.

In order to find out about occupational preferences within Science, a list of occupations was included which could later be analysed in terms

of the research - non-research criterion. As the researcher was not familiar with the different occupations which are available for a Science graduate in this country, some informal short interviews with students of the Chemistry Department were carried out. No useful information emerged from these interviews in relation with career opportunities because the students did not seem to have much knowledge about their possible future occupations. In fact, career information was eventually obtained through some members of the Staff of the Chemistry and Physics Departments of the Colleges concerned. They collaborated on the elaboration of a list of occupations, giving a short description of each of them. The list was included in the questionnaire as question number 4, in which the subjects have to rank the 10 occupations from the most liked to the least liked.

The occupations or posts included in the list were classified according to the "research - non-research" criterion as follows:

Research:

- Lecturer in University
- Research Worker in Industry
- Lecturer in Technical College
- Research worker in a Research Association
- Research Worker at a Government or Semi-Government Establishment.

Non-Research:

- Science teacher at school
- Industrial Management
- Sales Executive

- Routine process control in Industry
- Administrative work

Question 9 of the questionnaire also included a list of activities, but in a more abstract type of description; this was done having in mind that the occupational titles given in question 4 involved a number of "external" conditions to the work itself, such as status, salary, environment, etc. The occupations listed in Q.4 were directly related to the actual future possibilities available for the subjects of our sample (according to the Departmental Staff) but Q.9 was intended to explore preferences towards research vs. other occupations.

Questions 3, 5 and 6 were devoted to the exploration of reasons for their occupational preferences. They were included as open-ended questions in order to avoid the effects of "social desirability", which might have appeared if the subjects had faced a list of reasons to rate, for example.

It has already been pointed out that an attempt was made to study some negative implications or disadvantages of research as seen by students. Question 8 consisted of a list of disadvantages which the subject had to rank from the most serious to the least serious.

A pilot study on the Questionnaire was carried out and is described in Appendix 4.

3.6 The Conformity Test

In order to meet hypothesis number 7 a new conformity test was developed. The requirements that were considered in the construction of the conformity test, were:

- It is necessary to develop quantitative measures of the extent of conforming behaviour under social pressure.
- It is necessary to obtain an opinion of people in a standard situation and then to elicit opinions on the same subject under conditions involving social pressure.
- It is necessary to administer the conformity test to large groups of people.

The conformity test was based on the assumption that conforming behaviour should be easy to obtain when an individual is exposed to an ambiguous stimulus in a social situation.

Pilot work on the conformity test and its validity was carried out and is described in Appendices 6 & 7.

- The final form of the Conformity Test used as stimuli some designs suggested by Rock and Kremen, (1957) and by Shafer and Murphy (1943). (See Appendix 8)

These designs are of the figure-ground type, and the subject's task is to choose which side of the design (A or B) looks like the figure. The idea behind these patterns, is that there should be an equal probability of perceiving either side as being the figure. (Rock and Kremen, 1957) If the subject changes his opinion when he has been given information about norms there would be reason to believe

that this was a conformity response.

The conformity test in its final form consists of 12 figure-ground type designs which were presented to the subjects in two types of situation.

First of all, each subject received an answer sheet (See Appendix 9). The experiment was described to them as a "perception scale" and its purpose was said to measure their "perceptual accuracy".

A projector was used to present each of the 12 designs for five seconds, and after each presentation they were asked to write their answers. At the end of the twelve slides the researcher collected all the answer sheets. The subjects then performed the same task of choosing the figure of each design under a rather different condition.

They were given a second answer sheet, which was called Perception Scale II (See Appendix 10). The 12 designs were presented again to all the subjects but the group pressure variable was introduced by giving them a fictitious group opinion on each of the designs. On the Answer Sheet (Appendix 10) the fictitious group opinion is indicated by a circle around one of the sides of each design. After the experiment was concluded the researcher explained the actual purposes of it to all the subjects.

The Score on the Conformity Test for each subject was worked out in terms of percentages of:

$$\frac{\text{Actual Conformity Responses}}{\text{Possible Conformity Responses}}$$

The number of possible conformity responses for each subject was given by the number of responses of a subject to the first presentation which differed from the group opinion he received on the second presentation.

The number of actual conformity responses was given by the number of responses which changed from first to second presentation in the direction of the "Possible Conformity Responses".

Separate Side Experiments were carried out on the effects of the size of the group on the Conformity Test and are reported on in Appendix 11.

4. Procedure

Contact with subjects was made with the help of the members of the staff of the corresponding Science Departments, who provided a list of the names of all the students.

The first contact with the subjects was through a short letter (See Appendix 12) inviting them to collaborate on the project. They were told some of the general purposes of the research and that they would be asked to attend two testing sessions, in addition to filling in the questionnaire which was attached to this letter. The letter and questionnaire were given to them by the lecturer at the beginning of a lecture and they were to return the filled questionnaire using the College internal mail system (pigeon-hole).

Three weeks after they were given the questionnaire a reminder letter was sent to those students who had not returned it, asking them to collaborate. For those students who had returned the questionnaire a letter was sent giving the place and times of the following two testing sessions (See appendices 13 & 14).

The tests used in this research took between two and three hours per student to complete. Each testing session lasted for about an hour and was conducted by the researcher. The two testing sessions were carried out as near as possible to one another, and the actual order in which the tests were given, was consistent throughout the testing programme.

This was as follows:

Session one:

Sixteen Personality Factor Questionnaire

Survey of Interpersonal Values

Orientation Inventory

Session two:

AH5 Intelligence Test

Conformity Test

The order of test adminstration was determined mainly by consideration of time, but it was planned so as to make the contents of the first session obviously relevant to the research topics in order to keep the interest of the subjects. The tests were group administered, and the groups of students in the testing sessions were rather small, ranging from 3 to 10 subjects, due to the difficulty of getting the subjects to attend at the same times.

Great care was taken to avoid the possibility of students copying from one another's answers by arranging good spacing between the seats or desks. In arranging the testing programme for both Colleges, care was taken to ensure that the separate testing sessions were completed with as small time lapse as possible. The testing programme was carried out during the Michaelmas and Lent terms of Session 1967-68.

Every effort was made to establish a friendly rapport with the groups of students tested and to establish a good level of motivation and interest during the testing sessions. The researcher's aim was to

produce an atmosphere in which discussion and comments about the tests were encouraged. Subjects were given an opportunity after each session to discuss any particular questions they might have about the research project or the testing procedure.

The tests seem to have produced a good level of motivation and interest. The researcher was especially interested in the subject's comments on the conformity test, in order to have an idea about the validity of the experiment.

CHAPTER FIVE

I - STATISTICAL ANALYSIS OF RESULTS

1. Main Correlation Coefficients

2. Principal Components Analysis

3. Tests of Differences between Means

CHAPTER FIVE

I - STATISTICAL ANALYSIS OF RESULTS

The next two chapters will deal with the analysis of the results, first presenting all the statistics carried out and then integrating the results from all the measures used according to two main topics : Occupational preferences, and the perception of research and non-research occupations in Science.

5.1 Main Correlation Coefficients

The first statistical analysis that will be included here is the correlational one: a product moment correlation matrix was calculated for 45 variables from the Occupational Preferences Questionnaire on the results from the total sample of 102 subjects*.

A second product moment correlation matrix was calculated for the "Experimental Sample" (53 subjects) on the main variables of the Occupational Preferences Questionnaire and the main psychological variables, namely, personality factors from the 16 PF, Interpersonal Values, Intelligence, "Orientations" and Conformity.

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*The EXCHLF Computer Program for Correlations was used.
Atlas Computer, University of London

A list of the names of the 74 variables included in the second matrix will be given in Appendix 16. Some fragments of these correlation matrices will be included below with some comments on the statistically significant coefficients.*

I - Correlations between Ratings on Ten Occupations

Table 8 shows the correlation coefficients obtained between the ratings of 10 different occupations. They cover a wide range, going from 0.173 to 0.688.

These correlation coefficients indicate associations among several occupational preferences, for example persons who said they would enjoy being science teachers at schools, showed a rather high tendency (0.611) to like lecturing at Technical Colleges and a moderate tendency to like lecturing at Universities (0.230).

Persons who preferred management jobs tended to like sales work (0.497) and administration (0.460), however they disliked doing research in Industry (-0.204) in research Associations (-0.392) and at Government Establishments (-0.449).

For those who liked lecturing in Universities a tendency appeared to enjoy different research jobs (research in Industry 0.210; research in research Association 0.361; research in Government 0.249) and to dislike such jobs as sales (-0.318) Routine Process (-0.271) and administration (-0.244).

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* One would expect 5 out of every 100 correlations to be significant by chance.

Persons who expressed preference for doing research in Industry also liked other research posts such as research in Research Associations (0.688) and Research in Government Establishments (0.596). However, they disliked sales jobs (0.412) and administration (0.376). These who said they would enjoy sales tended to dislike every type of research job (research in Research Association - 0.463; Research in Government -0.416) but they liked administrative work (0.403). Finally those who liked the post of Research Worker in a Research Association tended to dislike administration and those who liked administration, tended to dislike to do Research in Government Establishments (-0.300)

II - Correlations between Rankings on Each of Ten Occupations and Sten Scores on 16 Personality Factors (See Table 9)

Correlation coefficients between the rankings on the ten occupations and the 16 personality factors were rather low, falling in the range of 0.2 to 0.3. However, some statistically significant relationships did appear; for example,

- Preference for doing Research in Research Association: tended to be related with being reserved, detached, critical and cool (Factor A, 0.297) rather than outgoing.

- Preference for doing Research in Government Establishments: tended to be associated with Factor A from the 16 P.F. that is with being reserved, rather than outgoing (0.292).

- Preference for Lecturing in Universities: was associated with placidness, being self-assured, confident and serene (Factor O, 0.327).

- Preference for Management: tended to be associated with being expedient, to evade rules, to feel few obligations (Factor G, 0.289) and with being venturesome, uninhibited and spontaneous Factor H, 0.255). Those who liked management tended also to be practical, rather than imaginative (Factor M, 0.389) and to be relaxed and tranquil rather than tense and frustrated (Factor Q4, 0.298).

- Preference for being a Sales Executive: was somewhat related to being practical, careful, conventional and regulated by external realities rather than being imaginative (Factor M, 0.297).

- Preference for administrative work: was associated with tender-mindedness (Factor I, -0.282), with being practical and careful (Factor M, 0.293) and with being experimenting, critical, liberal and analytical (Factor Q1, -0.332)

III - Correlations Between Ratings on Each of 6 Activities and Sten Scores on 16 Personality Factors (See Table 10)

The correlation coefficients between the 16 personality factors and the 6 descriptions of occupations were rather low, falling in the range of 0.2 to 0.4. However a summary of the statistically significant relationships will be given below.

- Preference for Pure Research: tended to be associated with being less intelligent and concrete-thinking (Factor B, 0.304) and with being tough-minded, self-reliant, and realistic (Factor I, 0.284).

- Preference for Development: was associated with being reserved, detached, critical and cool rather than outgoing (Factor A, 0.200).

- Preference for Administration: was associated with tender-mindedness, with being dependent, over-protected and sensitive rather than tough-minded (Factor I, -0.344)

- Preference for Sales Work: tended to be related to being assertive, independent, aggressive, and stubborn (Factor E, -0.278) and at the same time being tough-minded, self-reliant and realistic (Factor I, 0.435).

IV - Correlations between Rankings on Each of Ten Occupations and Intelligence Scores (See Table 11)

The correlation coefficients calculated between Intelligence scores on the AH5 Intelligence Test and preferences for different jobs were very low, with the only exception of the preference for the job of Lecturing in Universities which was associated with low intelligence scores on both parts of the AH5 (0.367, 0.354 and 0.380).

V - Correlations between Ratings on Each of Six Descriptions of Occupations and Intelligence Scores (See Table 12)

The correlation coefficients calculated for the ratings on the six Descriptions of Activities and the Intelligence Scores from the AH5 Intelligence Test were also very low, with the exception of the preference for doing pure research which was associated with low Intelligence Scores in Part I of the AH5 Intelligence Test (0.325)

which includes numerical material and with the total score of the same test (0.287).

VI - Correlations between Rankings on Each of Ten Occupations and Each of Six Interpersonal Values (See Table 13)

Not many relationships between values and occupational preferences were significant, although some of the occupations showed correlation coefficients of 0.2 to 0.4 with a few of the interpersonal values.

The results indicated that the main significant associations were those between preference for Science Teaching and some values, thus:

- Persons who liked Science Teaching: tended to place a high value on conformity, on doing what is socially correct, following regulations closely, doing what is accepted and proper (-0.305) believing that it is not important to be free to make one's own decisions or being able to do things in one's own way (0.407). These people also had high scores in the benevolence value, which means that they think it is important to do things for other people, to help the unfortunate and to be generous (-0.289).

- Persons who liked management: tended to score high on the leadership value, which means that they consider of great importance being in charge of other people, having authority over others and being in a position of leadership or power (-0.406).

For those who showed preference for the work of Routine Process

high values resulted on independence, on considering important to have the right to do whatever one wants to do, etc., (-0.273) and they seem to be persons who do not value very highly leadership or having authority over others (0.290).

Finally, persons who said they liked lecturing in Technical Colleges showed low scores on independence value (0.309) this indicating that they consider of low importance the right to make one's own decisions, or being able to do things in one's own way.

VII - Correlations between Ratings on Each of Six Activities and Each of Six Interpersonal Values (See Table 14)

Correlation coefficients between the ratings on the six descriptions of occupations and the interpersonal values were also very low for almost all of the occupations, excepting the relationships which appeared in the case of those with a preference for teaching. They obtained high scores on the value of leadership (-0.296) and low scores on support, or being treated with kindness and consideration (0.275) and independence (0.426) or having the right to make one's own decisions and doing things in one's own way.

VIII - Correlations between Rankings on Each of Ten Occupations and 3 Orientation Scores (Self, Interaction and Task Orientation)

(See Table 15)

The correlation coefficients between the rankings on each of the ten occupations and the three orientation scores were very low indeed,

and no statistically significant coefficients appeared.

IX - Correlations between Ratings on Each of Six Activities and Three Orientation Scores (Self, Interaction and Task Orientation)

(See Table 16)

The correlation coefficients calculated for the ratings on each of 6 activities and the 3 orientation scores were also very low and the only statistically significant relationship ($P < 0.05$) was that of preference for sales and being "Interaction-Oriented" that is maintaining happy and harmonious relationships in a superficial sort of way, having interest in group activities (-0.272).

X - Correlations between Conformity Scores and Occupational Preferences

(See Tables 17 & 18)

The correlation coefficients between the conformity scores and the rankings on each of the ten occupations and those between the conformity scores and each of the 6 activities were very low indeed; no statistically significant results came out.

5.2 Principal Components Analysis

A principal components analysis with varimax rotation was carried out using the EXCHLF Library Computer Program (Atlas Computer-University of London), in order to investigate if the observed relationships could be reproduced or represented from a smaller set of variables than the number of variables with which the analysis was begun.

This analysis was calculated for 53 variables (See Tables 19, 21, 23, 25, 27, 29, 31, 33) from the Occupational Preferences Questionnaire and some of the Psychological Variables of a sample of 53 Subjects. (The number of variables is limited by requirements imposed by the Computer Program, and were selected from the 74 as being the most important variables of the study.)

The aim of this analysis was to investigate which psychological factors could be associated with certain Occupational Preferences, or in other words, if we could find some components formed by Occupational Preferences, Values and Personality Factors as it was hypothesized.

Eight components were extracted and rotated by the varimax method. No very satisfactory answer appears to have been found to the problem of determining the statistical significance of a Rotated Factor Loading.

In all the following tables an arbitrary figure 0.3 has been adopted to distinguish high and probably significant Loadings.

I - First Component : Preference for Research

(See Tables 19 & 20)

On the first component the highest Loadings occurred for all the Occupations which involved research work, such as doing research in industry (0.616) in Government Establishments (0.812) and in Research Associations (0.823), also the descriptions of "Pure" and "Applied Research" appeared with very high Loadings (0.623 & 0.474).

A high preference for research work appeared to be associated with being prepared to face a high number of "disadvantages" in a research post (-0.655)

The associations between preference for research work and personality factors were not very close; two of the highest ones being Factor A (0.443)and Factor Q2 (0.361). These figures indicate a moderate tendency for the person who preferred to do research to be reserved, detached, critical and cool, rather than an easy-going person, to like things or words rather than dealing with people, to enjoy working alone but at the same time liking intellectual companionship , (Factor A), and to be self-sufficient rather than group dependent, and accustomed to making his own decisions (Factor Q2).

In relation to job values, preference for research work was associated with thinking it not important that a research post would narrow one's interests (-0.445) but valuing the presence of a few specialists in the working environment (-0.389) and not minding being "intellectually isolated" (-0.389).

The Loadings on this first component indicate that persons who preferred research work tend to get low scores on the self-orientation scale from the "Orientation Inventory" indicating that they are not the sort of person who expect direct rewards for themselves from their jobs. (0.267) Although this Loading is not as high as the ones which are being commented here, the comparison of the Loadings on this variable on the "teaching" and "management" factors seems to indicate that those who preferred research occupations scored lower on this variable (self-orientation) than the other groups.

On the negative pole of this compoent we find those occupations which have to do with Management (-0.435), Sales (-0.389) and Administration (-0.324).

II - Second Component

(See Tables 21 & 22)

Component 2 was identified as a tough vs. tender-minded personality factor which was found to be associated with liking for administrative occupations.

The picture that emerged from this component was a tender-minded person (0.773), dependent, over-protected and sensitive, rather tense (0.591) apprehensive (0.512) and concientious (0.384), very intelligent (0.416) and with preference for administrative occupations (-0.463).

This sort of person did not seem to like difficult work nor one that would involve heavy responsibility (-0.366), and did not mind being under non-scientists direction (0.471).

On the other hand the social position of the post was not of great importance to them (0.534) nor the freedom to pursue their own ideas (0.379). At the same time they tended to place a high value on being conformists (-0.214).

III - Third Component : Occupational Preference for Teaching

(See Tables 23 & 24)

The third component included high Loadings on all the teaching occupations and it was interesting to note that the Occupations of Lecturing in a University or at a Technical College appeared with high loadings on the teaching component rather than on the "research" component.

The associations between personality factors and preference for teaching were low (of the 0.2 order). However the most distinctive characteristic of the people who preferred to teach was related to their interpersonal values. It was important to them to do what is socially correct, to follow regulations closely, to do what is accepted and proper. In other words conformity was valued highly (-0.338) and they did not place much importance on the right to make one's own decisions, and being able to do things in one's own way (0.683).

In relation to jobs these persons did not seem to value salary very highly; (-0.326). However they considered of great importance the purposes of the job (0.359) and thought that it was a very serious disadvantage of a post to have anti-social purposes, and finally they did not like competitive jobs (0.302).

Persons with this occupational preference had a tendency to be more "interaction-oriented" (-0.297) than "self-oriented" (0.169) or in other words that they were more interested in group-activities and with maintaining happy relationships than in expecting direct rewards for themselves from the work they are doing.

IV - Fourth Component : Findings in Relation to Personality Factors

(See Tables 25 & 26)

The fourth component had high Loadings on several of Cattell's 16 personality factors and it was interpreted as an introversion component, following Cattell's description of the second order Extraversion-Introversion factor. The factors that came out with the highest Loadings were Factor F (0.722), Surgency (Enthusiastic-Happy Go Lucky) vs. Desurgency (Glum, sover, serious); Factor H (0.625) Parmia (Adventurous) vs. Threctia (shy, timid) and Factor E (0.612) Dominance or ascendance (Aggressive, competitive) vs. Submission (Mild). On Cattell's estimation of the introversion-extraversion factor these three factors have the highest weights. He also includes Factors A (Cyclothymia vs. Schizothymia) and Factor Q2 (Self-sufficiency vs. Group dependency) but in the present research these two factors had rather low Loadings on the introversion-extraversion factor (0.292 & 0.223 respectively).

On the negative pole of the Introversion component were loaded such occupations as sales and management which seems to be in accordance to Cattell's observation that persons with high extraversion scores tend to prefer contact jobs as salesmen. The main job values that appeared associated with the preference for sales work and extraversion

was the salary and the social position of the post (loadings: 0.462 & 0.425).

V - Fifth Component

(See Tables 27 & 28)

On this component the highest loading was represented by the task-orientation scale (0.817) and we will label the component "task-orientation".

This component clearly isolated the task orientation scale from the self and interaction orientation scales of the Orientation Inventory (loadings: task or = 0.817, self or = 0.467, interaction or = 0.527).

The task Orientation Scale appeared to be closely associated with Factor Q3 from Cattell's 16 PF (0.631), which suggested that people who are concerned about completing jobs, solving problems, working persistently and doing the best job possible, tended to be controlled persons, who showed socially approved character responses, persistence, foresight, considerateness of others and conscientiousness.

Task-oriented persons also placed high values on conformity (0.508), considering of great importance to do what is socially correct, and what is accepted and proper. They disliked sales occupations (0.318) and in relation to job values the task oriented person did not like jobs with heavy responsibility (-0.396).

VI - Sixth Component

(See Tables 29 & 30)

Preference for administration and preference for working on Industrial Management, both loaded highly on the sixth component.

The persons in this group tended to get low scores on Factor M of the 16 P.F. which indicated that preference for administrative work was associated (0.571) with being practical, careful, conventional, regulated by external realities, with interests narrowed to immediate issues; they tended to show no spontaneous creativity. This finding seems to go along with Cattell and Drevdahl (1955) who found that administrators were easily distinguishable on this factor from creative researchers and teachers.

Persons who liked administrative work showed a tendency to change their opinions towards that given by a group, which was evident on their high scores on the conformity test (-0.523).

Some other associations but less important being of the order of 0.4 and 0.3, were those of liking administration and management related with being forthright (0.468), natural and less sentimental, less intelligent (0.380) and emotionally less stable, easily upset (0.307).

In relation to their job values, they thought a job should not be one that narrowed one's interests (0.360) nor one which had anti-social purposes (0.226).

VII - Seventh Component

(See Tables 31 & 32)

Component seven will be tentatively named "job commitment" meaning the energy that the person invests or is prepared to invest in his work. The items with highest loadings on this factor were those corresponding to the amount of dedication (0.822 & 0.770) which a person is willing to exercise on his work.

A high tendency of the order of 0.8 and 0.7 appeared for persons who did not want the kind of post that requires too much dedication outside working hours, to be "conservative" (0.567), respecting established ideas and tolerant of traditional difficulties (Factor Q1). These persons also tended to get high scores on the Intelligence Test (0.614) and to dislike the occupation of lecturing in a University (0.430).

VIII - Eighth Component

(See Tables 33 & 34)

On component eight, a clear distinction appeared between the interaction and self-orientation scales of the Orientation Inventory. These two scales appeared at the two poles, the Interaction Orientation with a positive loading of 0.381 and the Self Orientation with a negative loading of -0.295.

Factor C of the 16 P.F. Test, to like maintaining happy, harmonious relationships with others, to be emotionally mature and stable, calm, realistic about life loaded positively (0.398) at the Interaction Oriented end of the component, in relation to job values

the Interaction Oriented person did not mind having difficult or competitive posts or if it was only occasionally rewarding (0.569; 0.554; 0.528); however, they did not like "Intellectually isolated" posts (-0.518) or one which would have anti-social purposes (0.406).

5.3 Tests of Differences between Means

The 53 subjects were classified according to their occupational preferences (expressed in Question 9) in three groups.

- Preference for Research: This group included all the subjects who had rated one of the following occupations as a liked occupation: (N= 25)
  - Pure Research
  - Applied Research

Subjects whose ratings on each of these occupations indicated indifference or a neutral position were left out in this analysis.

- Preference for Teaching: This second group included the subjects who rated "Teaching" as a liked occupation (N = 13).
- Preference for Sales, Administration and Development: All subjects who rated one of these occupations as a liked occupation were included in this group (N = 10)

Means and standard deviations were calculated on all the "Independent Variables" (personality factors, intelligence, values, orientations and conformity) for the 3 groups, and T-Tests were calculated for:

- Preference for Research Group vs. Preference for Teaching Group (See Table 35)
- Preference for Research Group vs. Preference for Sales, Administration and Development Group (See Table 36)

It was thought that the way in which subjects were classified, excluding those who expressed neutral feeling for these groups of occupations and the analysis of the differences between the 3 groups might yield more marked differences from those obtained from the two previous analyses in which the whole sample of subjects was used.

Tables 35 & 36 indicate that no statistically significant differences between the means appeared, with the only exception being for the means for the "conformity Test" scores. The results from the T-Test show that persons who preferred research occupations got lower conformity scores than those who preferred sales, administration or development. Compared with the group who preferred the teaching occupations, the group who preferred research occupations again got lower conformity scores; the difference being lower but still statistically significant.

In order to test differences among the mean personality profiles on the 16 P.F. of these groups a profile similarity coefficient was calculated (Cattell, 1957) for the following pairs of groups:

- Preference for research group and preference for teaching group (See Table 37 and Figure 4).
- Preference for research group and preference for sales, administration and development group (See Table 38 and Figure 5).
- Preference for research group and "Profile of Research Scientists" (Cattell, 1957). (See Table 39 and Figure 3)

Tables 37, 38 and 39 indicate high profile similarity coefficients for the three comparisons which shows that:

- the 16 personality factors for the three groups of science students with different occupational preferences are rather homogeneous and that the mean profile of those who preferred research occupations place these individuals within the typical profile of the research scientist.

T-Tests were also carried out to explore sex and College Differences on the Variables from the Occupational Preferences Questionnaire and the Psychological Variables. (See Tables 40, 41, 42 and 43).

Sex Differences: In order to study sex differences on the main variables, the sample from one of the colleges (the other one included a majority of male subjects) was taken into account. Means and standard deviations were calculated on all the variables from the occupational preferences questionnaire and on the psychological variables.

T-Tests were calculated in order to explore the differences between the means.

The results (See Tables 40 and 41) indicate that male subjects showed a stronger preference for the occupation of lecturing in Universities, than women, and on the other hand women liked the post of research worker in Industry better than men. Moreover, the occupation of sales executive was rated more favorably by men than by women. The same was found for the post of Lecturing in Technical

Colleges.

Administrative work was rated more favorably by women than by men.

Some sex differences were found on the psychological variables: On the Factor B from the 16 P.F., men were found to be less Intelligent than women, and tough-minded rather than tender-minded when compared to the female group.

Finally, the male group was found to be more Interaction-Oriented than the female group.

College Differences: The analysis of the College Differences was based on the comparison of the male subjects for the two Colleges.

Means and Standard Deviations were calculated for the variables on these two groups of subjects from the two Colleges involved.

T-Tests were carried out (See Tables 42 and 43 between the means of both groups.

A summary of the statistically significant differences will be given below:

The main differences in Occupational Preferences were related to the Occupations of "Research Worker in Industry", Applied Research" and "Administrative Work".

The two first ones were rated more favorably by the Chelsea College sample, while Administrative Work was more liked by the Bedford College Sample.

On the psychological variables the main differences referred to the Interpersonal Values, specifically, the "Support" and "Independence Values".

The former were more important for the Bedford College Sample and the latter to the Chelsea College Sample.

In general, the sex differences which appeared on some of the variables, seem to be in agreement with what one would have expected.

The results on College Differences do not seem surprising; they suggest that the College environment plays an important role in the Occupational Preferences of the students, thus, those who came from a College of Science and Technology seemed to show a stronger preference for doing Research in Industry, or generally speaking, for Applied Research.

CHAPTER SIX

II - RESULTS

6.1. Occupational Preferences

6.2. Perception of Research and Non-Research Occupations in Science

CHAPTER SIX

II - RESULTS

6.1 Occupational Preferences

An attempt to summarize the results from the statistical analyses presented in the previous chapter will constitute the present chapter.

In the first place a classification of the occupations which were included in the study will be presented. The occupations proved not to be isolated variables, but seemed to fall into groups. Three main types of occupations appeared:

Research Occupations: which included Research in Industry, in Research Associations, and in Government Establishments, as well as the more general descriptions of "Pure" and "Applied Research".

Teaching Occupations: such as Lecturing in Universities, in Technical Colleges, Science Teaching at School, and the general description of "Teaching".

The third type was represented by Occupations like Administration and Management.

The main aim of the analysis of the results was to study how persons who showed any of these three occupational preferences, differred in some psychological aspects.

In the following paragraphs, a summary of the characteristics of each group will be presented:

6.1.1. Preference for Research Occupations:

The associations between personality factors and the preference for Research Occupations were not very strong. The persons who showed this occupational preference had a mean personality profile (16 P.F.) very similar to the typical profile of the Research Scientist; they were characterized mainly by the two following factors: Factor A and Factor Q2. This indicated that those who preferred Research work tended to be reserved, detached, critical and cool, rather than easy-going persons. They liked things or words rather than dealing with people, they enjoyed working alone but at the same time they liked intellectual companionship. This group was also self-sufficient rather than group-dependent, being persons accustomed to making their own decisions.

The appearance of this characteristic trait was accompanied by the fact that this group also had significantly lower scores on the conformity test than the two other groups who showed other occupational preferences.

In relation to their intelligence scores, the preference for doing "Pure Research" resulted associated with low intelligence scores, especially when numerical material was used.

No significant associations appeared between values and the preference for doing Research work.

This group of persons tended to get low scores on the "Self-Orientation" Scale from the "Orientation Inventory"; this result indicated that they were not the sort of persons who expect direct rewards for themselves from their jobs.

Turning now then to the job values, it was found that persons who preferred Research Work tended to think that it is not important that a Research Post would narrow their interests; on the other hand, they valued the presence of a few specialists in the working environment, but did not mind being "intellectually isolated". They also tended to value highly the freedom to pursue their own ideas. Finally, they did not think it was a serious disadvantage to have a difficult or competitive Research Job, or one that would require too much dedication.

6.1.2 Preference for Teaching Occupations:

Persons who preferred the Teaching Occupations did not seem to present large personality differences in relation to the groups who had other occupational preferences; in fact, associations between personality factors and the preference for teaching were very low. There was only a tendency for those who preferred lecturing in Universities to be placid, to be self-assured, confident and serene.

The most distinctive characteristic of the people who preferred to teach was related to their interpersonal values. It was very important to them to do what is socially correct, following regulations closely, doing what is accepted and proper or in other words, being conformists and not placing much importance on the right to make one's

own decisions or being able to do things in one's own way.

This finding seems to be linked with the fact that this group got higher conformity scores than those who preferred the Research Occupations.

These people also placed a high value on benevolence, which means that they thought it important to do things for other people, to help the unfortunate and to be generous.

Persons with this occupational preference had a tendency to be more "interaction-oriented" than "self-oriented", or in other words they seemed to be more interested in group activities and with maintaining happy relationships than in expecting direct rewards for themselves from their work.

In relation to job values, these persons did not seem to value very highly the salary of a post, and on the other hand, the purposes of the job seemed to be of great importance; they thought it was a very serious disadvantage of a post to have anti-social purposes, and finally, they did not like competitive jobs.

6.1.3 Preference for Management, Administration and Sales

- Preference for Management: The associations between personality factors and the preference for management indicated that this group tended to be expedient, to evade rules, to be venturesome, uninhibited and spontaneous. They also tended to be practical rather than imaginative, and relaxed rather than tense and frustrated.

In relation to values, this group placed a high value on leadership, which means that they considered of great importance being in charge of other people, having authority over others and being in a position of leadership or power.

- Preference for Administration: This group seemed to be characterized by tender-mindedness; that is being dependent, over-protected and sensitive; they also tended to be practical, careful, conventional and regulated by external realities and experimenting rather than conservative.

- Preference for Sales: The occupational preference for sales was related to being practical, careful, conventional, and regulated by external realities rather than imaginative.

They were also characterized by being assertive, independent, aggressive and stubborn and tough-minded or realistic.

One of the most salient features of this group in relation to the previous ones was its high scores on the "Interaction-Orientation" scale, which means that they liked to maintain happy and harmonious relationships in a superficial sort of way, showing interest in group activities.

A common characteristic of these three last groups was their high conformity scores compared with the previous groups.

Turning now to their job values, those who showed occupational preferences for management and administration thought a job should not be one which narrowed one's interests nor one which had anti-social purposes; however, they did not mind if the job was difficult or if it had a low social position.

6..2 Perception of Research and Non-Research Occupations in Science

This general title refers to what was called in an earlier chapter our second line of research. It includes, in the first place, the reasons or motives that students have for thinking they will like or dislike several occupations. This involves the perception of the characteristics of the jobs as well as the perception of the individual himself in making a choice of occupations. The second section will deal more specifically with negative attitudes towards research jobs or in other words the negative implications or disadvantages of research jobs as perceived by this sample of students.

6.2.1. Analysis of Reasons for Occupational Preferences

Subjects were asked about the reasons for their Occupational Preferences and for the Occupations they disliked. This was done in order to see whether there were any particular motivations or reasons associated with certain jobs, specifically, if there was a "motivation to do Research".

The results for the sample as a whole (whatever their preferences) were examined and the open-ended answers were content analysed (See Appendix 5) and the frequency of the categories was counted.

Due to the small size of the sample once it is broken down into motivation groups it is difficult to analyse the results using a statistical method. However through the inspection of the frequencies of the given reasons, it is possible to suggest answers to some questions

such as:

- Are there any specific reasons associated with the Occupational Preference for Research Work?
- Are there any specific reasons for disliking Research Occupations?

An overall count of the frequencies with which each category of "Reasons for Occupational Preferences" or "Occupational Values" appeared for the total sample of Students indicated that the value "Interesting-Boring" was the most frequently mentioned; in the second place came "Varied-Monotonous" then "Self-Assessment of Personal Characteristics" followed by "Contact with Degree Subject", "Salary" and "Useful Results"; then in this order: "Meeting or Working with People", "Opportunity of Independent Work", "Working Facilities", "Use of Imagination", "Travelling" and finally "Social Status". (See Table 44)

This overall pattern of Occupational Values seems to present minor differences when the variable of sex was taken into account. (See Table 45)

The values were compared with the male and female subjects from one College, however due to the small size of the frequencies once the results were broken down into the 12 categories it was not possible to use any statistical test.

Table 45 suggests that although the main value for men and women was the Interest of the Work, some differences appeared in the subsequent ordering of the values for the two groups. Women placed as

TABLE 44

OCCUPATIONAL VALUES FOR TOTAL SAMPLE

Name of Value	Frequency
Interesting-Boring	47
Salary	12
Contact with Degree Subject	19
Meeting or Working with People	7
Travelling	3
Useful Results	12
Self-Assessment of Personal Characteristics	22
Use of Imagination	5
Opportunity of Independent Work	7
Working Facilities	6
Social Status	2
Varied-Monotonous	24
	166

TABLE 45

OCCUPATIONAL VALUES FOR MALE AND FEMALE Ss.

Name of Value	Frequency for Bedford Male Ss	Frequency for Bedford Female Ss
Interesting-Boring	9	22
Salary	4	3
Contact with Degree Subject	3	10
Meeting or Working with People	0	6
Travelling	0	2
Useful Results	2	3
Self-Assessment of Personal Char.	1	16
Use of Imagination	0	2
Opportunity of Independent Work	0	4
Working Facilities	1	4
Social Status	1	00
Varied-Monotonous	4	11
	25	83

the second most important value the "Self-Assessment of Personal Characteristics" while men were more concerned about the salary and the Variety of the Work.

College differences on the Occupational Values were also explored; for this purpose the male groups from the two colleges were compared (See Table 46).

The inspection of Table 46 suggests that the main value for the two College Samples was the Interest of the Work. However, the Bedford College Sample placed the salary as the second most important value, while the Chelsea College Sample was more concerned about the Variety of the Work and the Usefulness of the Results of the Work.

For purposes of the analysis of Occupational Values in relation to Occupational Preferences we will group the following occupations into a "Research Category":

- Research worker in Industry
- Research worker in a Research Association
- Research worker at a Government or Semi-Government Establishment.

The "Research Category" will be contrasted with those whose Preference was for any other kind of Employment.

This grouping seems justified, since the results from the principal components analysis indicate that the three Research Occupations were very closely related (See Tables 19 & 20).

The most frequent reason given by this sample of students for liking Research Occupations was that they thought the work was

TABLE 46

OCCUPATIONAL VALUES FOR SAMPLES FROM TWO COLLEGES

Name of Value	Frequency for Bedford Male Ss	Frequency for Chelsea Male Ss
Interesting-Boring	9	16
Salary	4	5
Contact with Degree Subject	3	6
Meeting or Working with People	0	1
Travelling	0	1
Useful Results	2	7
Self-Assessment of Personal Char.	1	5
Use of Imagination	0	3
Opportunity of Independent Work	0	3
Working Facilities	1	1
Social Status	1	1
Varied-Monotonous	4	9
	25	58

interesting. The second most frequent reason for liking Research Occupations made reference to the Usefulness of the Results and the practical Application of Knowledge; Research Occupations were also preferred because of the variety of the work involved as opposed to monotonous jobs.

Some other values such as Contact with Degree Subject, Opportunity of Independent Work and Working Facilities were also mentioned in relation to Preference for Research Occupations (See Tables 47 & 52).

On the other hand, in this particular sample only a few subjects disliked the prospect of Research Jobs to such a degree that they included them as the least liked Occupation (and in the Questionnaire they were asked only about their reasons for their first and last choices). In fact only four persons of the total sample included Research Jobs as their least liked Occupation. Two of them thought that the job was boring, one said that he was not the right person for the job and the last one was not happy about the working facilities and environment conditions.

The most frequent reason given for liking Non-Research Occupations was the opportunity to meet people or to work with people. In the second place came the Interest of the Work.

In order to see whether individuals have the same reasons for liking or disliking occupations, the results for the sample as a whole (whatever their preference) were examined, the frequency of the

TABLE 47

FREQUENCIES OF REASONS GIVEN FOR 1ST CHOICE OF OCCUPATION

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Res.	14	3	4	2	1	6	2	3	4	3	0	5	47
Non-Res.	8	4	2	10	1	5	4	0	5	5	1	5	50
Total	22	7	6	12	2	11	6	3	9	8	1	10	97

TABLE 51

FREQUENCIES OF REASONS GIVEN FOR LAST CHOICE OF OCCUPATION

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Res.	2	0	0	0	0	0	1	0	0	1	0	0	4
Non-Res.	28	6	13	0	1	6	19	3	0	3	0	14	93
Total	30	6	13	0	1	6	20	3	0	4	0	14	97

KEY TO TABLES 47 & 51

1. Interesting-Boring
2. Salary
3. Contact with degree Subject
4. Meeting People
5. Travelling
6. Useful Results
7. Self-Assessment of personal Characteristics
8. Use of Imagination
9. Opportunity of Independent Work
10. Working facilities
11. Social Status
12. Varied-Monotonous

TABLE 52

REASONS FOR LIKING RESEARCH AND NON-RESEARCH OCCUPATIONS IN ORDER OF FREQUENCY

	Research Occupations	Non-Research Occupations
1st Place	Interesting-Boring	Meeting People-Working with People
2nd Place	Useful Results	Interesting-Boring
3rd Place	Varied-Monotonous	Useful results, opportunity of Independent Work, Working facilities and Varied-Monotonous
4th Place	Contact with degree subject & Opportunity of Independent Work	Salary & Self-Assessment of personal characteristics
5th Place	Salary, Working facilities and Use of Imagination	Contact with degree subject
6th Place	Meeting people and Self-Assessment of personal characteristics	Travelling & Social status
7th Place	Travelling	

categories of "Reasons" was counted and chi square tests were carried out.

The results from a chi square test indicate that the frequencies for each of the 12 categories of "Reasons" were significantly different at the .001 level (See Table 48).

Turning now to the Reasons for Liking occupations the results from a chi square test indicate that the frequencies for each of the 12 categories of response were significantly different at the .001 level. In fact the two most used reasons for liking occupations were: Interesting-Boring and Meeting People or Working with People. On the other hand, the two least used categories were: Travelling and Social Status. (See Tables 49 & 47)

A similar analysis was carried out of Reasons for Disliking occupations.

The results from a chi square test indicate that the frequencies of each of the 12 categories of reasons were significantly different at the .001 level (See Table 50). In fact, the two most frequently used categories of reasons for disliking occupations were: "Boring" and "Self-Assessment of Personal Characteristics".

In relation to the problem of the generality of occupational values given for liking or disliking occupations, within the limited context of this research this sample of students tended to use different categories of responses for their likes and dislikes. Only 14 of the 97 subjects did, in fact, use the same category to express their reasons for liking and disliking the occupations. (See Table 54)

TABLE 54

CATEGORIES USED BY THE SAME PERSON IN BOTH INSTANCES (FOR LIKE AND DISLIKE)

	Number of Subjects
Interesting-Boring	9
Varied-Monotonous	2
Self-Assessment	1
Contact with Degree Subject	1
Facilities of Work	1
	14

SUMMARY AND DISCUSSION

"Reasons for Liking and Disliking Occupations"

The answers to the open-ended questions referring to reasons for liking and disliking occupations were content analysed and twelve general categories of response were elaborated.

The occupational values expressed by this sample of students seem to be very similar indeed to those that have been reported in previous literature. Although this research is not concerned with the relationships of the occupational values expressed by this sample with some other Inventories of Values, it seems likely that a great overlap exists between the values expressed by this particular sample and those measured by Super's Work Values Inventory.

Moreover the specific pattern in which the occupational values were expressed by this sample seems to tie up with the results obtained by Wagman (1965) and Centers (1949) on College Students' Occupational values as compared with High School Students. In fact the most frequent reason expressed for liking occupations by the two College samples was the "Interest of the Work".

The next most frequent reasons were "Meeting People or Working with People" then "Useful Results", followed by "The Variety of the Work" and "Opportunity for Independent Work". Mention of economic values, specifically of salary, Prospects and Promotion appears on the sixth place; this fact together with the location of "Social Status" as the least frequently used reason for liking occupations seems to indicate a rather low concern for socio-economic aspects of jobs.

As it has been said in a previous chapter these are characteristics of a very limited sample of College Students and further research is needed in order to see if this particular "Pattern" of values holds for the general College Population.

Due to the small size of the sample, once it is broken down into groups according to the sex variable or to preference for research or non-research occupations, it is difficult to analyse the results using a statistical method. However from the inspection of the patterns of values of each of these sub-groups some comments can be offered.

In relation to differences of values between men and women, the results suggest that although the main value for both groups was the interest of the Work, men tended to value the Usefulness of the Results or the Practical Application of Knowledge higher than women. The same could be said for the salary of the job. On the other hand women tended to be more conscious of their "Personal Characteristics" then men when asked to state a preference for a job.

A comparison of the pattern of occupational values for the "Preference for Research Group" with the "Preference for Non-Research Group" suggests some differences between these two groups.

Thus, the value most frequently expressed by those who preferred Research Occupations was the Interest of the Work, while persons who preferred Non-Research Occupations placed the highest value on meeting people, or working with people and helping others.

It is interesting to point out here that this value appeared with a rather low frequency for persons who liked Research Occupations.

Roe's findings on the main characteristic of Scientists, namely their concern with relationships between words or things rather than with people seem to fit in very well with the results suggested by this study.

6.2.2 Analysis of Job Disadvantages

Question 8 of the Occupational Preferences Questionnaire included a list of 13 "disadvantages" of research posts, which the subject had to rank. He was also asked to say which of those disadvantages he was prepared to face.

The analysis of job disadvantages was begun by carrying out correlations between the 13 disadvantages.

A - Correlations among each of 13 Job Disadvantages

A correlation matrix of 13 x 13 was calculated for the rankings of 13 Job Disadvantages. Low ranks indicate more serious disadvantages and high ranks less serious ones. Table 55 gives the correlation matrix.

The results show that some of these disadvantages present a tendency to be considered or ranked in groups. People who do not like difficult jobs tend to dislike jobs with heavy responsibility (0.442) and competitive jobs (0.443). At the same time they do not like jobs that require too much dedication (0.270) nor those which are only occasionally rewarding (0.336); finally, they do not mind being under the direction of a non-scientist. On the other hand those persons who valued highly the social position of a post, tended to place high value

on the job's salary (0.394), they did not like to be intellectually isolated (0.242) nor under the direction of a non-scientist (0.326).

A tendency also appeared for persons who valued highly their freedom to pursue their own ideas, to dislike intellectual isolation (0.218) and to dislike a non-scientist director.

Such clustering of disadvantages suggested that it might be possible to select a scale of disadvantages which would form a self-consistent measure of strength of willingness to face disadvantages. This possibility was explored by means of a scalogram analysis (see Section E) but it was not, in fact, possible to select a scale of sufficiently high "reproducibility".

B - Correlations between Rankings on each of 13 Job Disadvantages and each of Ten Occupations

A 13 x 10 correlation matrix was calculated for rankings on 13 job disadvantages and 10 occupations. (See table 56). Low ranks on job disadvantages indicated a more serious disadvantage and high ranks a less serious disadvantage. On the other hand, a low rank on an occupation indicated preference or liking that occupation and vice versa, high ranks implied dislike of the occupation.

From table 56 it can be seen that in general these correlation coefficients were not very high, falling in the range of 0.2 to 0.4.

Some significant relationships were found between the 13 job disadvantages and the research posts. Persons who showed preference for doing research in Industry did not appear to value very highly the purpose of a job, for they did not mind if it had anti-social

purposes (0.292).

Liking to do research in Research Associations was correlated with (0.334) wanting to be a dedicated worker and not considering as a job disadvantage that it may narrow one's interests too much.

Those who showed preference for doing research in Government Establishments tended to like competitive jobs (0.267) and did not consider as a serious disadvantage of a job that it could narrow one's interests too much.

Now, turning to the teaching occupations, the results indicated that persons who liked or preferred the occupation of lecturing in Universities tended to like jobs which require much dedication (-0.271) even working outside working hours (-0.294) and on the other hand to dislike having to work under non-scientist direction (0.417) and not getting rewards for their work (0.285).

A tendency also appeared for persons who thought they would like lecturing at Technical Colleges, to dislike non-scientists directing their work (0.291) and to place high values on the purposes of their job (0.338).

Persons who preferred other types of occupation such as Management, tended to dislike jobs that narrow one's interests too much. Those who preferred sales occupations tended to place a high value on the social position of the job (0.332) and they were not prepared to perform jobs in which they had to invest much dedication (0.279).

C - Correlations between Ratings on each of 6 Activities and each of 13 Job Disadvantages

A 6 x 13 correlation matrix of 6 activities and 13 job disadvantages was calculated. (See Table 57). Low ranks on the job disadvantages indicate a more serious job disadvantage and vice versa. Low rating on the 6 activities indicate a preference for that activity and a high rating implies dislike of that activity.

Only a few correlation coefficients turned out to be statistically significant, (5% level).

Persons who liked Pure and Applied Research placed a high value on the freedom they are given to pursue their own ideas (0.226 & 0.220).

Persons who showed preference for Working in Development tended to like competitive jobs (-0.183). A tendency also appeared for persons who liked sales occupations to place a high value on the social position of jobs (0.330) and to like competitive jobs (0.188).

D - Correlations between Rankings on each of 13 Job Disadvantages and Psychological Variables

This point of the correlations between the rankings on each of the job disadvantages and the psychological variables measured (see Table 58) is not really the main concern of this thesis, but a short account of the correlations significant at the 5% level is presented in terms of variables associated with each of the 13 job disadvantages.

- Difficulty of the Work: A tendency appeared for those persons who did not like difficult jobs to be more outgoing than reserved (-0.307); to be more tender than tough-minded (-0.308) and to give great importance

to being recognized by others (Recognition value -0.357).

- Low Social Position: The results indicated that persons who valued highly the social position of jobs tend to be rather happy-go-lucky than sober (-0.271), rather placid than apprehensive (0.281) and rather relaxed than tense (0.315).

This item was also associated with Intelligence, thus persons who placed a high value on the social position of jobs tended to get low scores on Part I (0.313), Part II(0.309)and Total Score (0.328) of the AH5 Intelligence Test.

- Heavy Responsibility: Persons who did not like jobs with heavy responsibilities tended to be more tender than tough-minded (-0.352) and tense rather than relaxed /(-0.338). This item was also associated with Intelligence, the results indicating a tendency for persons who do not like heavy responsibility to get high scores on Part II (-0.277) and Total Score of the AH5 Intelligence Test (-0.275).

- Low Salary: Significant associations were found for people who placed high value on the salary of a job to be rather assertive then humble (-0.325) and more suspicious than trusting (-0.421). A tendency also appeared for these people to place a low value on benevolence (0.345) and to get low scores on the Interaction-Orientation Scale (0.330).

-"Requires too much dedication" and "requires too much dedication, outside working hours".

These two items were significantly associated with the same two variables, the conservative-experimenting Factor from the 16 PF and with Intelligence. Thus, not liking to be a dedicated worker tended to be

associated with being experimenting rather than conservative (0.313 & 0.414) and with getting high scores on:

AH5 Part I (-0.431) & (-0.483)

AH5 Part II (-0.328) & (-0.416)

AH5 Total (-0.398) & (-0.473)

- Very Competitive: The results indicated a tendency for people who did not like competitive jobs to get high scores on the conformity test (-0.304).

- Narrows range of interests: Persons who did not like jobs which would narrow their interests tended to be less intelligent (16 PF 0.273) and to get high scores on the conformity test (-0.397).

- Results could be exploited for anti-social purposes: People who thought that this was a serious disadvantage of a post tended to be more practical than imaginative (0.350) and Placid rather than Apprehensive (0.286). They placed a low value on Support (0.406) and a very high value on Benevolence (-0.341).

- Too little freedom to pursue one's own ideas: This item was only significantly associated with one personality factor. Persons who thought that this was a serious disadvantage tended to be rather Expedient than Conscientious (0.317).

- Intellectual Isolation: This item was associated with four personality factors from the 16 PF. The results indicated a tendency for persons who thought that Intellectual Isolation was a serious disadvantage to be more outgoing than reserved (-0.284), to be happy-go-lucky rather than Sober (-0.397), expedient rather than conscientious

(0.275) and group dependent rather than self-sufficient (0.319).

- Non-Scientist Direction: A tendency appeared for persons who thought this was a serious disadvantage to be tough rather than tender-minded (0.327) to place a low value on Support (0.324) and to value highly conformity (-0.315).

E - Scalogram Analysis on 13 Job Disadvantages

The aim of doing a scalogram analysis (Guttman, 1950) on the job disadvantages was to try to rank the sample of students who wanted to go into research occupations, according to "the strength of their preference". It was hoped to do this by using the number of "disadvantages" that they were prepared to face in order to get a research job.

All items or "job disadvantages" were dichotomous, and the subject could mark each item, indicating that he was prepared to face it, or just leave it blank meaning that he did not want to face it.

Figure 6 shows a bar chart representation of the percentage distributions for the respective items; figures 7 & 8 present the initial and subsequent arrangements of subjects and items.

A coefficient of reproducibility was calculated (Guttman, 1950) for the whole list of items, by counting up the number of responses which would have been predicted wrongly for each person on the basis of his scale score, dividing these errors by the total number of responses and subtracting the resulting fraction from one. As will be seen in Figure 8, the coefficient of reproducibility did not reach the 90 per cent which Guttman established as a requirement for

reproducibility.

A coefficient of reproducibility was calculated for those 6 items which showed least errors; the coefficient of 0.85 was obtained (see Figure 9).

To summarize, the list of "job disadvantages" could not be dealt with as a unidimensional Guttman Scale.

SUMMARY & DISCUSSION

The results from the analysis of job disadvantages suggest a clustering of disadvantages; however it was not possible to select an unidimensional scale which would form a self-consistent measure of strength of willingness to face disadvantages of a research post.

This finding is not surprising, when the disadvantages concerned are examined and it is remembered that environmental circumstances and personality differences will play a part in any one individual's assessment of the importance of a given disadvantage for him.

CHAPTER SEVEN

DISCUSSION

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DISCUSSION

Before the discussion of the results is presented, a word of caution is necessary in relation to the interpretation of correlation coefficients and factor loadings. In all work concerned with the relation of personality factors to other variables, one must not forget that it is possible for a correlation to indicate causal action in either of the two possible directions. Thus, this research does not provide an answer to causal relationships but merely to associations between variables, specifically those associations of personality factors, values, etc., with some occupational preferences.

Probably the best way to begin the discussion of results is to go back to the hypotheses and examine the ways in which the results relate to them.

HYPOTHESIS 1: "There is a similarity among the personality profiles of students who show an occupational preference for research and the typical research scientists profile."

The similarity between the profiles of students who preferred research occupations and the typical research scientist one is indicated by a very large profile similarity coefficient; the main characteristic factor being factor A which refers to being a reserved person.

This finding apart from being interesting in itself could throw some light on the question of whether the characterstics of occupational

groups are products of the occupational role or whether these characteristics are already present when a person makes his choice of occupation. The results of the present research suggest the latter point of view, in fact persons who think they will like to go into research, already possess a personality profile which is similar to that of the typical research scientist. However, prior expectations were not all confirmed: persons who showed different occupational preferences, within the range of occupations open for Science graduates, such as teaching or administration, did not present large differences in their personality profiles from those who preferred research occupations. These Science students seemed to form a rather homogeneous group and probably the later contact with the occupation which they will finally enter, will be responsible for some personality differences among the occupational groups.

HYPOTHESIS 2: "High values on Independence are positively related to the occupational preference for research".

The results of the present research do not confirm or reject this hypothesis, because no statistically significant associations were found between the preference for research work and Independence as an Interpersonal value. However, there is some indication that persons who preferred research work tended to value highly the freedom to pursue their own ideas.

Summarizing, Independence appeared to be valued within the working environment, but no conclusion can be made about the value of Independence in general for those who prefer research occupations.

HYPOTHESIS 3: "Low values on Conformity are positively related to the occupational preference for research."

It was hoped to obtain some evidence in support of this hypothesis from the Survey of Interpersonal Values. However, conformity, measured as a value, that is conformity regarded as important or not important for the individual rather than whether or not he actually conforms, was not related to the occupational preference for research. In fact, the results show no significant associations between low values on conformity and the preference for research.

HYPOTHESIS 4: "There is a positive relationship between task-involved motivations and the occupational preference for research."

No significant associations were found between the preference for research occupations and the scores on the Task-Orientation Scale from the Orientation Inventory.

HYPOTHESIS 5: "Low scores on Interaction Orientation are positively associated with the occupational preference for research."

No significant indication of this relationship emerged from the results of the present study. However, in relation to the personality of those who preferred research occupations it was found that they like things or words, rather than dealing with people. This finding seems to go in accordance with the summary of the characteristics that have been found for research scientists (presented in Chapter 2, Section 5) namely : a preference for mental manipulations, involving things rather than people, a somewhat distant attitude in interpersonal relations and

a preference for intellectually challenging situations rather than socially challenging ones.

HYPOTHESIS 6: "Low scores on Self-Orientation are positively associated with the occupational preference for research."

Some evidence for the acceptance of this hypothesis was provided by the principal components analysis which showed that persons who preferred research occupations did, in fact, get low scores on the Self-Orientation Scale of the Orientation Inventory. This indicates that they are not interested in direct rewards from their work.

HYPOTHESIS 7: "There is a positive relationship between low scores on conformity and the occupational preference for research."

The results of the present research indicate that persons who preferred research occupations, did in fact get lower scores on a test of conformity behaviour than persons who had other occupational preferences. It should be pointed out that here conformity is referred to as the actual conformity behaviour as measured by the Conformity Test and not conformity as a value, as was discussed in Hypothesis 3.

It will be interesting at this point to discuss the two last hypotheses in relation with what we have presented in the first chapters, namely thinking of research as a creative activity and trying to study the results from the present research in relation to Crutchfield's theory (1962) on the kinds of motivations which lead to creative acts.

The fact that persons who preferred research occupations tended to get low scores on Self-Orientation and to get low scores on

conformity, seems to provide empirical support for Crutchfield's theory. This author, as has been pointed out earlier, explains that ego-involved motivations (self-orientation) are detrimental to creative thinking; the achievement of the creative solution is a means to an ulterior end, rather than the end in itself thus, the creator is not free from the constraints of old ways of thought. Moreover, the pressure to conform may be injurious to creative thinking because it arouses ego-involved motives in the problem solver, the solution of the problem itself becomes of secondary relevance, his cognitive processes become less flexible, his insights less sensitive.

Tentatively we could summarize the results by describing the person motivated towards research as a person who is not interested in external rewards from his job, his job is not a means to an ulterior end, but probably the end in itself. At the same time he is motivated to doing things in his own way and does not depend on the opinion of others, preferring to make his own decisions and not to conform to outer pressures.

In addition to the comments presented on the hypotheses, it will be interesting to give some mention to the results on the intelligence test. As has been indicated earlier the preference for doing Pure Research was associated with low Intelligence scores, specially when numerical material was used. It has been difficult to find an explanation for this fact because presumably Pure Research is an activity which requires a high Intelligence level and also it has been found that research scientists are characterized as having high

Intelligence. If we go back to Rosen's (1961) findings suggesting a rough correspondence between the intelligence of persons and the intellectual requirements of the occupations which they prefer; the results of the present research seem to point in the opposite direction.

A tentative explanation could be that a high score on the Intelligence test (AH5) which was used here, provides a measure of convergent thinking rather than of divergent thinking (Hudson, 1966).

Probably it would have been useful to obtain from our sample some measures of divergent thinking, in order to examine if those persons who like or prefer research occupations do well on open-ended tests or "creativity tests". At the moment it can only be hypothetisized that this might be so: the reason for this being that those who did prefer research work seemed to present some of the characteristics which Hudson (1968) has found for the "divergent person", namely that they are less susceptible to pressure from authority and from other people.

The present study suggests that a classification of occupations according to the functions performed may be very useful in Occupational Psychology. In fact the classification of occupations which was obtained from the Principal Components Analysis was different to the one that was proposed beforehand. (As indicated on Section 3.5 page110, the occupations of Lecturing in Universities and Technical Colleges were thought to belong to the "Research Category". However the results indicate that they were seen as teaching occupations.)

Although this research does not give evidence on the criteria of success in scientific work, it suggests that there are some differences in personality factors, intelligence, values and on conformity between persons who preferred research occupations and those who liked other occupations in Science. Certainly more extensive research is needed in this area, especially on the refinement of the tests used in order to build an appropriate battery of valid and reliable tests to be used in the selection of research scientists. Specifically the conformity test which is a new instrument that seems to provide very relevant information, needs to be studied further.

Some suggestions for further research will be presented below.

1. To develop methods of analysing and classifying occupations according to personality dimensions, to supplement existing aptitude and interest dimensions.

2. Job analyses refining occupational fields, levels and specialties to reflect specific functions performed, abilities required, and particularly personality demands.

3. Criteria of success in scientific work appropriate to the various fields and levels of scientific and technical endeavour.

4. Critical minima of aptitudes for defined levels of achievement in the various scientific fields.

5. The study of the development of parental, authority and peer relationships and its effects on the vocational choice of scientists.

6. The study of psychological and social factors (religious affiliation, social status, mobility, etc.) and the interaction of these social systems in vocational preference and choice.

7. The study of the determinants of a series of vocational decisions leading to entry into and stabilization in scientific occupations.

8. Longitudinal studies to reveal more about the development of and changes in aptitudes, interests, values and needs.

9. The study of sex roles in relation with occupational preferences.

10. The study of educational factors in relation with Occupational Preferences.

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TABLES

TABLE 4

T-TEST ON VARIABLES FROM THE OCCUPATIONAL PREFERENCES QUESTIONNAIRE FOR THE ORIGINAL AND THE EXPERIMENTAL SAMPLE

Name of Variable	Experimental Sample			Original Sample			T	Prob. Level
	M_1	SD_1	N_1	M_2	SD_2	N_2		
Ranking of:-								
Sc. teacher	6.0	2.8	53	6.1	2.9	44	0.17	-
Ind. Mag.	6.6	2.6	53	5.7	2.5	44	1.76	-
Lect. Univ.	4.2	2.7	53	5.6	2.7	44	2.59*	2%
Res. in Ind.	3.9	2.1	53	3.7	2.7	44	0.41	-
Sales Ex.	7.9	2.4	53	6.7	3.3	44	2.10*	5%
Rout. Proc.	6.5	2.7	53	6.0	2.0	44	1.04	-
Lect. Tech. C.	5.6	2.0	53	6.1	2.4	44	1.13	-
Res. Res.Assoc	3.1	2.0	53	4.2	2.1	44	2.68*	1%
Admin.	7.4	2.2	53	6.3	2.8	44	2.20*	5%
Res. Gov. Est.	3.4	1.9	53	4.0	2.5	44	1.33	-
Rating of:-								
Teaching	4.1	2.2	52	5.5	2.7	28	2.59*	2%
Administration	6.5	2.1	52	5.9	2.8	28	1.11	-
Pure Research	2.7	2.0	52	3.3	2.0	28	1.33	-
Applied Res.	2.9	1.8	52	3.1	1.9	28	0.47	-
Sales	6.5	2.3	52	6.3	2.7	28	0.36	-
Development	5.0	2.3	52	4.8	2.4	28	0.37	-

TABLE 5

THE SAMPLE

	No. of Subjects Contacted	Returned Questionnaire	Completed Testing Sessions
Bedford College Chem. & Biochem.	123	37	22
Physics	66	30	22
Chelsea College Chem. & Biochem.	120	35	12
	309	102	56

TABLE 6

DISTRIBUTION OF AGE OF TOTAL SAMPLE

		18	19	20	21	22	23
Bedford College	Chem. & Biochem.	10	13	8	5	1	0
	Physics	8	9	8	4	1	0
Chelsea College	Chem. & Biochem.	4	14	9	7	0	1
		22	36	25	16	2	1

$\bar{x} = 19.5$

TABLE 7

DISTRIBUTION OF SEX OF TOTAL SAMPLE

	M	F
Bedford College Chem & Biochem.	9	28
Physics	12	18
Chelsea College Chem. & Biochem.	34	1
	55 (53%)	47 (45%)

TABLE 8 CORRELATIONS BETWEEN RATINGS ON TEN OCCUPATIONS

	No.of Variables									
Science teacher	16									
Management	17	0.010								
Lecturer in University	18	0.230*	-0.075							
Research in Industry	19	-0.188	-0.204*	0.210*						
Sales	20	-0.151	0.497**	-0.318**	-0.412**					
Routine Process Control	21	0.065	-0.144	-0.271**	0.017	-0.141				
Lecturer in Tech. Coll.	22	0.611*	0.075	0.506**	-0.062	-0.173*	0.033			
Research in Res. Assoc.	23	-0.048	-0.392**	0.361**	0.688**	-0.465**	0.113	0.141		
Administration	24	0.079	0.460**	0.244**	-0.376**	0.403**	-0.016	0.006	-0.280*	
Research in Government	25	-0.151	-0.449**	0.249*	0.596**	-0.416**	0.130	-0.033	0.793*	-0.300*
		16	17	18	19	20	21	22	23	24	25

PROBABILITY LEVEL

*	.05
**	.02
***	.01

TABLE 9 CORRELATIONS BETWEEN RANKINGS ON EACH OF TEN OCCUPATIONS AND STEN SCORES ON SIXTEEN PERSONALITY FACTORS

	16	17	18	19	20	21	22	23	24	25
Reserved-Outgoing	-0.160	-0.248	-0.127	0.169	-0.030	0.140	-0.117	0.297*	-0.008	0.292*
Less Intelligent-More Intelligent	0.089	0.128	0.039	-0.147	0.056	0.234	0.076	0.030	0.093	-0.013
Affected by Feelings-Emot. Stable	0.042	0.089	-0.032	0.077	-0.062	-0.082	0.061	0.014	0.115	-0.065
Humble-Assertive	0.037	-0.212	0.035	0.008	-0.178	0.001	0.002	-0.007	-0.100	-0.042
Sober-Happy go lucky	0.192	-0.269	-0.229	-0.176	-0.209	0.245	-0.065	-0.072	-0.069	-0.152
Expedient-Conscientious	-0.060	0.289*	0.103	-0.105	0.208	0.061	0.103	0.055	0.205	0.030
Shy-Venturesome	0.087	-0.255*	-0.217	-0.130	-0.062	0.212	0.022	-0.047	0.004	-0.157
Tough-Tender	0.036	0.131	-0.019	0.058	0.186	0.012	0.010	0.064	-0.282*	0.026
Trusting-Suspicious	0.067	0.033	-0.002	-0.059	-0.145	-0.035	-0.051	-0.033	-0.052	-0.113
Practical-Imaginative	0.034	0.389***	-0.095	-0.041	0.297*	-0.109	0.129	-0.203	0.293*	-0.092
Forthright-Shrewd	0.144	0.043	0.031	-0.021	-0.081	-0.054	-0.009	0.005	0.224	-0.035
Placid-Apprehensive	0.051	0.177	0.327**	0.077	0.148	0.092	0.186	0.111	0.072	0.002
Conservative-Experimenting	0.090	-0.194	-0.234	0.071	0.000	-0.105	-0.096	-0.163	-0.332**	-0.179
Group Dependent-Self Sufficient	0.189	0.102	0.110	-0.125	0.079	-0.064	0.087	-0.102	0.026	-0.162
Undisciplined-Controlled	0.042	-0.051	-0.124	-0.161	-0.016	-0.055	-0.068	-0.199	-0.066	-0.199
Relaxed-Tense	0.113	0.298*	0.179	-0.065	0.144	-0.226	0.065	-0.039	-0.107	-0.107
	Science teacher	Manag.	Lect. Univ.	Res. Ind.	Sales Exec.	Rout. Proc.	Lect. Tech. Coll.	Res. Assoc.	Adm.	Res. Govt.

PROBABILITY LEVEL
* .05
** .02
*** .01

TABLE 10 CORRELATIONS BETWEEN RATINGS ON EACH OF SIX ACTIVITIES AND STEN SCORES ON SIXTEEN PERSONALITY FACTORS

	No. of Variables						
Reserved-Outgoing	46	-0.079	0.142	0.092	0.062	-0.031	0.200
Less Int. - More Int.	47	-0.030	0.122	0.304*	0.108	0.119	0.099
Affected by feeling-Emot. Stable	48	-0.016	0.000	0.039	-0.040	0.110	0.136
Humble-Assertive	49	0.129	-0.203	0.237	0.005	-0.278*	-0.153
Sober-Happy go lucky	50	-0.043	0.245	-0.013	-0.103	-0.171	0.047
Expedient-Conscientious	51	-0.007	-0.106	-0.100	-0.008	0.144	0.104
Shy-Venturesome	52	-0.117	0.029	-0.108	-0.096	-0.051	-0.017
Tough-Tender	53	-0.050	-0.344**	0.284*	0.189	0.435***	0.173
Trusting-Suspicious	54	0.228	0.123	0.028	0.025	-0.201	0.186
Practical-Imaginative	55	0.070	0.042	0.077	0.006	0.230	0.063
Forthright-Shrewd	56	0.245	0.245	-0.058	-0.176	-0.041	0.115
Placid-Apprehensive	57	0.126	0.093	0.211	-0.038	0.235	0.059
Conservative-Experimenting	58	0.011	-0.202	-0.113	-0.192	0.051	0.001
Group Dep. - Self Sufficient	59	0.143	-0.137	-0.037	-0.157	-0.140	0.015
Undisciplined-Self Control.	60	-0.012	-0.189	-0.111	0.014	-0.054	-0.043
Relaxed - Tense	61	0.078	-0.047	0.117	0.021	0.247	-0.008
		40	41	42	43	44	45
		Teaching	Administ.	Pure Res.	Applied Research	Sales	Development

PROBABILITY LEVEL
* .05
** .02
*** .01

TABLE 11 CORRELATIONS BETWEEN RANKINGS ON EACH OF TEN OCCUPATIONS AND THREE INTELLIGENCE SCORES

	No. of Variables	16 Science Teacher	17 Manag.	18 Lect. Univ.	19 Res. Ind.	20 Sales Exec.	21 Routine Proc.	22 Lect. Tech. Coll.	23 Res. Res. Assoc.	24 Adm.	25 Res. Govt.
Part I AH5	62	-0.024	0.082	0.367***	-0.085	0.145	0.017	0.100	0.124	0.059	0.012
Part II AH5	63	-0.050	0.055	0.354***	-0.133	0.170	-0.065	0.015	0.080	0.081	-0.021
Total	64	-0.039	0.072	0.380***	-0.116	0.167	-0.027	0.059	0.107	0.075	-0.005

PROBABILITY LEVEL

*** .01

TABLE 12 CORRELATIONS BETWEEN RATINGS ON EACH OF SIX ACTIVITIES AND THREE INTELLIGENCE SCORES

	No. of Variables	40 Teaching	41 Adminst.	42 Pure Res.	43 Appl. Res.	44 Sales	45 Develop.
Part I AH5	62	0.190	-0.037	0.325**	0.086	0.178	0.054
Part II AH5	63	0.254	0.009	0.226	-0.088	-0.012	0.031
Total	64	0.236	-0.014	0.287*	-0.006	0.082	0.044

PROBABILITY LEVEL

** .02

* .05

TABLE 13 CORRELATIONS BETWEEN RANKINGS ON EACH OF TEN OCCUPATIONS AND EACH OF SIX INTERPERSONAL VALUES

	No. of Variables										
Support	65	0.190	0.185	0.224	-0.031	-0.129	-0.229	0.104	-0.004	-0.029	-0.037
Conformity	66	-0.305*	0.121	-0.197	-0.086	0.159	0.205	-0.058	-0.143	0.117	-0.017
Recognition	67	0.130	0.012	-0.136	0.092	-0.049	-0.010	-0.092	-0.065	-0.075	-0.158
Independence	68	0.407***	0.112	0.188	-0.201	0.062	-0.273*	0.309*	0.025	0.247	-0.044
Benevolence	69	-0.289*	0.105	0.008	0.143	0.066	0.095	0.006	0.010	-0.114	0.034
Leadership	70	-0.098	-0.406***	-0.151	0.024	-0.057	0.290*	-0.253	0.104	-0.166	0.100
		16	17	18	19	20	21	22	23	24	25
		Science teacher	Manag.	Lect. univ.	Res. Inst.	Sales ex.	Rout Proc.	Lect. tech. coll.	Res. res. assoc.	Administ.	Res. Govt.

PROBABILITY LEVEL

* .05

** .02

*** .01

TABLE 14

CORRELATIONS BETWEEN RATINGS ON EACH OF SIX ACTIVITIES AND EACH OF SIX INTERPERSONAL VALUES

	No. of Variables						
Support	65	0.275*	0.032	0.246	0.103	0.138	-0.042
Conformity	66	-0.167	0.035	-0.224	0.087	-0.020	0.108
Recognition	67	0.014	0.071	0.011	-0.053	-0.183	0.073
Independence	68	0.426***	0.194	0.212	-0.033	0.172	-0.009
Benevolence	69	-0.245	-0.344**	-0.175	0.002	0.007	-0.046
Leadership	70	-0.296*	0.052	-0.132	-0.072	-0.047	0.023
		40	41	42	43	44	45
PROBABILITY LEVEL		Teaching	Adm.	Pure Res.	Appl.Res.	Sales	Develop.
* .05							
** .02							
*** .01							

TABLE 15

CORRELATIONS BETWEEN RATINGS ON EACH OF SIX ACTIVITIES AND EACH OF THREE ORIENTATION SCORES (SELF-TASK & INTERACTION)

	No. of Variables						
Self-orientation	71	0.109	0.128	0.183	0.098	0.096	0.065
Interaction-orientation	72	-0.104	-0.075	0.075	0.124	-0.272	-0.022
Task-orientation	73	-0.032	-0.142	-0.129	-0.120	0.189	0.040
		40	41	42	43	44	45
		Teaching	Adminst.	Pure. Res.	Appl. Res.	Sales	Develop.

TABLE 16 CORRELATIONS BETWEEN RATINGS ON EACH OF TEN OCCUPATIONS AND EACH OF THREE ORIENTATION SCORES (SELF, TASK & INTERACTION ORIENTATIONS)

	No. of Variables.										
Self-orientation	71	0.211	-0.069	0.061	0.249	-0.120	0.054	0.146	0.251	-0.071	0.140
Interaction-orientation	72	-0.072	0.063	-0.079	0.132	-0.153	0.039	-0.024	-0.027	-0.135	-0.009
Task-orientation	73	-0.113	0.030	0.041	-0.223	0.155	0.005	-0.052	-0.104	0.114	-0.044
		16	17	18	19	20	21	22	23	24	25
		Science teacher	Manag.	Lect. Univ.	Res. Ind.	Sales Exec.	Rout. Proc.	Lect. Tech. Coll.	Res. Res. Assoc.	Admin.	Res. Govt.

TABLE 17 CORRELATIONS BETWEEN RANKINGS ON EACH OF TEN OCCUPATIONS AND CONFORMITY SCORES

Conformity 74	-0.204	-0.115	0.072	0.114	0.207	-0.105	-0.105	0.204	0.003	-0.001
	6	7	8	9	10	11	12	13	14	15
	Science teacher	Manage-ment	Lect. univ.	Res. Ind.	Sales ex.	Rout. proc.	Lect. tech. coll.	Res. res. assoc.	Adm.	Res. Govt.

TABLE 18 CORRELATIONS BETWEEN RATINGS ON EACH OF SIX ACTIVITIES AND CONFORMITY SCORES

Conformity 74	-0.012	-0.114	-0.057	-0.089	0.085	-0.408*
	40	41	42	43	44	45
	Teaching	Admin.	Pure Research	Applied Research	Sales	Develop-ment

* PROBABILITY LEVEL .05

TABLE 19

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 1

1.	Science Teacher	-150	
2.	Industrial Management	-435	
3.	Lecturer in University	282	
4.	Research in Industry	616	
5.	Sales Executive	-389	
6.	Routine Process	-019	
7.	Lecturer in Tech.Coll.	044	
8.	Research in Res.Assoc.	823	
9.	Administrative Work	-324	
10.	Research in Govt.	812	
11.	Difficulty of the work	-275	
12.	Low social position	-198	
13.	Heavy responsibility	120	
14.	Low salary	064	
15.	Too much dedication	-227	
16.	Very competitive	-286	
17.	Narrows range of interests	-445	
18.	Anti-social purposes	-210	
19.	Too little freedom	232	
20.	Too much dedication outside w. hours	-056	
21.	Intellectual isolation	-389	
22.	Non-Scientists direct'n	132	
23.	Occasionally rewarding	-030	
24.	No. of disadvantages to face	-655	
25.	Teaching	026	
26.	Administration	-036	
27.	Pure research	623	
28.	Applied research	474	
29.	Sales	046	
30.	Development	110	
31.	Reserved-outgoing	443	
32.	Less Intelligent-more intelligent	-085	
33.	Affected by feelings-emotionally stable	167	
34.	Humble-Assertive	032	
35.	Sober- Happy-go-lucky	-029	
36.	Expedient-Conscientious	-079	
37.	Shy-Venturesome	-041	
38.	Tough-tenderminded	188	
39.	Trusting-suspicious	-096	
40.	Practical-Imaginative	-010	
41.	Forthright-Shrewd	-019	
42.	Placid-Apprehensive	-032	
43.	Conservative-Experimenting	-113	
44.	Group dependent-Self sufficient	-361	
45.	Self conflict-controlled	-053	
46.	Relaxed-tense	-060	
47.	Intelligence	027	
48.	Values - Conformity	-019	
49.	Value - Independence	-004	
50.	Self-Orientation	267	
51.	Interaction-Orientation	-026	
52.	Task-Orientation	-088	
53.	Conformity	140	

TABLE 20

COMPONENT 1

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Ranking of "Research in Res. Assoc."	0.823
Ranking of "Research in Government Est."	0.812
Rating of "Pure Research"	0.623
Ranking of "Research Industry"	0.616
Rating of "Applied Research"	0.474
Factor A - Reserved vs Outgoing	0.443
Factor Q2 - Group Dependent - Self-sufficient	-0.361
Ranking of "Sales Executive"	-0.389
Ranking of "Intellectual Isolation" as a Job Disadvantage	-0.389
Ranking of "Industrial Management"	-0.435
Ranking of "Narrows Range of Interest" as a Job Disadvantage	-0.445
Number of Disadvantages to Face	-0.655

TABLE 21

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 2

1.	Science Teacher	145	
2.	Industrial Management	191	
3.	Lecturer in University	216	
4.	Research in Industry	-029	
5.	Sales Executive	229	
6.	Routine Process	080	
7.	Lecturer in Tech.Coll.	256	
8.	Research in Res.Assoc.	068	
9.	Administrative Work	-283	
10.	Research in Govt.	-069	
11.	Difficulty of the Work	-272	
12.	Low social position	534	
13.	Heavy responsibility	-366	
14.	Low salary	205	
15.	Too much dedication	-029	
16.	Very competitive	-060	
17.	Narrows range of interests	097	
18.	Anti-social purposes	149	
19.	Too little freedom	379	
20.	Too much dedication outside w. hours	-108	
21.	Intellectual isolation	165	
22.	Non-Scientists direct'n	471	
23.	Occasionally rewarding	-037	
24.	No. of disadvantages to face	-180	
25.	Teaching	001	
26.	Administration	-463	
27.	Pure research	231	
28.	Applied research	010	
29.	Sales	375	
30.	Development	058	
31.	Reserved-outgoing	-195	
32.	Less Intelligent-more intelligent	416	
33.	Affected by feelings-emotionally stable	149	
34.	Humble-Assertive	020	
35.	Sober - Happy-go-lucky	-166	
36.	Expedient-Conscientious	384	
37.	Shy-Venturesome	025	
38.	Tough-tender-minded	773	
39.	Trusting-suspicious	-160	
40.	Practical-Imaginative	185	
41.	Forthright-Shrewd	-031	
42.	Placid-Apprehensive	512	
43.	Conservative-Experimenting	325	
44.	Group dependent-Self-sufficient	254	
45.	Self conflict-controlled	047	
46.	Relaxed-tense	591	
47.	Intelligence	354	
48.	Values - Conformity	-214	
49.	Value - Independence	-088	
50.	Self-Orientation	-016	
51.	Interaction-Orientation	-016	
52.	Task-Orientation	043	
53.	Conformity	-131	

TABLE 22

COMPONENT 2

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Factor I - Tough minded-Tender minded	0.773
Factor Q4 - Relaxed-Tense	0.591
Ranking of "Low Social Position" as a Job Disadvantage	0.534
Factor O - Placid-Apprehensive	0.512
Ranking of "Non-Scientists Direction" as a Job Disadvantage	0.471
Factor B - Less Intelligent-More Intelligent	0.416
Factor G - Expedient-Conscientious	0.384
Ranking of "Too Little Freedom to Pursue One's Own Ideas" as a Job Disadvantage	0.379
Rating of "Sales Work"	0.375
Intelligence Score -AH5	0.354
Ranking of "Heavy Responsibility" as a Job Disadvantage	-0.366
Rating of "Administration"	-0.463

TABLE 23

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 3

1.	Science teacher	657	
2.	Industrial Management	077	
3.	Lecturer in University	615	
4.	Research in Industry	-132	
5.	Sales Executive	-047	
6.	Routine Process	-458	
7.	Lecturer in Tech. Coll	604	
8.	Research in Res. Assoc.	113	
9.	Administrative work	224	
10.	Research in Govt.	015	
11.	Difficulty of the work	189	
12.	Low social position	021	
13.	Heavy responsibility	-043	
14.	Low salary	-326	
15.	Too much dedication	019	
16.	Very competitive	302	
17.	Narrows range of interests	-145	
18.	Anti-social purposes	359	
19.	Too little freedom	-018	
20.	Too much dedication o.w.h.	017	
21.	Intellectual isolation	064	
22.	Non-Scientists direction	152	
23.	Occasionally rewarding	272	
24.	No. of disadvantages to face	-121	
25.	Teaching	758	
26.	Administration	051	
27.	Pure research	234	
28.	Applied research	-264	
29.	Sales	013	
30.	Development	-247	
31.	Reserved-outgoing	-245	
32.	Less intell.-more intell.	-059	
33.	Aff. by feelings-Em.stable	-025	
34.	Humble-Assertive	145	
35.	Sober-Happy-go-lucky	-132	
36.	Expedient-Conscientious	-142	
37.	Shy-venturesome	-173	
38.	Tough - tender-minded	-102	
39.	Trusting-suspicious	246	
40.	Practical-Imaginative	076	
41.	Forthright-Shrewd	079	
42.	Placid-Apprehensive	160	
43.	Conservative-experimenting	026	
44.	Gr. dependent-self-suff.	196	
45.	Self conflict-controlled	038	
46.	Relaxed-tense	131	
47.	Intelligence	080	
48.	Value - Conformity	-338	
49.	Value - Independence	683	
50.	Self-Orientation	169	
51.	Interaction-Orientation	-297	
52.	Task-Orientation	064	
53.	Conformity	-088	

TABLE 24

COMPONENT 3

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Rating of "Teaching"	0.758
Score on "Independence Value"	0.683
Ranking of "Science Teacher" as an Occupation	0.657
Ranking of "Lecturer in University"	0.615
Ranking of "Lecturer at a Tech. Coll."	0.604
Ranking of "Anti-social Purposes" as a Job Disadvantage	0.359
Ranking of "Routine Process Control in Industry"	-0.458

TABLE 25

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 4

1.	Science teacher	222	
2.	Industrial Management	-327	
3.	Lecturer in university	-145	
4.	Research in Industry	-046	
5.	Sales executive	-417	
6.	Routine process	207	
7.	Lecturer in Tech. Coll.	028	
8.	Research in Res. Assoc.	003	
9.	Administrative work	-172	
10.	Research in Govt.	-084	
11.	Difficulty of work	-063	
12.	Low social position	-425	
13.	Heavy responsibility	-090	
14.	Low salary	-462	
15.	Too much dedication	-114	
16.	Very competitive	154	
17.	Narrows range of interests	074	
18.	Anti-social purposes	069	
19.	Too little freedom	-096	
20.	Too much dedication o.w.h.	074	
21.	Intellectual isolation	-276	
22.	Non-scientists direction	-177	
23.	Occasionally rewarding	175	
24.	No. of disadvant. to face	094	
25.	Teaching	-059	
26.	Administration	-124	
27.	Pure research	096	
28.	Applied research	-044	
29.	Sales	-439	
30.	Development	-013	
31.	Reserved-outgoing	292	
32.	Less intell.-more intell.	325	
33.	Aff.by feelings-Em.stable	197	
34.	Humble-Assertive	612	
35.	Sober-Happy-go-lucky	722	
36.	Expedient-conscientious	-141	
37.	Shy-venturesome	625	
38.	Tough - tender-minded	026	
39.	Trusting-suspicious	374	
40.	Practical-imaginative	-035	
41.	Forthright-shrewd	433	
42.	Placid-apprehensive	012	
43.	Conservative-experimenting	411	
44.	Grp. dependent-self-suff.	223	
45.	Selfconflict-controlled	420	
46.	Relaxed-tense	-154	
47.	Intelligence	041	
48.	Value - Conformity	-070	
49.	Value - Independence	084	
50.	Self-Orientation	-126	
51.	Interaction-Orientation	020	
52.	Task-Orientation	030	
53.	Conformity	-388	

TABLE 26

COMPONENT 4

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Factor F - Sober-Happy-go-lucky	0.722
Factor H - Shy-Venturesome	0.625
Factor E - Humble-Assertive	0.612
Factor N - Forthright-Shrewd	0.433
Factor Q3 - Self conflict-Controlled	0.420
Factor Q1 - Conservative-Experimenting	0.411
Factor L - Trusting-Suspicious	0.374
Conformity Score	-0.388
Ranking of "Sales Executive"	-0.417
Ranking of "Low Social Position" as a Job Disadvantage	-0.425
Rating of Sales	-0.439
Ranking of "Low Salary" as a job Disadvantage	-0.462

TABLE 27

VARIMAX ROATION OF COMPONENT LOADINGS : COMPONENT 5

1. Science teacher	-189	28. Applied research	-020
2. Industrial Management	030	29. Sales	298
3. Lecturer in university	-079	30. Development	096
4. Research in Industry	-213	31. Reserved-outgoing	119
5. Sales executive	318	32. Less intell-more intell.	-213
6. Routine process	-146	33. Aff.by feelings-Em.stable	106
7. Lecturer in Tech. Coll.	-169	34. Humble-Assertive	162
8. Research in Res. Assoc.	-156	35. Sober-Happy-go-lucky	-056
9. Administrative work	079	36. Expedient-conscientious	255
10. Research in Govt.	-096	37. Shy-venturesome	037
11. Difficulty of work	-037	38. Tough - tender-minded	105
12. Low social position	077	39. Trusting-suspicious	168
13. Heavy responsibility	-396	40. Practical-imaginative	-064
14. Low salary	-120	41. Forthright-shrewd	009
15. Too much dedication	-144	42. Placid-apprehensive	-138
16. Very competitive	-260	43. Conservative-experimenting	141
17. Narrows range of interests	-127	44. Grp. dependent-self-suff.	045
18. Anti-social purposes	-168	45. Self conflict-controlled	631
19. Too little freedom	202	46. Relaxed-tense	-012
20. Too much dedication o.w.h.	-097	47. Intelligence	191
21. Intellectual isolation	002	48. Value - Conformity	508
22. Non-scientists direction	-079	49. Value - Independence	128
23. Occasionally rewarding	090	50. Self-Orientation	-467
24. No. of disadvant. to face	-249	51. Interaction-Orientation	-527
25. Teaching	076	52. Task-Orientation	817
26. Administration	028	53. Conformity	154
27. Pure research	-151		

TABLE 28

COMPONENT 5

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
-Score on "Task-Orientation"	0.817
-Factor Q3 - Self Conflict-Controlled	0.631
-Score on "Conformity Value"	0.508
Ranking of "Heavy Responsiblity" as a Job Disadvantage	-0.396
Score on "Self Orientation"	-0.467
Score on "Interaction Orientation"	-0.527

TABLE 29

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 6

1. Science teacher	-146	28. Applied research	048
2. Industrial Management	530	29. Sales	346
3. Lecturer in university	-179	30. Development	472
4. Research in Industry	-178	31. Reserved-outgoing	216
5. Sales executive	371	32. Less intell-more intell.	380
6. Routine process	-051	33. Aff.by feelings-Em.stable	307
7. Lecturer in Tech. Coll.	-061	34. Humble-assertive	-081
8. Research in Res. Assoc.	-162	35. Sober-happy-go-lucky	071
9. Administrative work	564	36. Expedient-conscientious	153
10. Research in Govt.	-128	37. Shy-venturesome	-038
11. Difficulty of work	-228	38. Tough - tender-minded	109
12. Low social position	-225	39. Trusting-suspicious	059
13. Heavy responsibility	-028	40. Practical-imaginative	571
14. Low salary	-044	41. Forthright-shrewd	468
15. Too much dedication	093	42. Placid-apprehensive	159
16. Very competitive	-024	43. Conservative-experimenting	-135
17. Narrows range of interests	360	44. Grp. Dependent-self-suff.	-040
18. Anti-social purposes	226	45. Self conflict-controlled	-159
19. Too little freedom	-016	46. Relaxed-tense	044
20. Too much dedication o.w.h.	151	47. Intelligence	209
21. Intellectual isolation	-081	48. Value - Conformity	180
22. Non-scientists direction	-029	49. Value - Independence	141
23. Occasionally rewarding	143	50. Self-Orientation	071
24. No. of disadvant. to face	-021	51. Interaction Orientation	-044
25. Teaching	109	52. Task-Orientation	-037
26. Administration	505	53. Conformity	-523
27. Pure research	153		

TABLE 30

COMPONENT 6

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Factor M - Practical-Imaginative	0.571
Ranking of "Administrative Work"	0.564
Ranking of "Industrial Management"	0.530
Rating of "Administration"	0.505
Rating of "Development"	0.472
Factor N - Forthright-Shrewd	0.468
Factor B - Less Intelligent-More Intelligent	0.380
Ranking of "Sales Executive"	0.371
Ranking of "Narrows Range of Interest" as a Job Disadvantage	0.360
Score on Conformity	-0.523

TABLE 31

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 7

1. Science teacher	-020	28. Applied research	-040
2. Industrial management	-009	29. Sales	369
3. Lecturer in university	-430	30. Development	140
4. Research in industry	048	31. Reserved-outgoing	-013
5. Sales executive	194	32. Less intell-more intell.	-276
6. Routine process	-141	33. Aff. by feelings-Em.Stable	079
7. Lecturer in Tech. Coll.	-137	34. Humble-assertive	-124
8. Research in Res. Assoc.	-240	35. Sober-happy-go-lucky	083
9. Administrative work	-123	36. Expedient-conscientious	-106
10. Research in Govt.	-142	37. Shy-venturesome	127
11. Difficulty of work	165	38. Tough - tender-minded	191
12. Low social position	-254	39. Trusting-suspicious	022
13. Heavy responsibility	242	40. Practical-imaginative	102
14. Low salary	-140	41. Forthright-shrewd	-180
15. Too much dedication	770	42. Placid-apprehensive	-116
16. Very competitive	-049	43. Conservative-experimenting	567
17. Narrows range of interests	-046	44. Grp. dependent-Self-suff.	-088
18. Anti-social purposes	-159	45. Self conflict-Controlled	208
19. Too little freedom	-075	46. Relaxed-tense	029
20. Too much dedication o.w.h.	822	47. Intelligence	-614
21. Intellectual isolation	-227	48. Value - Conformity	-098
22. Non-scientists direction	-341	49. Value - Independence	167
23. Occasionally rewarding	-170	50. Self-Orientation	055
24. No. of disadvant. to face	145	51. Interaction-Orientation	017
25. Teaching	-097	52. Task-Orientation	-174
26. Administration	033	53. Conformity	001
27. Pure research	002		

TABLE 32

COMPONENT 7

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Ranking of "Too much Dedication outside Working Hours" as a Job Disadvantage	0.822
Ranking of "Too much Dedication" as a Job Disadvantage	0.770
Factor Q1- Conservative-Experimenting	0.567
Rating of "Sales"	0.369
Ranking of "Lecturer in University"	-0.430
Intelligence Score	-0.614

TABLE 33

VARIMAX ROTATION OF COMPONENT LOADINGS : COMPONENT 8

1. Science teacher	019	28. Applied research	-285
2. Industrial management	068	29. Sales	-070
3. Lecturer in university	168	30. Development	-127
4. Research in industry	064	31. Reserved-outgoing	032
5. Sales executive	166	32. Less intell-more intell.	-009
6. Routine process	-114	33. Aff. by feelings-Em.Stable	398
7. Lecturer in Tech. Coll.	161	34. Humble-assertive	-100
8. Research in Res. Assoc.	025	35. Sober-happy-go-lucky	217
9. Administrative work	179	36. Expedient-conscientious	-035
10. Research in Govt.	-043	37. Shy-venturesome	129
11. Difficulty of work	569	38. Tough - tender-minded	-096
12. Low social position	146	39. Trusting-suspicious	-220
13. Heavy responsibility	116	40. Practical-imaginative	-009
14. Low salary	308	41. Forthright-shrewd	057
15. Too much dedication	170	42. Placid-apprehensive	043
16. Very competitive	554	43. Conservative-experimenting	-036
17. Narrows range of interests	-349	44. Grp. dependent-Self-suff.	055
18. Anti-social purposes	-406	45. Self conflict-Controlled	049
19. Too little freedom	-310	46. Relaxed-tense	-118
20. Too much dedication o.w.h.	068	47. Intelligence	193
21. Intellectual isolation	-518	48. Value - Conformity	246
22. Non-scientists direction	-228	49. Value - Independence	-054
23. Occasionally rewarding	528	50. Self-Orientation	-295
24. No. of disadvant. to face	-046	51. Interaction-Orientation	381
25. Teaching	038	52. Task-Orientation	-057
26. Administration	-182	53. Conformity	-134
27. Pure research	-066		

TABLE 34

COMPONENT 8

HIGHEST AND LOWEST FACTOR LOADINGS

Description of Measure	Factor Loading
Ranking of "Difficult Work" as a Job Disadvantage	0.569
Ranking of "Very Competitive"as a Job Disadvantage	0.554
Ranking of "Occasionally Rewarding" as a Job Disadvantage	0.528
Factor C - Affected by feelings-Emot. stable	0.398
Score on "Interaction-Orientation"	0.381
Ranking of "Anti-social Purposes" as a Job Disadvantage	-0.406
Ranking of "Intellectual Isolation" as a Job Disadvantage	-0.518

TABLE 35

T-TESTS ON THE MAIN PSYCHOLOGICAL VARIABLES (16 P.F., VALUES, ETC.) FOR SAMPLE WHO PREFER RESEARCH OCCUPATIONS vs SAMPLE WHO PREFER TEACHING

Variable Number	Preference for Research (N=25)		Preference for Teaching (N=13)			
	M_1	SD_1	M_2	SD_2	T	Probability Level
46	4.12	1.76	4.33	2.43	0.30	-
47	6.32	1.90	6.46	2.16	0.14	-
48	5.20	1.75	5.13	2.06	0.15	-
49	6.68	2.52	7.26	2.57	0.67	-
50	4.76	2.25	4.46	2.06	0.40	-
51	4.36	1.86	4.20	1.47	0.16	-
52	4.80	2.38	4.40	2.26	0.63	-
53	6.24	1.89	6.80	2.04	0.84	-
54	5.00	2.10	4.46	1.99	0.77	-
55	6.48	1.61	6.60	1.99	0.20	-
56	5.64	1.80	5.20	2.30	0.59	-
57	5.68	1.99	4.93	1.90	1.13	-
58	6.28	2.15	6.13	1.95	0.21	-
59	6.24	1.58	6.33	2.09	0.24	-
60	4.64	2.43	4.53	2.06	0.14	-
61	5.48	2.77	5.60	1.54	0.24	-
62	17.1	6.76	17.6	7.56	0.20	-
63	20.7	7.20	21.8	7.96	0.55	-
64	37.6	13.2	39.4	1.45	0.39	-
65	66.2	28.3	54.4	29.0	1.21	-
66	31.6	24.8	37.1	24.9	0.65	-
67	35.3	31.2	31.8	25.5	0.35	-
68	65.4	20.5	49.6	28.7	1.96	-
69	50.0	28.7	62.7	22.8	1.38	-
70	39.8	26.8	49.0	24.5	1.04	-
71	43.1	28.7	43.9	29.6	0.08	-
72	48.0	28.7	43.3	28.7	0.48	-
73	52.1	29.2	63.0	27.2	1.12	-
74	34.0	25.6	55.3	22.0	2.56*	.02

TABLE 36

T-TESTS ON THE MAIN PSYCHOLOGICAL VARIABLES (16 P.F. VALUES, ETC.) FOR SAMPLE WHO PREFER RESEARCH OCCUP. vs. SAMPLE WHO PREFER SALES, MANAGEMENT, ADMINISTRATION, etc.

	Preference for Research (N=25)		Preference for Sales Manag., Adm., etc. (N=10)			
No. of Variables	M_1	SD_1	M_2	SD_2	T	Probability Level
46	4.12	1.76	5.30	2.66	1.49	-
47	6.32	1.90	5.80	2.25	0.67	-
48	5.20	1.75	5.70	1.56	0.76	-
49	6.68	2.52	7.50	2.54	1.57	-
50	4.76	2.25	4.60	2.95	0.16	-
51	4.36	1.86	4.30	1.94	0	-
52	4.80	2.38	5.10	2.02	0.34	-
53	6.24	1.89	6.20	2.04	0	-
54	5.00	2.10	5.50	2.17	0.61	-
55	6.48	1.61	5.90	2.13	0.85	-
56	5.64	1.80	5.90	2.55	0.38	-
57	5.68	1.99	5.10	1.52	0.70	-
58	6.28	2.15	7.10	2.23	0.98	-
59	6.24	1.58	7.20	2.20	1.41	-
60	4.64	2.43	4.30	2.26	0.32	-
61	5.48	2.77	5.00	1.88	0.48	-
62	17.1	6.76	16.2	4.46	0.37	-
63	20.4	7.20	21.0	5.01	0.54	-
64	37.6	13.2	37.2	9.15	0.08	-
65	66.2	28.3	59.5	32.3	0.59	-
66	31.6	24.8	27.0	23.1	0.49	-
67	35.3	31.2	31.3	21.5	0.36	-
68	65.4	20.5	64.8	27.7	0.06	-
69	50.0	28.7	55.2	26.2	0.48	-
70	39.8	26.8	42.1	30.2	0.21	-
71	43.1	28.7	46.4	27.7	0.30	-
72	48.0	28.7	39.0	21.6	0.87	-
73	52.1	29.2	62.9	26.8	0.99	-
74	34.0	25.6	40.7	21.3	3.60*	.01

TABLE 37

PROFILE SIMILARITY COEFFICIENT (16 P.F.) BETWEEN 16 P.F. MEAN PROFILE OF "PREFERENCE FOR RESEARCH" GROUP AND 16 P.F. MEAN PROFILE OF "PREFERENCE FOR TEACHING" GROUP

Factors	Mean Profile of "Preference for Research" Group (N=25) M_1	Mean Profile of "Preference for Teaching" Group (N=13) M_2	D^2
A	4.12	4.33	0.04
B	6.32	6.46	0.01
C	5.20	5.13	0.004
E	6.68	7.26	0.33
F	4.76	4.46	0.09
G	4.36	4.20	0.02
H	4.80	4.40	0.16
I	6.24	6.80	0.31
L	5.00	4.46	0.29
M	6.48	6.60	0.01
N	5.64	5.20	0.19
O	5.68	4.93	0.56
Q1	6.28	6.13	0.02
Q2	6.24	6.33	0.008
Q3	4.64	4.53	0.01
Q4	5.48	5.60	0.01
			2.06

$rp = 0.97$

TABLE 38

PROFILE SIMILARITY COEFFICIENT BETWEEN MEAN 16 P.F. PROFILE FOR "PREFERENCE FOR RESEARCH" GROUP & MEAN 16 P.F. PROFILE FOR "PREFERENCE FOR SALES, MAN., ADM., ETC." GROUP

Factor	Preference for Research	Preference for Sales, Manag., Adm., etc.	
	M_1	M_2	D^2
A	4.12	5.30	1.39
B	6.32	5.80	0.52
C	5.20	5.70	0.25
E	6.68	7.50	0.67
F	4.76	4.60	0.02
G	4.36	4.30	0.003
H	4.80	5.10	0.09
I	6.24	6.20	0.001
L	5.00	5.50	0.25
M	6.48	5.90	0.33
N	5.64	5.90	0.06
O	5.68	5.10	0.33
Q1	6.28	7.10	0.67
Q2	6.24	7.20	0.92
Q3	4.64	4.30	0.11
Q4	5.48	5.00	0.23
			5.84

$r_p = 0.95$

TABLE 39

PROFILE SIMILARITY COEFFICIENT BETWEEN MEAN 16 P.F. PROFILE FOR "PREFERENCE FOR RESEARCH" GROUP & MEAN 16 P.F. PROFILE FOR RESEARCH SCIENTISTS (N = 144)

Variable	Preference for Research	Research Scientists	
	M_1	M_2	D^2
A	4.12	3.0	1.25
B	6.32	7.4	1.21
C	5.20	4.8	0.16
E	6.68	5.5	1.21
F	4.76	2.8	3.61
G	4.36	4.8	0.25
H	4.80	4.4	0.16
I	6.24	6.7	0.25
L	5.00	4.5	0.25
M	6.48	5.6	0.64
N	5.64	5.6	0
O	5.68	4.8	0.64
Q1	6.28	6.6	0.16
Q2	6.24	8.4	4.84
Q3	4.64	6.4	3.24
Q4	5.48	4.3	1.10
			18.97

rp = 72

TABLE 40

T-TESTS ON VARIABLES FROM THE OCCUPATIONAL PREFERENCES QUESTIONNAIRE FOR BEDFORD MALE Ss vs. FEMALE BEDFORD Ss.

Variable Number	Male (N=22)		Female (N=43)		T	Probability Level
	M_1	SD_1	M_2	SD_2		
6	6.0	2.6	5.6	3.1	0.54	-
7	6.0	2.7	6.9	2.2	1.52	-
8	3.5	2.8	5.5	2.8	2.89*	.01
9	5.0	2.3	3.7	2.2	2.36*	.05
10	6.9	3.2	7.7	2.5	1.17	-
11	7.3	2.3	5.7	2.9	2.38*	.05
12	5.8	2.0	5.7	2.3	0.18	-
13	3.2	2.1	3.6	2.2	0.75	-
14	6.9	2.5	6.5	2.7	0.61	-
15	3.7	2.5	3.6	2.0	0.18	-
16	4.5	2.6	4.8	2.7	0.45	-
17	5.0	2.2	5.9	1.9	1.83	-
18	3.6	2.9	4.4	2.4	1.25	-
19	3.8	1.9	3.3	1.9	1.06	-
20	5.0	2.8	6.9	1.8	3.51*	.001
21	6.1	1.9	5.2	2.3	1.66	-
22	4.3	2.3	4.7	2.1	0.75	-
23	3.4	2.5	3.3	2.2	0.17	-
24	5.4	2.6	5.4	2.7	0	-
25	3.4	2.5	3.5	2.3	0.17	-
26	7.7	4.5	7.2	3.9	0.49	-
27	7.5	4.7	9.2	4.0	1.61	-
28	7.4	3.7	6.8	3.5	0.68	-
29	5.6	3.5	6.6	3.4	1.17	-
30	7.0	3.9	6.5	4.0	0.51	-
31	7.0	3.8	7.2	3.8	0.21	-
32	5.7	3.8	5.9	3.6	0.21	-
33	7.4	4.9	5.6	4.2	1.63	-
34	5.2	3.0	6.2	3.1	1.31	-
35	6.1	4.1	5.2	4.4	0.84	-
36	4.5	2.5	5.2	3.2	0.94	-
37	5.0	4.1	7.0	4.0	2.00*	.05
38	6.3	3.4	6.8	3.4	0.59	-
39	6.3	3.6	3.8	3.5	2.87*	.01
40	3.9	2.4	3.8	3.1	0.14	-
41	6.1	2.8	5.0	3.1	1.48	-
42	2.4	1.8	2.7	2.3	0.56	-
43	3.1	1.8	2.6	2.1	1.02	-
44	5.0	2.8	6.4	3.1	1.89	-
45	4.8	2.4	4.1	2.7	1.09	-

TABLE 41

T-TESTS ON THE MAIN PSYCHOLOGICAL VARIABLES (16 P.F., VALUES, ETC.) FOR BEDFORD MALE Ss vs. BEDFORD FEMALE Ss.

Variable Number	Male (N=16)		Female (N=25)		T	Probability Level
	M_1	SD_1	M_2	SD_2		
46	4.6	2.0	4.0	2.1	0.90	-
47	5.6	1.9	6.4	2.2	3.80*	.001
48	5.1	1.7	5.1	1.7	0	-
49	6.9	2.8	6.4	2.4	0.60	-
50	4.8	1.7	3.8	1.9	1.69	-
51	3.7	2.2	4.6	1.1	1.73	-
52	4.8	1.9	4.5	2.2	0.44	-
53	5.8	1.9	7.4	1.3	3.20*	.001
54	5.1	1.6	4.3	2.1	1.29	-
55	6.6	1.8	6.4	1.6	0.37	-
56	5.4	2.0	5.0	1.9	0.64	-
57	4.9	2.3	5.2	1.9	0.45	-
58	6.7	2.1	5.9	2.2	1.14	-
59	6.1	1.7	6.2	1.7	0.20	-
60	4.6	2.1	4.3	2.2	0.42	-
61	5.3	2.9	5.9	1.8	0.81	-
62	14.8	6.6	18.2	6.8	1.56	-
63	19.5	8.9	21.1	6.3	0.66	-
64	34.3	15.0	39.4	12.3	1.17	-
65	66.1	30.5	63.8	27.9	0.24	-
66	35.0	31.7	29.6	21.1	0.81	-
67	38.1	32.6	34.4	26.2	0.39	-
68	50.5	29.4	61.0	24.0	1.23	-
69	57.6	32.3	53.3	25.8	0.46	-
70	40.6	20.9	44.6	30.2	0.45	-
71	40.9	24.4	52.3	31.2	1.22	-
72	60.9	24.5	37.7	25.7	2.83*	.001
73	47.5	25.5	56.0	31.4	0.89	-
74	40.6	27.8	42.6	27.0	0.22	-

TABLE 42

T-TESTS ON THE VARIABLES FROM THE OCCUPATIONAL PREFERENCES QUESTIONNAIRE FOR BEDFORD MALE Ss vs. CHELSEA MALE Ss

Variable Number	Bedford Male (N=22)		Chelsea Male (N=32)		T	Probability Level
	M_1	SD_1	M_2	SD_2		
6	6.0	2.6	6.5	3.1	0.64	-
7	6.0	2.7	4.6	2.9	1.84	-
8	3.5	2.8	4.2	2.8	0.93	-
9	5.0	2.3	3.0	2.5	3.07*	.01
10	6.9	3.2	6.4	3.6	0.54	-
11	7.3	2.3	6.4	2.6	1.36	-
12	5.8	2.0	5.6	2.6	0.31	-
13	3.2	2.1	3.8	2.2	1.03	-
14	6.9	2.5	6.7	3.0	0.26	-
15	3.7	2.5	3.8	2.5	0.14	-
16	4.5	2.6	5.7	2.5	1.76	-
17	5.0	2.2	4.7	2.7	0.44	-
18	3.6	2.9	3.9	2.5	0.42	-
19	3.8	1.9	2.8	2.2	1.78	-
20	5.0	2.8	5.9	3.0	1.15	-
21	6.1	1.9	6.1	2.6	0	-
22	4.3	2.3	5.4	2.1	1.89	-
23	3.4	2.5	3.6	2.5	0.29	-
24	5.4	2.6	6.8	2.3	2.15	-
25	3.4	2.5	3.6	2.6	0.28	-
26	7.7	4.5	9.7	3.5	1.88	-
27	7.5	4.7	8.8	3.5	1.20	-
28	7.4	3.7	9.1	3.1	1.88	-
29	5.6	3.5	4.6	3.6	1.05	-
30	7.0	3.9	6.4	3.5	0.61	-
31	7.0	3.8	8.8	3.2	1.93	-
32	5.7	3.8	4.9	3.1	0.87	-
33	7.4	4.9	6.4	4.0	0.84	-
34	5.2	3.0	5.2	3.2	0	-
35	6.1	4.1	6.3	3.6	0.19	-
36	4.5	2.5	5.5	3.5	1.19	-
37	5.0	4.1	5.9	3.2	0.93	-
38	6.3	3.4	6.7	3.4	0.43	-
39	6.3	3.6	4.8	3.3	1.63	-
40	3.9	2.4	3.7	2.8	0.28	-
41	6.1	2.8	5.2	3.6	1.02	-
42	2.4	1.8	2.0	2.0	0.78	-
43	3.1	1.8	1.8	1.8	2.70*	.01
44	5.0	2.8	3.8	3.4	1.41	-
45	4.8	2.4	3.6	3.2	1.53	-

TABLE 43

T-TESTS ON THE MAIN PSYCHOLOGICAL VARIABLES (16 P.F., VALUES, ETC.) FOR BEDFORD MALE Ss vs. CHELSEA MALE Ss.

Variable Number	Bedford Male (N=16)		Chelsea Male (N=10)		T	Probability Level
	M_1	SD_1	M_2	SD_2		
46	9.6	2.0	4.9	2.4	0.46	-
47	5.6	1.9	6.1	2.0	0.62	-
48	5.1	1.7	5.7	1.7	0.85	-
49	6.9	2.8	7.1	3.1	0.16	-
50	4.8	1.7	5.9	3.0	0.94	-
51	3.7	2.2	4.5	2.0	0.90	-
52	4.8	1.9	5.0	2.6	0.21	-
53	5.8	1.9	4.8	1.5	1.36	-
54	5.1	1.6	6.4	1.9	1.83	-
55	6.6	1.8	6.3	2.6	0.33	-
56	5.4	2.0	6.4	2.3	1.13	-
57	4.9	2.3	5.2	1.6	0.35	-
58	6.7	2.1	7.1	1.7	0.49	-
59	6.1	1.7	7.3	2.1	1.55	-
60	4.6	2.1	4.9	2.3	0.33	-
61	5.3	2.9	3.4	2.0	1.77	-
62	14.8	6.6	16.3	6.9	0.53	-
63	19.5	8.9	21.4	8.5	0.52	-
64	34.3	15.0	37.7	15.1	0.54	-
65	66.1	30.5	33.6	20.6	2.90*	.01
66	35.0	31.7	44.6	19.5	0.83	-
67	38.1	32.6	20.1	19.5	1.53	-
68	50.5	29.4	76.1	20.0	2.34*	.05
69	57.6	32.3	50.7	26.6	0.55	-
70	40.6	20.9	50.0	28.9	0.93	-
71	40.9	24.4	30.9	23.0	1.01	-
72	60.9	24.5	50.0	29.2	1.00	-
73	47.5	25.5	65.1	25.5	1.66	-
74	40.6	27.8	37.2	20.2	0.32	-

TABLE 48

CHI SQUARE TEST ON "FREQUENCIES OF OCCUPATIONAL VALUES"

Occupational Value	fo	$\frac{(fo - fe)^2}{fe}$
1. Interesting-Boring	52	80.05
2. Meeting people	13	0.59
3. Useful results	19	0.52
4. Varied-monotonous	12	1.04
5. Independent work	3	10.6
6. Facilities	17	0.07
7. Salary	26	6.33
8. Contact with degree sub.	6	2.31
9. Self-assessment	9	3.13
10. Use of imagination	12	1.04
11. Travelling	1	14.1
12. Social status	24	3.87
	194	123.6

$P < .001$

TABLE 49

CHI SQUARE TEST ON "REASONS FOR LIKING OCCUPATIONS"

	fo	$\frac{(fo - fe)^2}{fe}$
Interesting-Boring	22	23.2
Meeting people	12	1.7
Useful Results	11	0.9
Varied-monotonous	10	0.3
Independent work	10	0.3
Facilities	8	0.004
Salary	7	0.17
Contact with degree sub.	6	0.59
Self assessment	6	0.59
Use of imagination	4	2.15
Travelling	2	4.6
Social status	1	6.3
	99	$x^2 = 40.8$

$P < .001$

TABLE 50

CHI SQUARE TEST ON "REASONS FOR DISLIKING OCCUPATIONS"

	fo	$\frac{(fo - fe)^2}{fe}$
Interesting Boring	30	60.5
Self Assessment	20	18.0
Varied-monotonous	14	4.5
Contact with degree sub.	13	3.1
Salary	6	0.5
Useful Results	6	0.5
Facilities for work	4	2.0
Use of imagination	3	3.1
Travelling	1	7.0
Meeting people	0	8
Independent work	0	8
Social status	0	8
	97	123.2

$P < .001$

TABLE 55 CORRELATIONS BETWEEN RANKINGS ON 13 DISADVANTAGES OF JOBS

	No. of Variables	26	27	28	29	30	31	32	33	34	35	36	37	38
Difficulty of the work	26													
Low social position	27	-0.011												
Heavy responsibility	28	0.442***	-0.022											
Low salary	29	-0.168	0.394***	-0.022										
Too much dedication	30	0.270***	0.013	0.181	-0.100									
Very competitive	31	0.433***	-0.038	0.240**	-0.080	0.107								
Narrows range of interests	32	-0.011	0.012	-0.194	-0.132	0.060	0.000							
Anti-social purposes	33	-0.169	0.118	0.031	0.015	-0.194*	-0.007	0.061						
Little freedom	34	-0.184	0.093	0.033	0.029	-0.113	-0.219*	0.231**	0.206*					
Too much ded. outside w. h.	35	0.102	-0.082	0.109	-0.054	0.679***	-0.048	0.050	-0.141	-0.036				
Intellectual isolation	36	-0.124	0.242**	-0.114	-0.107	0.064	-0.186	0.441***	0.115	0.218*	-0.016			
Non-scientists direction	37	-0.260***	0.326***	-0.032	0.265***	-0.354***	-0.065	-0.046	0.413***	0.298***	-0.265***	0.059		
Occasionally rewarding	38	0.336***	0.030	0.120	0.098	0.009	0.379***	0.018	0.023	-0.058	-0.082	-0.143	0.125	

PROBABILITY LEVEL

* .05
** .02
*** .01

TABLE 56 CORRELATIONS BETWEEN RANKINGS ON EACH OF TEN OCCUPATIONS AND EACH OF THIRTEEN JOB DISADVANTAGES

	No. of Variables.										
Difficulty of the work	26	0.108	0.109	0.071	-0.023	-0.027	-0.059	0.153	-0.188	0.078	-0.169
Low social position	27	0.093	0.102	0.224	-0.127	0.332**	0.133	0.210	-0.037	-0.085	-0.134
Heavy responsibility	28	-0.065	-0.170	-0.018	0.155	-0.190	0.145	-0.012	0.105	0.048	0.111
Low salary	29	-0.241	-0.010	0.076	-0.010	0.198	0.006	-0.121	0.151	0.000	0.142
Too much dedication	30	-0.012	0.117	-0.271*	-0.112	0.279*	-0.037	0.019	-0.334**	0.093	-0.230
Very competitive	31	0.156	0.124	0.204	-0.105	-0.019	-0.065	0.246	-0.144	0.233	-0.267*
Narrows range of interest	32	-0.071	0.385***	-0.252	-0.203	0.149	0.133	-0.152	-0.409***	0.126	-0.380***
Anti-social purposes	33	0.193	0.206	0.143	-0.292*	-0.092	0.048	0.338**	-0.124	0.159	-0.136
Little freedom	34	-0.055	-0.061	0.187	0.010	0.016	0.128	0.139	0.223	-0.158	0.114
Too much ded. outside w.h.	35	-0.085	-0.002	-0.294*	-0.015	0.167	-0.065	-0.120	-0.184	0.109	-0.057
Intellectual isolation	36	0.023	0.182	0.106	-0.243	0.109	0.053	-0.027	-0.180	0.044	-0.160
non-Scientists Direction	37	0.158	0.082	0.417***	0.054	-0.052	-0.078	0.291*	0.226	-0.143	0.071
Occasionally rewarding	38	0.001	0.168	0.285*	-0.035	0.227	-0.175	0.118	0.016	0.121	-0.081
		16	17	18	19	20	21	22	23	24	25
		Science teacher	Manag	Lect. Univ.	Res. Indus.	Sales	Rout. Process	Lect. Tech.Coll.	Res. Res. Assoc.	Admin.	Res. Govt.

PROBABILITY LEVEL

* .05
** .02
*** .01

TABLE 57

CORRELATIONS BETWEEN RATINGS ON EACH OF 6 ACTIVITIES AND EACH OF 13 JOB DISADVANTAGES

	No. of Variables													
Teaching	40	0.089	0.100	-0.122	-0.090	-0.071	0.277*	-0.061	0.249	-0.042	-0.134	0.119	0.223	0.354***
Administration	41	-0.022	-0.211	0.179	-0.023	-0.047	0.007	0.191	0.081	-0.123	0.021	0.015	-0.256	0.056
Pure Research	42	-0.148	-0.098	0.101	-0.123	-0.098	0.058	-0.186	0.171	0.233	0.004	-0.198	0.105	0.027
Applied Research	43	-0.119	-0.150	-0.010	0.036	-0.192	-0.186	0.100	-0.039	0.222	-0.214	-0.026	-0.055	-0.154
Sales	44	-0.075	0.403***	-0.036	0.182	0.202	-0.225	0.145	0.044	0.220	0.154	0.046	0.222	0.158
Development	45	-0.048	-0.146	0.020	-0.005	-0.001	-0.022	0.300	-0.079	0.100	0.077	-0.041	0.274	0.047
		26	27	28	29	30	31	32	33	34	35	36	37	38
		Difficulty of Work	Low social pos.	Heavy respons.	Low salary	Too much dedication	Very competitive	Narrows interests	Anti-social purposes	Little Freedom	Too much ded. outside w.h.	Intellectual isolation	non-scientist direction	Occasionally rewarding

PROBABILITY LEVEL

* .05

** .02

*** .01

TABLE 58

CORRELATIONS BETWEEN RANKINGS ON EACH OF 13 DISADVANTAGES AND SOME PSYCHOLOGICAL VARIABLES

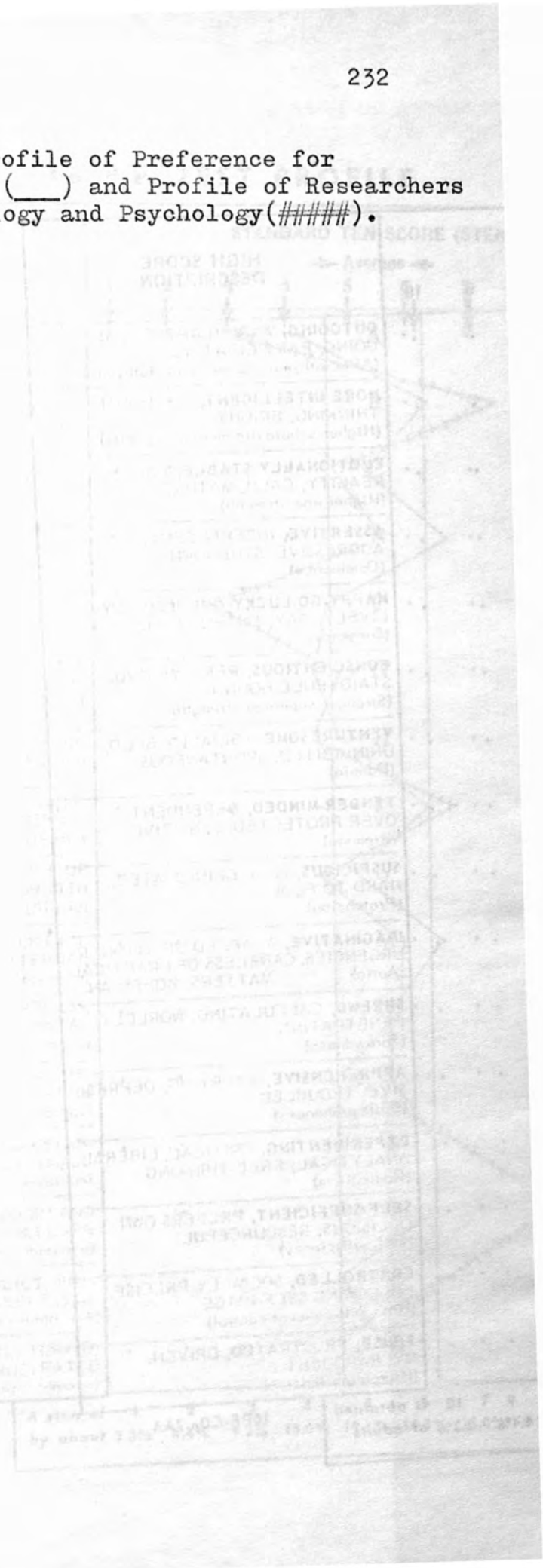
	26 Diff. Work	27 Low soc. position	28 Heavy resp.	29 Low Salary	30 Too much Dedic.	31 Very Comp.	32 Narrows interests	33 Anti-soc. purposes	34 Too little freedom	35 Too much ded. o.w.h.	36 Intell. Isol.	37 Non-Sc. Direct.	38 Occas. Rewarding
46 - Reserved-outgoing	-0.307**	-0.203	0.092	0.018	-0.143	-0.184	-0.151	-0.136	0.077	-0.039	-0.284*	-0.018	-0.055
47 - Less-More Intelligent	-0.157	0.025	-0.137	-0.125	-0.135	0.065	0.273*	0.118	0.060	-0.092	-0.004	-0.022	-0.088
48 - Affected by feelings-Em. Stable	0.029	-0.063	-0.082	0.112	-0.012	0.107	0.064	-0.110	0.079	0.067	-0.203	0.011	0.184
49 - Humble-Assertive	-0.103	-0.260	-0.227	-0.325***	-0.167	0.028	0.109	0.095	0.040	-0.051	-0.034**	0.010	0.079
50 - Sober-Happy-go-lucky	0.062	-0.271*	0.154	-0.156	-0.035	0.064	-0.014	-0.163	-0.130*	0.187	-0.397	-0.256	-0.037
51 - Expedient-conscientious	-0.181	0.194	-0.087	0.198	0.091	-0.183	-0.027	0.062	0.317	-0.060	0.275*	0.145	-0.186
52 - Shy-venturesome	-0.098	-0.213	0.062**	-0.080	0.087	0.154	0.016	-0.121	-0.011	0.134	-0.218	-0.120*	-0.127
53 - Tough-Tender minded	-0.308**	0.240	-0.352*	0.076*	-0.018	-0.156	0.062	0.038	0.176	-0.151	-0.028	0.327*	-0.088
54 - Trusting-Suspicious	0.009	-0.222	-0.085	-0.421**	-0.052	0.036	-0.120	0.214**	-0.157	0.057	-0.073	-0.017	-0.030
55 - Practical-Imaginative	-0.253	-0.113	-0.120	0.071	0.061	-0.176	0.070	0.350*	-0.082	0.162	-0.122	0.192	0.089
56 - Forthright-shrewd	-0.126	-0.119	-0.096	-0.189	-0.034	-0.035	0.068	0.181	-0.109	0.004	-0.116	-0.021	-0.007
57 - Placid-apprehensive	-0.064	0.281*	-0.006	-0.032	-0.022	0.127	-0.032	0.286*	0.252	-0.019	-0.004	0.194	0.063
58 - Conservative-experimenting	0.004	-0.059	-0.134	-0.151	0.313**	-0.004	0.131	0.011	0.025	0.414***	-0.032	-0.095	-0.107
59 - Group Dep-Self-Suff.	0.159	0.065	-0.040	-0.060	0.025	0.190	0.237	0.099	0.110	0.029	0.319**	-0.071	0.087
60 - Self-conflict - controlled	0.050	-0.134	-0.220	-0.224	-0.053	0.053	-0.058	-0.080	0.048	-0.010	-0.044	-0.178	-0.038
61 - Relaxed-tense	-0.180	0.313**	-0.338***	0.012	-0.019	-0.067	-0.011	0.055	0.077	-0.102*	0.128	0.116	-0.132
62 - AH5 I	-0.134	0.309**	-0.241	0.074	-0.431**	0.103	0.132	0.000	0.115	-0.483**	0.057	0.187	0.177
63 - AH5 II	-0.097	0.312*	-0.277*	0.118	-0.328**	0.123	0.011	-0.068	0.086	-0.416**	0.152	0.110	0.236
64 - AH5 TOTAL	-0.121	0.328*	-0.275*	0.102	-0.398**	0.120	0.073	-0.038	0.105	-0.473**	0.113	0.155*	0.220
65 - Support Value	-0.202	-0.028	-0.068	-0.002	-0.075	0.019	0.239	0.406**	-0.083	-0.070	-0.042	0.324*	-0.074
66 - Conformity Value	0.181*	-0.088	-0.034	-0.078	0.079	-0.036	0.001	-0.212	0.039	-0.057	-0.124	-0.315**	0.045
67 - Recognition Value	-0.357**	-0.191	0.155	-0.106	0.169	-0.025	0.246	0.248	0.052	0.031	0.161	0.160	-0.235
68 - Independence Value	0.175*	-0.075	-0.049	-0.222**	0.005	0.170	0.067	0.102*	-0.033	0.141	0.111	-0.083	0.111
69 - Benevolence Value	0.342**	0.354**	-0.252	0.345**	-0.094	0.083	-0.179	-0.341**	-0.032	-0.178	-0.075	0.019	0.177
70 - Leadership Value	-0.214	0.033	0.176	0.041	-0.065	-0.239	-0.250	-0.065	0.086	0.112	0.039	-0.031	-0.104
71 - Self-Orientation	-0.175	-0.040	0.204	-0.109*	0.001	-0.006	0.074	0.052	-0.001	-0.076	0.047	0.134	-0.071
72 - Interaction-Orientat.	0.213	-0.069	0.162	0.330**	0.057	0.181	0.005	-0.085	-0.250	0.026	-0.127	-0.024	0.021
73 - Task-Orientation	0.041	0.131	-0.289	-0.163	-0.213	-0.215	-0.092**	0.082	0.167	-0.124	0.006	0.070	0.086
74 - Conformity Test	-0.000	0.327	0.017	0.145	-0.186	-0.304*	-0.397**	-0.145	0.174	-0.185	0.018	0.086	0.018

PROBABILITY LEVEL

* .05
** .02
*** .01
**** .001

FIGURES

Figure 3
Mean 16 P.F. Profile of Preference for Research Group (___) and Profile of Researchers in Physics, Biology and Psychology(#####).



16 P.F. TEST PROFILE

FACTOR	Raw Score Form C	Raw Score Form D	Raw Score Total	Standard Score	LOW SCORE DESCRIPTION	STANDARD TEN SCORE (STEN) (Average) 1 2 3 4 5 6 7 8 9 10	HIGH SCORE DESCRIPTION
A					**RESERVED,** DETACHED, CRITICAL, COOL (Sizothymia)	A	**OUTGOING,** WARMHEARTED, EASY-GOING, PARTICIPATING (Affectothymia, formerly cyclothymia)
B					**LESS INTELLIGENT,** CONCRETE-THINKING (Lower scholastic mental capacity)	B	**MORE INTELLIGENT,** ABSTRACT-THINKING, BRIGHT (Higher scholastic mental capacity)
C					**AFFECTED BY FEELINGS,** EMOTIONALLY LESS STABLE, EASILY UPSET (Lower ego strength)	C	**EMOTIONALLY STABLE,** FACES REALITY, CALM, MATURE (Higher ego strength)
E					**HUMBLE,** MILD, ACCOMMODATING, CONFORMING (Submissiveness)	E	**ASSERTIVE,** INDEPENDENT, AGGRESSIVE, STUBBORN (Dominance)
F					**SOBER,** PRUDENT, SERIOUS, TACITURN (Desurgency)	F	**HAPPY-GO-LUCKY,** IMPULSIVELY LIVELY, GAY, ENTHUSIASTIC (Surgency)
G					**EXPEDIENT,** EVADES RULES, FEELS FEW OBLIGATIONS (Weaker superego strength)	G	**CONSCIENTIOUS,** PERSEVERING, STAID, RULE-BOUND (Stronger superego strength)
H					**SHY,** RESTRAINED, DIFFIDENT, TIMID (Threctia)	H	**VENTURESOME,** SOCIALLY BOLD, UNINHIBITED, SPONTANEOUS (Parmia)
I					**TOUGH-MINDED,** SELF-RELIANT, REALISTIC, NO-NONSENSE (Harria)	I	**TENDER-MINDED,** DEPENDENT, OVER-PROTECTED, SENSITIVE (Premsia)
L					**TRUSTING,** ADAPTABLE, FREE OF JEALOUSY, EASY TO GET ON WITH (Alaxia)	L	**SUSPICIOUS,** SELF-OPINIONATED, HARD TO FOOL (Protension)
M					**PRACTICAL,** CAREFUL, CONVENTIONAL, REGULATED BY EXTERNAL REALITIES, PROPER (Praxernia)	M	**IMAGINATIVE,** WRAPPED UP IN INNER URGENCIES, CARELESS OF PRACTICAL (Autia) MATTERS, BOHEMIAN
N					**FORTHRIGHT,** NATURAL, ARTLESS, SENTIMENTAL (Artlessness)	N	**SHREWD,** CALCULATING, WORLDLY, PENETRATING (Shrewdness)
O					**PLACID,** SELF-ASSURED, CONFIDENT, SERENE (Untroubled adequacy)	O	**APPREHENSIVE,** WORRYING, DEPRESSIVE, TROUBLED (Guilt proneness)
Q_1					**CONSERVATIVE,** RESPECTING ESTABLISHED IDEAS, TOLERANT OF TRADITIONAL DIFFICULTIES (Conservatism)	Q_1	**EXPERIMENTING,** CRITICAL, LIBERAL, ANALYTICAL, FREE THINKING (Radicalism)
Q_2					**GROUP-DEPENDENT,** A "JOINER" AND SOUND FOLLOWER (Group adherence)	Q_2	**SELF-SUFFICIENT,** PREFERS OWN DECISIONS, RESOURCEFUL (Self-sufficiency)
Q_3					**UNDISCIPLINED SELF-CONFLICT,** FOLLOWS OWN URGES, CARELESS OF PROTOCOL (Low integration)	Q_3	**CONTROLLED,** SOCIALLY PRECISE, FOLLOWING SELF-IMAGE (High self-concept control)
Q_4					**RELAXED,** TRANQUIL, TORPID, UNFRUSTRATED (Low ergic tension)	Q_4	**TENSE,** FRUSTRATED, DRIVEN, OVERWROUGHT (High ergic tension)

Name: REFERENCE FOR RESEARCH PUBLICATIONS
Comments: PROFILE OF RESEARCHERS IN BIOLOGY, PHYSICS & PSYCHOLOGY ——— 144 CASES

A sten of	1	2	3	4	5	6	7	8	9	10	*is obtained*
by about	2.3%	4.4%	9.2%	15.0%	19.1%	19.1%	15.0%	9.2%	4.4%	2.3%	*of adults*

16PF-CDp-7AA

Figure 4
Mean 16 P.F. Profile of "Preference for Research Group" and "Preference for Teaching Group".

Res.____
Teach.####

IPAT

16 P.F. TEST PROFILE

FACTOR	Raw Score Form C	Raw Score Form D	Raw Score Total	Standard Score	LOW SCORE DESCRIPTION	STANDARD TEN SCORE (STEN) → Average ← 1 2 3 4 5 6 7 8 9 10	HIGH SCORE DESCRIPTION
A					**RESERVED,** DETACHED, CRITICAL, COOL (Sizothymia)	A	**OUTGOING,** WARMHEARTED, EASY-GOING, PARTICIPATING (Affectothymia, formerly cyclothymia)
B					**LESS INTELLIGENT,** CONCRETE-THINKING (Lower scholastic mental capacity)	B	**MORE INTELLIGENT,** ABSTRACT-THINKING, BRIGHT (Higher scholastic mental capacity)
C					**AFFECTED BY FEELINGS,** EMOTIONALLY LESS STABLE, EASILY UPSET (Lower ego strength)	C	**EMOTIONALLY STABLE,** FACES REALITY, CALM, MATURE (Higher ego strength)
E					**HUMBLE,** MILD, ACCOMMODATING, CONFORMING (Submissiveness)	E	**ASSERTIVE,** INDEPENDENT, AGGRESSIVE, STUBBORN (Dominance)
F					**SOBER,** PRUDENT, SERIOUS, TACITURN (Desurgency)	F	**HAPPY-GO-LUCKY,** IMPULSIVELY LIVELY, GAY, ENTHUSIASTIC (Surgency)
G					**EXPEDIENT,** EVADES RULES, FEELS FEW OBLIGATIONS (Weaker superego strength)	G	**CONSCIENTIOUS,** PERSEVERING, STAID, RULE-BOUND (Stronger superego strength)
H					**SHY,** RESTRAINED, DIFFIDENT, TIMID (Threctia)	H	**VENTURESOME,** SOCIALLY BOLD, UNINHIBITED, SPONTANEOUS (Parmia)
I					**TOUGH-MINDED,** SELF-RELIANT, REALISTIC, NO-NONSENSE (Harria)	I	**TENDER-MINDED,** DEPENDENT, OVER-PROTECTED, SENSITIVE (Premsia)
L					**TRUSTING,** ADAPTABLE, FREE OF JEALOUSY, EASY TO GET ON WITH (Alaxia)	L	**SUSPICIOUS,** SELF-OPINIONATED, HARD TO FOOL (Protension)
M					**PRACTICAL,** CAREFUL, CONVENTIONAL, REGULATED BY EXTERNAL REALITIES, PROPER (Praxernia)	M	**IMAGINATIVE,** WRAPPED UP IN INNER URGENCIES, CARELESS OF PRACTICAL MATTERS, BOHEMIAN (Autia)
N					**FORTHRIGHT,** NATURAL, ARTLESS, SENTIMENTAL (Artlessness)	N	**SHREWD,** CALCULATING, WORLDLY PENETRATING (Shrewdness)
O					**PLACID,** SELF-ASSURED, CONFIDENT, SERENE (Untroubled adequacy)	O	**APPREHENSIVE,** WORRYING, DEPRESSIVE, TROUBLED (Guilt proneness)
Q_1					**CONSERVATIVE,** RESPECTING ESTABLISHED IDEAS, TOLERANT OF TRADITIONAL DIFFICULTIES (Conservatism)	Q_1	**EXPERIMENTING,** CRITICAL, LIBERAL, ANALYTICAL, FREE-THINKING (Radicalism)
Q_2					**GROUP-DEPENDENT,** A "JOINER" AND SOUND FOLLOWER (Group adherence)	Q_2	**SELF-SUFFICIENT,** PREFERS OWN DECISIONS, RESOURCEFUL (Self-sufficiency)
Q_3					**UNDISCIPLINED SELF-CONFLICT,** FOLLOWS OWN URGES, CARELESS OF PROTOCOL (Low integration)	Q_3	**CONTROLLED,** SOCIALLY-PRECISE, FOLLOWING SELF-IMAGE (High self-concept control)
Q_4					**RELAXED,** TRANQUIL, TORPID, UNFRUSTRATED (Low ergic tension)	Q_4	**TENSE,** FRUSTRATED, DRIVEN, OVERWROUGHT (High ergic tension)

A sten of	1	2	3	4	5	6	7	8	9	10	is obtained
by about	2.3%	4.4%	9.2%	15.0%	19.1%	19.1%	15.0%	9.2%	4.4%	2.3%	of adults

16PF Op.7AA

Name: PREFERENCE FOR RESEARCH OCCUPATIONS
PREFERENCE FOR TEACHING OCCUPATIONS
Comments:

Figure5
Mean 16 P.F. Profile of Preference for Research Group (---) and Preference forSales, Administration and Development Group (###).

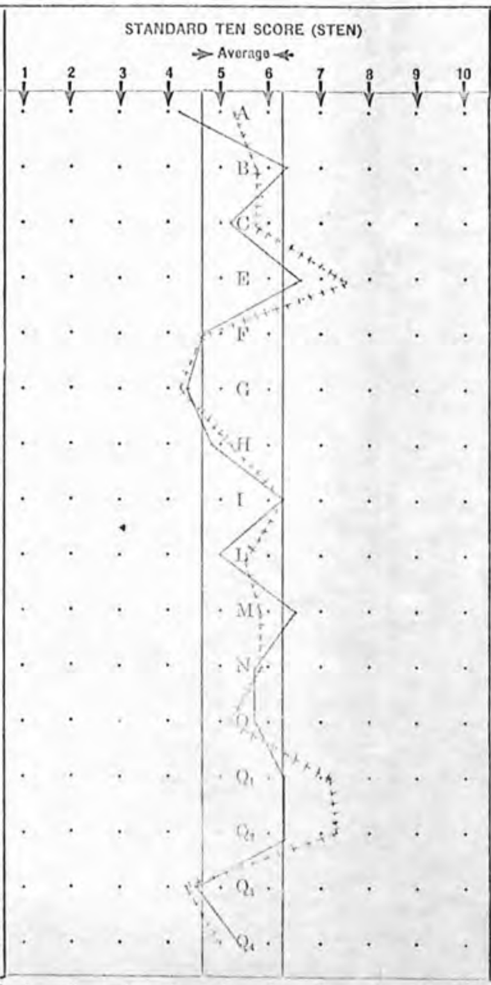
Name: ... for Research ... Occupations
Comments: ... Preferences for Sales, Management, Administration and Routine Prod ++++

IPAT

16 P.F. TEST PROFILE

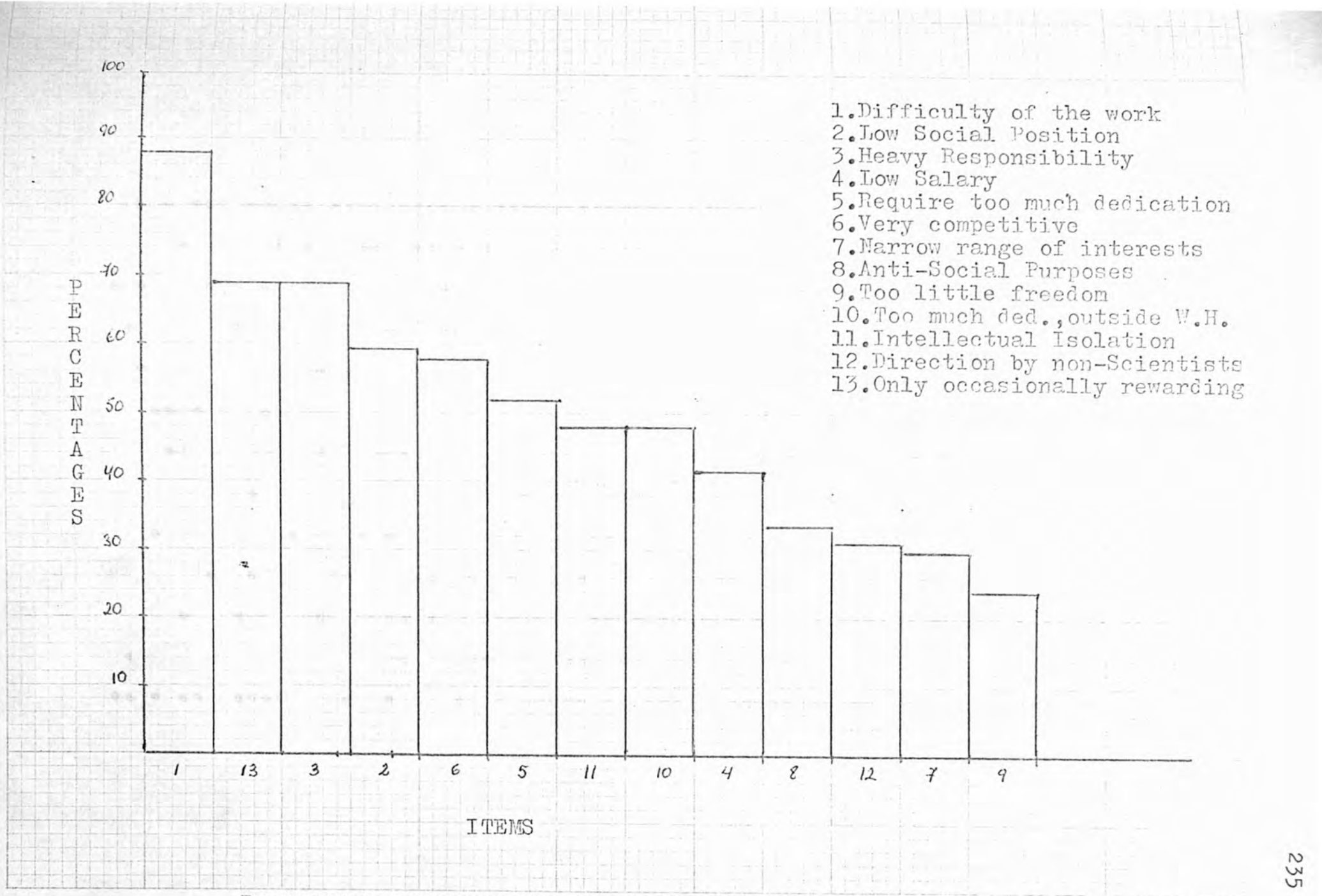
FACTOR	Raw Score Form C	Raw Score Form D	Raw Score Total	Standard Score	LOW SCORE DESCRIPTION	HIGH SCORE DESCRIPTION
A					RESERVED, DETACHED, CRITICAL, COOL (Sizothymia)	OUTGOING, WARMHEARTED, EASY-GOING, PARTICIPATING (Affectothymia, formerly cyclothymia)
B					LESS INTELLIGENT, CONCRETE-THINKING (Lower scholastic mental capacity)	MORE INTELLIGENT, ABSTRACT-THINKING, BRIGHT (Higher scholastic mental capacity)
C					AFFECTED BY FEELINGS, EMOTIONALLY LESS STABLE, EASILY UPSET (Lower ego strength)	EMOTIONALLY STABLE, FACES REALITY, CALM, MATURE (Higher ego strength)
E					HUMBLE, MILD, ACCOMMODATING, CONFORMING (Submissiveness)	ASSERTIVE, INDEPENDENT, AGGRESSIVE, STUBBORN (Dominance)
F					SOBER, PRUDENT, SERIOUS, TACITURN (Desurgency)	HAPPY-GO-LUCKY, IMPULSIVELY LIVELY, GAY, ENTHUSIASTIC (Surgency)
G					EXPEDIENT, EVADES RULES, FEELS FEW OBLIGATIONS (Weaker superego strength)	CONSCIENTIOUS, PERSEVERING, STAID, RULE-BOUND (Stronger superego strength)
H					SHY, RESTRAINED, DIFFIDENT, TIMID (Threctia)	VENTURESOME, SOCIALLY BOLD, UNINHIBITED, SPONTANEOUS (Parmia)
I					TOUGH-MINDED, SELF-RELIANT, REALISTIC, NO-NONSENSE (Harria)	TENDER-MINDED, DEPENDENT, OVER-PROTECTED, SENSITIVE (Premsia)
L					TRUSTING, ADAPTABLE, FREE OF JEALOUSY, EASY TO GET ON WITH (Alaxia)	SUSPICIOUS, SELF-OPINIONATED, HARD TO FOOL (Protension)
M					PRACTICAL, CAREFUL, CONVENTIONAL, REGULATED BY EXTERNAL REALITIES, PROPER (Praxernia)	IMAGINATIVE, WRAPPED UP IN INNER URGENCIES, CARELESS OF PRACTICAL MATTERS, BOHEMIAN (Autia)
N					FORTHRIGHT, NATURAL, ARTLESS, SENTIMENTAL (Artlessness)	SHREWD, CALCULATING, WORLDLY, PENETRATING (Shrewdness)
O					PLACID, SELF-ASSURED, CONFIDENT, SERENE (Untroubled adequacy)	APPREHENSIVE, WORRYING, DEPRESSIVE, TROUBLED (Guilt proneness)
Q_1					CONSERVATIVE, RESPECTING ESTABLISHED IDEAS, TOLERANT OF TRADITIONAL DIFFICULTIES (Conservatism)	EXPERIMENTING, CRITICAL, LIBERAL, ANALYTICAL, FREE-THINKING (Radicalism)
Q_2					GROUP-DEPENDENT, A "JOINER" AND SOUND FOLLOWER (Group adherence)	SELF-SUFFICIENT, PREFERS OWN DECISIONS, RESOURCEFUL (Self-sufficiency)
Q_3					UNDISCIPLINED SELF-CONFLICT, FOLLOWS OWN URGES, CARELESS OF PROTOCOL (Low integration)	CONTROLLED, SOCIALLY-PRECISE, FOLLOWING SELF-IMAGE (High self-concept control)
Q_4					RELAXED, TRANQUIL, TORPID, UNFRUSTRATED (Low ergic tension)	TENSE, FRUSTRATED, DRIVEN, OVERWROUGHT (High ergic tension)

STANDARD TEN SCORE (STEN)



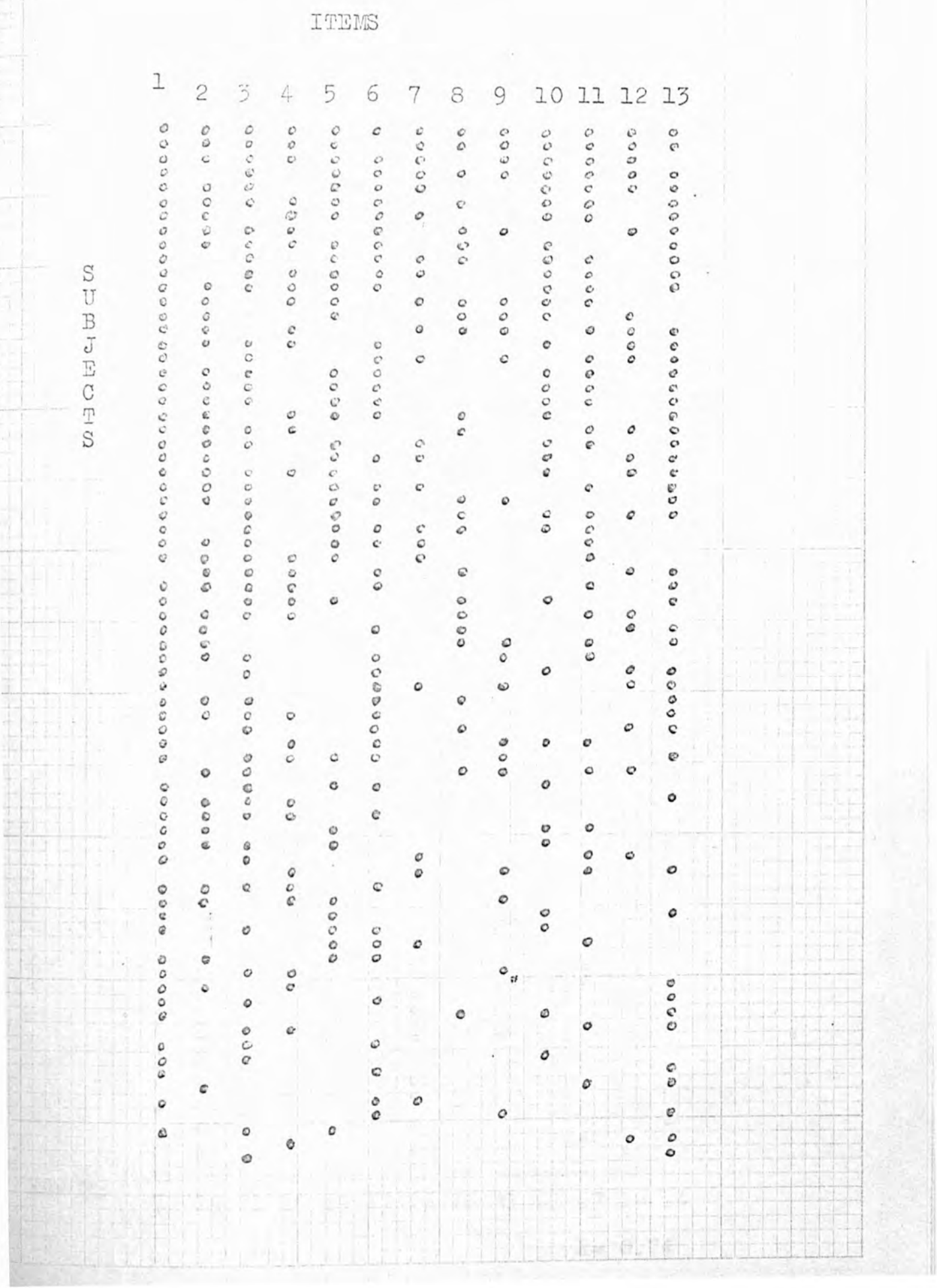
A sten of	1	2	3	4	5	6	7	8	9	10	is obtained
by about	2.3%	4.4%	9.2%	15.0%	19.1%	19.1%	15.0%	9.2%	4.4%	2.3%	of adults

16PF-CDp-7AA

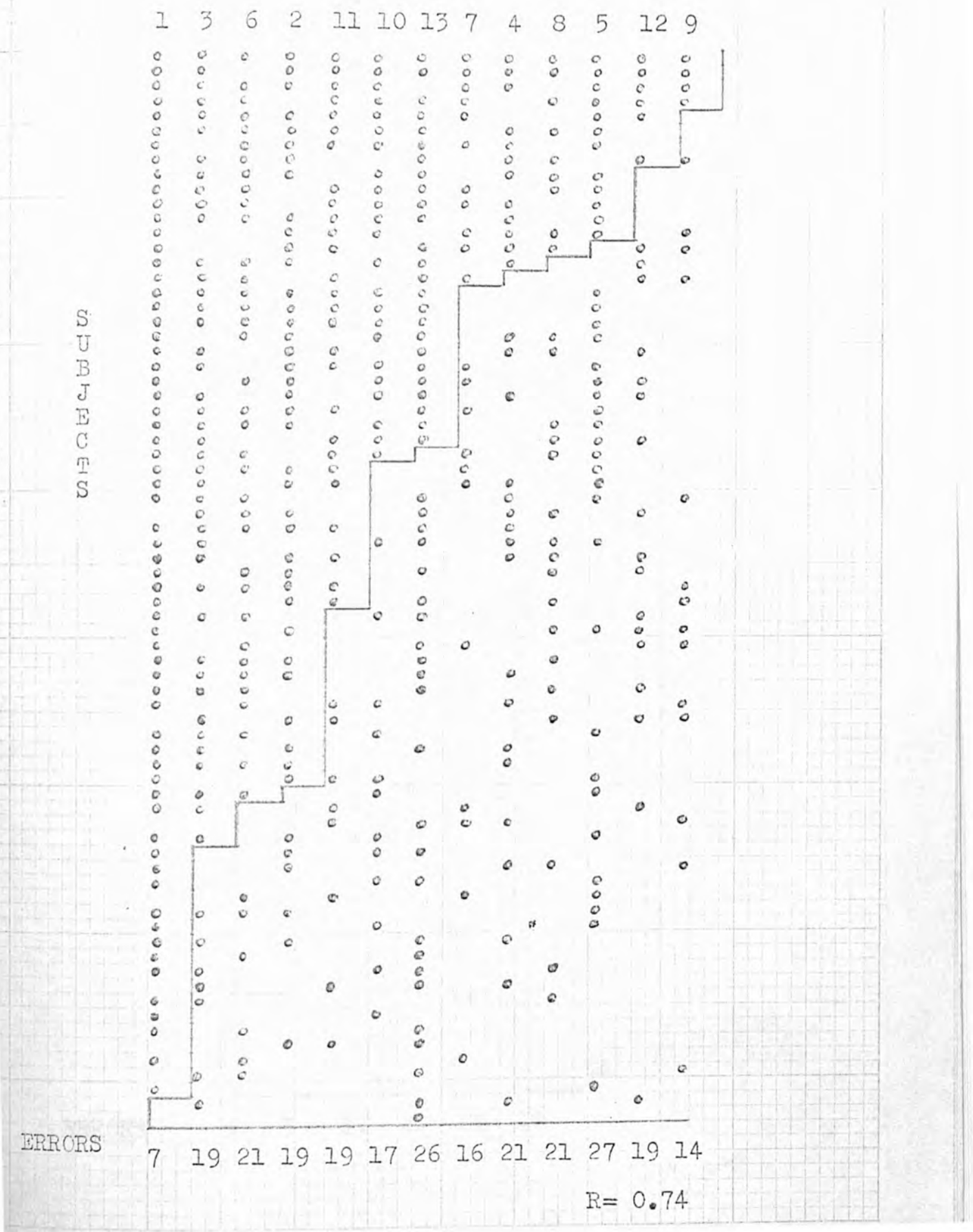


PERCENTAGE DISTRIBUTION OF REPLIES ON "JOB DISADVANTAGES" TO BE FACED

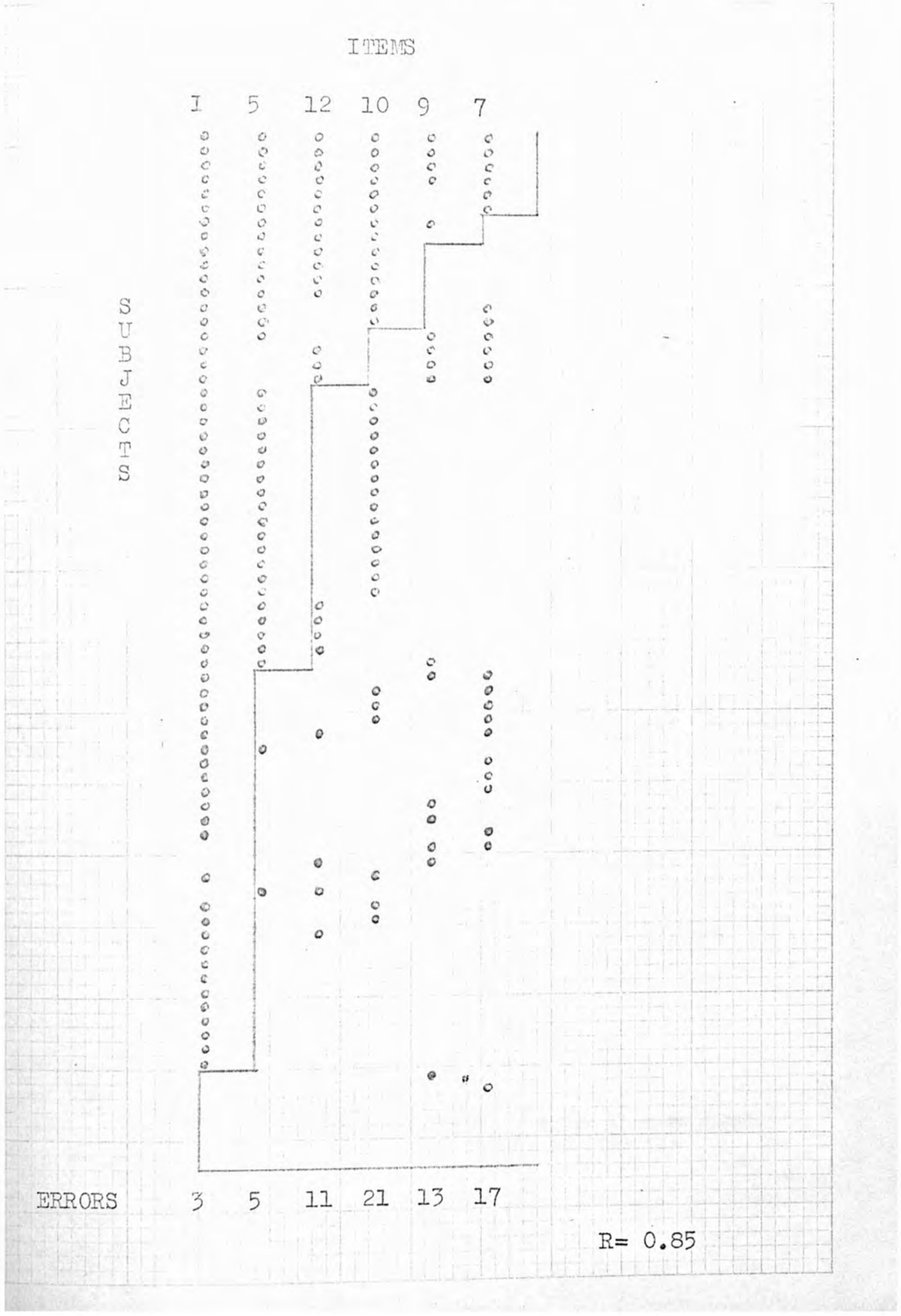
SCALOGRAM ANALYSIS ON 13"JOB DISADVANTAGES"
INITIAL ARRANGEMENT



SCALOGRAM ANALYSIS ON "13 JOB DISADVANTAGES"
FINAL ARRANGEMENT



SCALOGRAM ANALYSIS ON 6 "JOB DISADVANTAGES"
FINAL ARRANGEMENT



APPENDICES

APPENDIX 3

THE OCCUPATIONAL PREF. QUEST.

NAME:_____

SEX:_____ AGE:_____

COLLEGE:_____

DEPARTMENT:_____

YEAR:_____

DATE:_____

This is a short questionnaire concerned with the views you may have about possible future professional activities.

There are no "right" and "wrong" answers - it is simply a matter of your interests and preferences. To make the results as useful as possible, please answer the questions frankly and say as honestly as you can what is true of you. Don't just reply with what seems "the right thing to say."

_____

1. Have you decided what kind of work you will take up when you have finished your first degree?

   YES:_____ NO:_____

2. If you answer is NO, go to question number four (4). If your answer is YES, please indicate here the work you have in mind.

_____

3. Please write the three (3) main reasons that have influenced you in this choice. (Write them in order of importance, the most important on line 1.)

1._____

2._____

3._____

4. Supposing you could be in any of the following occupations, which would you prefer? Please rank them from 1 (most liked), 2 (next best).....and so on to 10 (least liked).

_____ Science teacher at school (Here there is rarely any opportunity for research work.)

_____ Industrial Management (In this work directicontact with your major subject may be rare.)

_____ Lecturer in a University (In this post it is important to conduct and direct research work, as well as to teach.)

_____ Research Worker in Industry (Depending on the size and nature of the industrial firm, this may cover far sighted basic investigations or day to day ad hoc problems, or a mixture of these.)

_____ Sales Executive (Dealing with sales of a firm's products at home and abroad.)

_____ Routine process control in Industry (Involving no research work but carrying out tests to maintain quality control.
For Biolchemists:
Routine Testing Work in Hospitals (Control tests carried out on speciments of body fluids and tissues.)

_____ Lecturer in a Technical College (Here the research may be subservient to teaching.)

_____ Research worker in a "Research Association" (This involves full time research work in fields which may vary from basic scientific problems to practical factory problems.)

_____ Adminstrative work (not necessarily concerned with your major subject.)

_____ Research worker at a Government or Semi Government Establishment (National Physical or National Chemical Laboratories, Atomic Energy Establishments, etc. Also engaged in a mixture of fundamental and ad hoc problems.

5. What are the three (3) main reasons that have influenced you in preferring the occupation you ranked as number 1 in question 4?
Write them in order of importance from 1 to 3.

1. _____

_____

2. _____

_____

3. _____

_____

6. What are the three (3) main reasons that have influenced you in deciding which occupation to rank as number ten (least liked) in question number 4? Write them in order of importance from 1 to 3.

1. _____

_____

2. _____

_____

3. _____

_____

7. Please put a mark on that point of the line you consider best shows your feelings about each of the following occupations:

If your position is neutral or indifferent, mark as follows:

	Strong Like	Strong Dislike
er Science teach/at School		
Industrial Management		
Lecturer in a University		
Research worker in Industry		
Sales Executive		
Routine process control in Industry For Bioch. Routine testing work in hospitals		
Lecturer in a Technical College		
Research worker in a "Research Association"		
Administrative work		
Research worker at a Government or Semi Government Establishment		

8. Some research posts are thought to have one or more of the following disadvantages:

_____ Difficulty of the work _____

_____ low social position _____

_____ heavy responsibility _____

_____ low salary _____

_____ require too much dedication _____

_____ very competitive _____

_____ narrow one's range of interest too much _____

_____ results may be exploited for antisocial purposes _____

_____ too little freedom to pursue one's own ideas _____

_____ require too much dedication, even outside working hours _____

_____ Intellectual isolation, except from few specialists _____

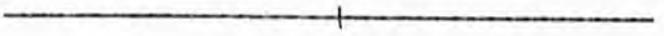
_____ too much direction by non-scientists _____

_____ only occasionally rewarding _____

A. In the left hand column, please rank these"disadvantages" from 1 (most serious) to 13 (least serious) from your point of view.

B. Please put X in the right hand column beside those "disadvantages" you would be prepared to face in order to have a career involving a substantial amount of research work. If you Don't want such a career please leave the right hand column blank.

9. Please use the line below as if it were an unmarked scale, the ends representing strong like and strong dislike, the midpoint indifference. Put a mark on the line at any point which indicates the distance of your feelings about each of the following activities, from either of the two extremes. Example of a neutral position:



	Strong Like	Strong Dislike
To conduct classes in one or more subjects, preparing and delivering lectures to students		
To deal with office procedures such as filing systems, administration, internal communication and so forth		
To search into a matter closely and carefully, to make inquiry directed to the discovery of the principles and facts of a subject		
To take conclusions drawn by research and act on them, finding the ways in which they can be turned to practical advantage		
To call at factories and industrial plants, and on engineers, architects and other professional and technical workers attempting to convince prospective customers of the desirability of purchasing from you		
To design the form of a variety of products taking into consideration costs, utility and specifications stipulated by individuals for whom the designs are being made		

NAME:_____

APPENDIX 4

PILOT STUDY ON THE QUESTIONNAIRE

An initial list of 11 "disadvantages" was elaborated from various sources, mainly from previous studies on the social image of the scientist:

- Mead, M. and Metraux (1957)
- Beardslee and O'Dowd (1961)

As the subjects for these studies were from American High Schools and Colleges we considered it was necessary to conduct a pilot study on the list of disadvantages (question 8) with British College students.

Question 8 in its initial form (See Appendix 4A) consisted of a list of 11 disadvantages which each subject was asked to rank from the most serious to the least serious. In addition to this, each subject was asked to include some "Disadvantages" he considered were missing.

The aim of this pilot study was to take out any "disadvantages" that appeared consistently as least serious and to add any important statements which were missing according to these students.

The initial form was given to 18 Sociology students and 20 Biochemistry students. As a result of the pilot study some statements had to be re-worded, for example "isolation from members of the Institution", due to the confusing meaning it had for the subjects.

An analysis was carried out of the "disadvantages" which subjects had suggested as missing from the given list, trying to group them according to common meaning, and to include in a new list, a statement

representing each group.

The final list which is included in the Questionnaire, consisted of 13 "disadvantages" which the subjects were asked to rank and they were also asked to tick those "disadvantages" they would be prepared to face in order to have a career involving a substantial amount of research work, with the underlying assumption that high motivation towards research would be related to high number of "disadvantages" to be faced.

APPENDIX 4 A

NAME:_____
COURSE:_____
YEAR:_____
DATE:_____

Some research posts are thought to have one or more of the following "disadvantages" :

____ Low salary
____ Difficult work
____ Low social position
____ Isolation from members of the institution
____ Heavy responsibility
____ Only occasionally rewarding
____ Requires too much dedication
____ Very competitive
____ Narrow one's range of interest too much
____ Results may be exploited for anti-social purposes
____ Involve too much personal danger

_____
_____
_____
_____

A.In the left hand column please rank these "disadvantages" from 1 (most serious) to 11 (least serious), from your point of view

B.Please write on the last lines some disadvantages that you consider are missing in the list.

APPENDIX 5

CONTENT ANALYSIS ON QUESTIONS 3, 5 & 6 OF THE OCCUPATIONAL PREFERENCES QUESTIONNAIRE

Questions 3, 5 & 6 of the Occupational Preferences Questionnaire dealt with the reasonsthat students had for liking and for disliking occupations. As has been pointed out before these were open-ended questions. The answers were content analysed with the aim of establishing some general and reliable categories of response, into which one could include the subjects' answers.

The first way in which the answers were analysed was according to the two general categories of "Intrinsic and Extrinsic Motivations" (Herzberg et al, 1959).

A list of all the responses to questions 3, 5 & 6 from the first 50 Questionnaires that were returned, was done, which included a total of 401 "reasons" to analyse.

Two independent judges were given the list of "reasons" with the following instructions: "read carefully the list of statements and try to place each of them in either of these two categories: Intrinsic or Extrinsic. In the first page you will find a brief explanation of what intrinsic and extrinsic refer to. If you consider that a statement belongs to the Intrinsic category please write number 1 beside it. On the other hand, if you think it belongs to the extrinsic category, please write a number 2."

The explanation that was given to the judges about the terms intrinsic and extrinsix was as follows:

- Intrinsic refers to recognition, achievement, the work itself, advancement and responsibility.
- Extrinsic refers to salary, technical competence, interpersonal relations, working conditions and company policies (Herzberg et al, 1959).

An analysis of the agreements between the two judges was carried out and the results are reported here.

AGREEMENTS BETWEEN TWO JUDGES (A & B)

	No. of Agreements	Times Used by Judge A	%	Times Used by Judge B	%
INTRINSIC	85	259	32.8	121	70.2
EXTRINSIC	104	139	74.8	280	37.1
	189	398	47.4	401	47.1

The results indicate a low level of agreement between the two judges in the classification of the "reasons" according to the Intrinsic and Extrinsic criterion.

The second form of analysis was carried out by two independent judges with the following instructions: "read carefully all these statements and try to classify them into groups which have common characteristics. Identify each statement of a group by the same number, then try to give a name or label to each of the groups or categories which you have found.

The list of Categories obtained from judge A was as follows:

- Interesting-Boring
- Salary-Prospects-Promotion-Demand of the Post
- Contact or Relation with Degree Subject
- Meeting People-Working with People
- Travelling
- Useful Results-Practical Application of Knowledge
- Self-Assessment of Personal Characteristics
- Use of Imagination or Creative Abilities-Challenging
- Opportunity of Independent Work
- Facilities for Work-Environmental Conditions-Equipment
- Social Status
- Varied Work-Monotonous

Judge C elaborated the following list of categories:

- Ambition (Status)-Lack of
- Money/Lack of
- Demanding (Challenge/Not
- Constructive (Useful)/Not
- Satisfaction (Rewarding)/Not
- Interesting (Stimulating)/Not
- Variety-Routine
- Freedom/Lack of
- Security/Lack of
- Ability/Inability

A list of 12 categories of response was elaborated taking into account the great overlap between the lists of categories elaborated by these two independent judges.

The 12 categories of the final list were as follows:

1. - Interesting-Boring
2. - Salary-Prospects-Promotion
3. - Contact or Relation with Degree Subject
4. - Meeting People-Working with People
5. - Travelling
6. - Useful results-Practical Application of Knowledge Helping Others
7. - Self Assessment of Personal Characteristics
8. - Use of Imagination or Creative Abilities-Challenge
9. - Opportunity of Independent Work
10. - Facilities for Work-Environmental Conditions-Equipment
11. - Social Status
12. - Varied-Monotonous

Once this list of 12 categories was elaborated the next step was to try to classify the 401 statements or "reasons" according to these categories.

Two independent judges carried out this task, with the following instructions:

"Read carefully all these statements and this list of categories. As you see, each category has a number. Your task is to try to place each statement within one of the categories, hence, you would write beside each statement a number which corresponds to the category to

which the statement belongs."

An analysis of the agreements between the two judges was carried out. An agreement is defined as that instance in which a statement is classified in the same category by both judges.

The results are reported here and indicate a high level of agreement between both judges, hence, the 12 categories presented above seem to be reliable and useful for purposes of the scoring of questions 3, 5 and 6 of the Occupational Preferences Questionnaire.

The final scoring of questions 3, 5 and 6 of the Questionnaire was carried out by the Researcher, using the 12 categories of response.

Examples of Typical Responses which fall in each of the 12 categories will be given below:

1 - Interesting-Boring:

"It's Something New and Interesting"

"Interesting Work"

2 - Salary:

"Reasonable Salary"

"High Salaries"

3 - Contact with Degree Subject:

"Away from Actual Contact with Science"

"Does not Seem to have Connection with Biochemistry"

4 - Meeting People-Working with People

"Opportunities to Meet a Large Variety of People"

"I prefer to Work with a Group of People"

5 - Travelling

"Too much travelling at Irregular Times"

"I do not like Too Much Travel Abroad"

6.- Useful Results:

"Actually Seeing Useful Results from What One is Doing"

"The Results Seem Useful"

7 - Self-Assessment of Personal Characterstics:

"I haven't Enough Personality to Sell Products"

"It seems best Suited to my Capabilities and Personality"

8 - Use of Imagination:

"The Chance of Creativity in a Field which I Believe In"

9 - Opportunity of Independent Work:

"Can be Own Boss to a Greater Extent"

"The Feeling that I was Always Checked Upon"

10 - Facilities for Work:

"Not Many Facilities for Research"

"The Facilities for Research Would Be the Best"

11 - Social Status:

"Higher Soci al Level"

"The Status is Low"

12 - Varied-Monotonous

"Wide Variety of Work"

"The Job Offers a Great Variety in One's Work"

Name of Category	No. of Agreements	Times Used by Judge A	%	Times Used by Judge D	%
1 Interesting-Boring	44	62	70.9	64	68.7
2 Salary-Prospects	51	53	96.2	63	80.9
3 Contact with Degree Subjects	18	28	64.2	18	100.0
4 Meeting People	17	23	73.9	22	77.2
5 Travelling	17	18	94.4	20	85.0
6 Useful Results	25	31	80.6	37	67.5
7 Self-Assessment of Personal Characteristics	27	37	72.9	36	75.0
8 Use of Imagination	13	22	59.0	37	35.1
9 Independent Work	9	18	50.0	15	60.0
10 Working Facilities	7	14	50.0	14	50.0
11 Social Status	8	9	88.8	9	80.8
12 Varied-Monotonous	30	37	81.0	47	63.8
	266	352	73.5	382	71.0

APPENDIX 6-A

PILOT STUDY ON THE CONFORMITY TEST

An experiment was conducted in order to see if conforming responses could be induced in the context of an experimental situation. The stimuli used were variations of the Muller-Lyer Illusions, and the social pressure was a fictitious majority group opinion. The subjects were asked to judge 20 pairs of lines, which were on 15 x 15 CM cards and to choose the shorter of each pair. They performed this task under three different situations:

Situation A: In this situation the subjects were not under group pressure, and this was the control standard situation. They received the following instructions:

"Your task here is to look carefully at each pair of lines and to choose the one you consider shorter. If you consider line A as the shorter, you will make a circle around letter A, and if you consider B as the shorter you will make a circle around letter B" (See Appendix 6-C)

Situation B: In this situation subjects were given a fictitious group opinion as to which was the shorter line of each pair. This experimental variable was introduced in order to elicit conforming opinions.

We will define a conformity opinion as the response which involves a change of opinion from the initial individual judgement (Sit.A) towards the group opinion.

The fictitious group opinion was in some items in accordance with the real length of the lines and in other cases the group opinion was

intended to produce a conflict with real perception.

The subjects were given the following instructions:

"Your task here is to look carefully at each pair of lines and to choose the one you consider shorter. If you consider Line A as the shorter you will make a circle around letter A and if you consider B as the shorter you will make a circle around letter B.

You will find a yellow circle around the letter corresponding to the shorter line, as judged by a group of students of the University of London." (See Appendix 6-D)

Situation C: The subjects judged the shorter line of each of the 20 pairs of lines under the influence of the fictitious group opinion, but the difference from situation B was that after each judgement the experimenter gave a mark of correct or incorrect to the answer.

The "correct answer" would be if the subject had given as the shorter line, the same that the group had. This situation was supposed to reinforce conforming opinions, by rewarding with good marks those answers that were in accordance to the group opinion.

The instructions were: "Your task here is to look carefully at each pair of lines and to choose the one you consider shorter. If you consider A as the shorter you will make a circle around letter A, and if you consider B as the shorter you will make a circle around letter B. You will find a yellow circle around the letter corresponding to the shorter line, as judged by a group of students of the University of London. This time after each answer I will correct it." (See Appendix 6-E)

In general there was little tendency to conform to the fictitious group opinion, although some conforming opinions did appear. Situation C had a larger effect on producing conformity responses. (See Appendix 6-B)

As a result of this experiment the procedure of exerting group pressure seemed satisfactory and it was decided to use it in further experiments. However it seemed that the stimuli (Muller-Lyer Illusions) were not adequate for this kind of experiment. When the size difference between the two lines was very evident, it was very difficult to elicit a change of opinion on the subject, such as those conformity responses found by Asch (1951) and Crutchfield (1955).

Furthermore, when the two lines were very similar in size, the subjects tried to give their judgement trying not to be "deceived" by the illusion effect. Evidence of these facts was obtained from comments the subjects made after the testing.

Having in mind all these difficulties it was decided to work with a more ambiguous stimulus, though still with perceptual material.

APPENDIX 6-B

PERCENTAGES OF CONFORMITY RESPONSES ON PILOT STUDY

	Situation B	Situation C
S1	0%	20%
S2	0%	20%
S3	5%	5%

APPENDIX 6-C

PILOT WORK ON THE CONFORMITY TEST

Age_____ Sex _____

Date_____

INSTRUCTIONS:

Your task here is to look carefully at each pair of lines and to choose the one you consider shorter.

If you consider line A as the shorter you will make a circle around letter A, and if you consider B as the shorter you will make a circle around the letter B.

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

ANSWER SHEET 1

APPENDIX 6 -D

PILOT WORK ON THE CONFORMITY TEST

Age_____ Sex_____

Date_____

INSTRUCTIONS:

Your task here is to look carefully at each pair of lines and to choose the one you consider shorter.

If you consider line A as the shorter you will make a circle around letter A, and if you consider B as the shorter you will make a circle around the letter B.

You will find a yellow circle around the letter corresponding to the shorter line judged by a group of students of the University of London.

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

ANSWER SHEET 2

APPENDIX 6-E

PILOT WORK ON THE CONFORMITY TEST

Age_____ Sex_____

Date_____

INSTRUCTIONS:

Your task here is to look carefully at each pair of lines and to choose the one you consider shorter.

If you consider line A as the shorter you will make a circle around letter A, and if you consider B as the shorter you will make a circle around the letter B.

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

ANSWER SHEET 3

APPENDIX 7

EXPERIMENT OF THE VALIDITY OF THE CONFORMITY TEST

An experiment was conducted in order to test the effectiveness of the group pressure (fictitious group opinion) on producing conformity responses in the conformity test.

A control group was used in order "to show us what would have happened to the experimental group if it had not been subjected to the experimental variable". (Oppenheim, 1966)

In the control situation the subjects received the "Perception Scale" for two consecutive times, however they were not given the fictitious norms which made up the "group pressure" under which the test was administered on the second time to the experimental group.

The control group was formed by 10 subjects which were tested in 2 groups of 5; and the experimental group were the 51 subjects who were tested as part of the main project.

The testing procedure was that presented in Section 3.6. (Page 112)

A percentage Index of changes of response from the first set of answers to the second was done for both control and experimental groups, and a statistical T-Test was used to test the differences between the mean of changes of the groups. (See Table over page)

The results show that there were significant differences at the .01 level between the percentage of change of response of the control and experimental groups.

This result indicates that the group pressure (fictitious group

opinion) was effective in producing conformity responses.

RESULTS

Control Group			Experimental Group			T	Probability Level
X_1	S_1	N_1	X_2	S_2	N_2		
14.3	9.7	10	38.6	24.1	51	3.21	$P < .01$

APPENDIX 8

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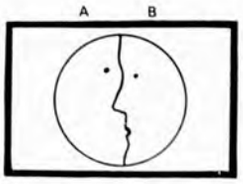

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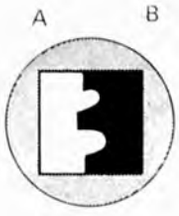

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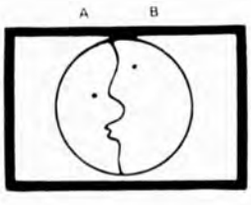

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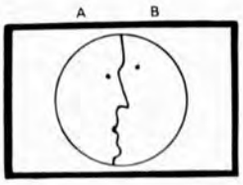

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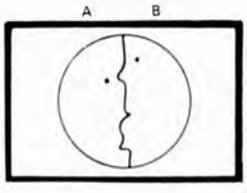

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APPENDIX 9

Name:_____

Sex:_____Age:_____

College:_____

Date:_____

PERCEPTION SCALE:

This is an experiment to see how accurate is your perception of figures. You will be shown designs very rapidly and you are to mark on this form which part of the design (A or B) looks like figure rather than like the background. A figure usually looks as though it is in front of the background, also a figure seems to have a definite shape while the background does not.

Now look at the first design and write which part A or B looks as a figure.

1. A B

2. A B

3. A B

4. A B

5. A B

6. A B

7. A B

8. A B

9. A B

10. A B

11. A B

12 A B

APPENDIX 10

Name: _____

Sex: _____ Age: _____

College: _____

Date: _____

PERCEPTION SCALE: II

In the second part of the perception scale you will see each of the 12 designs again, but this time you will find on this form, a circle around that side (A or B) of the design that has been chosen consistently by a large sample of students who have taken part in this experiment.

It is possible that this may help you in perceiving the correct side of the design.

1.	A	(B)
2.	(A)	B
3.	(A)	B
4.	A	(B)
5.	A	(B)
6.	(A)	B
7.	(A)	B
8.	(A)	B
9.	A	(B)
10.	A	(B)
11.	A	(B)
12.	(A)	B

APPENDIX 11

EXPERIMENT ON THE EFFECTS OF THE SIZE OF THE GROUP ON THE RESULTS OF THE CONFORMITY TEST

An experiment was carried out to explore the effects of the size of the group on the conformity test.

We were interested in knowing if the size of the group in which an individual took the conformity test had any particular effects on his conformity score. This seemed important if we take into account that the groups involved in the testing sessions for the main project were of various sizes.

The experiment included 4 types of situation:

- Individual (N=6)
- Dyads (N=4)
- Groups of 4 persons (N=8)
- Groups of 6 persons (N=6)

The Testing procedure was that presented in Section 3.6 (Page 112).

A conformity score was calculated for each subject as explained in the same section.

An analysis of variance was performed (See Table on next page) which indicated that there were no significant differences among the conformity scores on the 4 types of situations. This leads us to conclude that the size of the group does not have any effect on the conformity test.

EFFECTS OF THE SIZE OF THE GROUP ON THE CONFORMITY TEST

ANALYSIS OF VARIANCE

Individual	Dyads	Groups of 4	Groups of 6
44.4	63.3	50.0	0
50.0	40.0	57.1	20.0
25.0	100.0	20.0	100.0
85.7	50.0	33.3	25.0
16.6		0	20.0
42.8		12.5	20.0
		33.3	
		57.1	
$\bar{x}$ 44.0	63.3	32.9	30.8

	Sum SQ	Degrees of Freedom	Var.
Bet.	3180.7	3	1060.23
Within	14204.3	20	710.21
Total	17385.0	23	

$F = 1.492$

APPENDIX 12

Department of Psychology
Bedford College

I am carrying out some research on the attitudes and personality of people who want to undertake scientific research as a career, and I should be very grateful for your help. Your cooperation will be equally valuable whether or not you yourself want a research career.

Although the broad results will be reported to you and others interested, the individual results will be kept strictly confidential.

In addition to the questionnaire I enclose, I hope you will be kind enough to spare time for some further tests and scales which are essential for the research. They require altogether two sessions of 65 minutes each. If you can give me this time I shall be very grateful.

The times I suggest are 5 - 6 p.m. on

November: 27 - 28 - 29 - 30.

December: 1 - 4 - 5 - 6 - 8 - 9 - 11 - 12 - 13

Please initial on the form below the times you can manage. The tests will take place in Room 125 Tuke Building, First Floor, near entrance to Tuke Hall Gallery.
There will be notices showing the way.

Yours sincerely,

Mrs. Yolanda Añez.

APPENDIX 13

Department of Psychology
Bedford College

I am very grateful for your reply to the questionnaire I sent you last term, on your views about future professional activities, and I am very interested in having your results on some tests and scales which are essential for the research.

I hope you will be kind enough to spare time for the two testing sessions which will require 60 minutes each.

The _____ testing session will take place at_____

on_____in _____

_____

If you can give me this time I shall be very grateful.

Yours sincerely,

Mrs. Yolanda Añez

APPENDIX 14

Department of Psychology
Bedford College

I am carrying out some research on the attitudes and personality of people who want to undertake scientific research as a career, and I should be very grateful for your help.

Your cooperation will be equally valuable whether or not you yourself want a research career.

Although the broad results will be reported to you and others interested, the individual results will be kept strictly confidential.

I hope you will be kind enough to spare time for some tests and scales which are essential for the research. They require altogether two sessions of 60 minutes each. If you can give me this time I shall be very grateful.

The times I suggest are 5 - 6 p.m. on:

February 13-14-16-20-21-22-23-26-27-28-29

March 1 - 4 - 5 - 6

Please initial on the form below the times you can manage and please return it as soon as possible (Via pigeon hole). The tests will take place in Room 125 - Tuke Building, First Floor, near entrance to Tuke Hall Gallery.

I am sorry to take so much of your time, but in Psychological research we just can't manage without people's cooperation.

Yours sincerely,

Mrs. Yolanda Añez.

Atlas Computing Service

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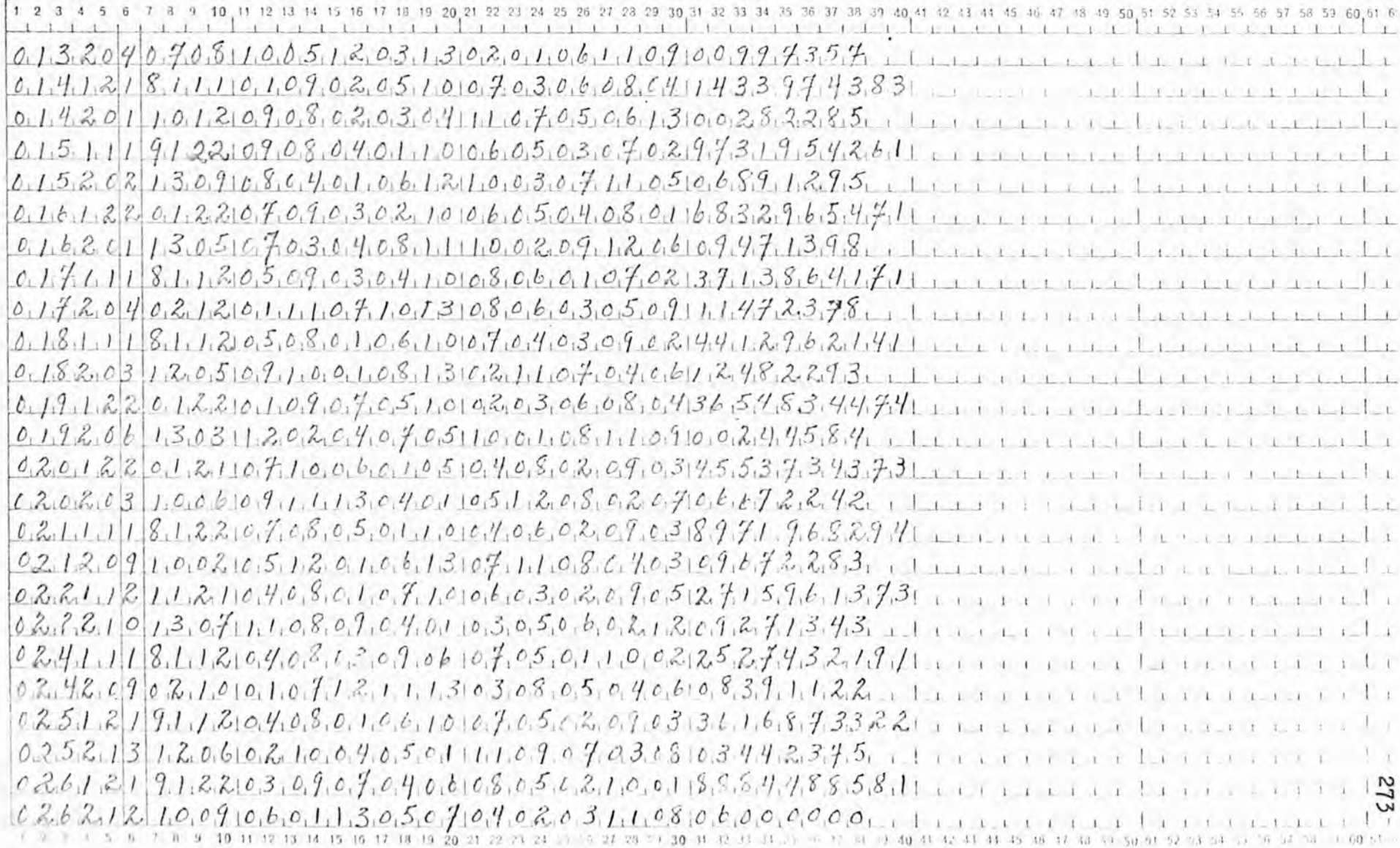

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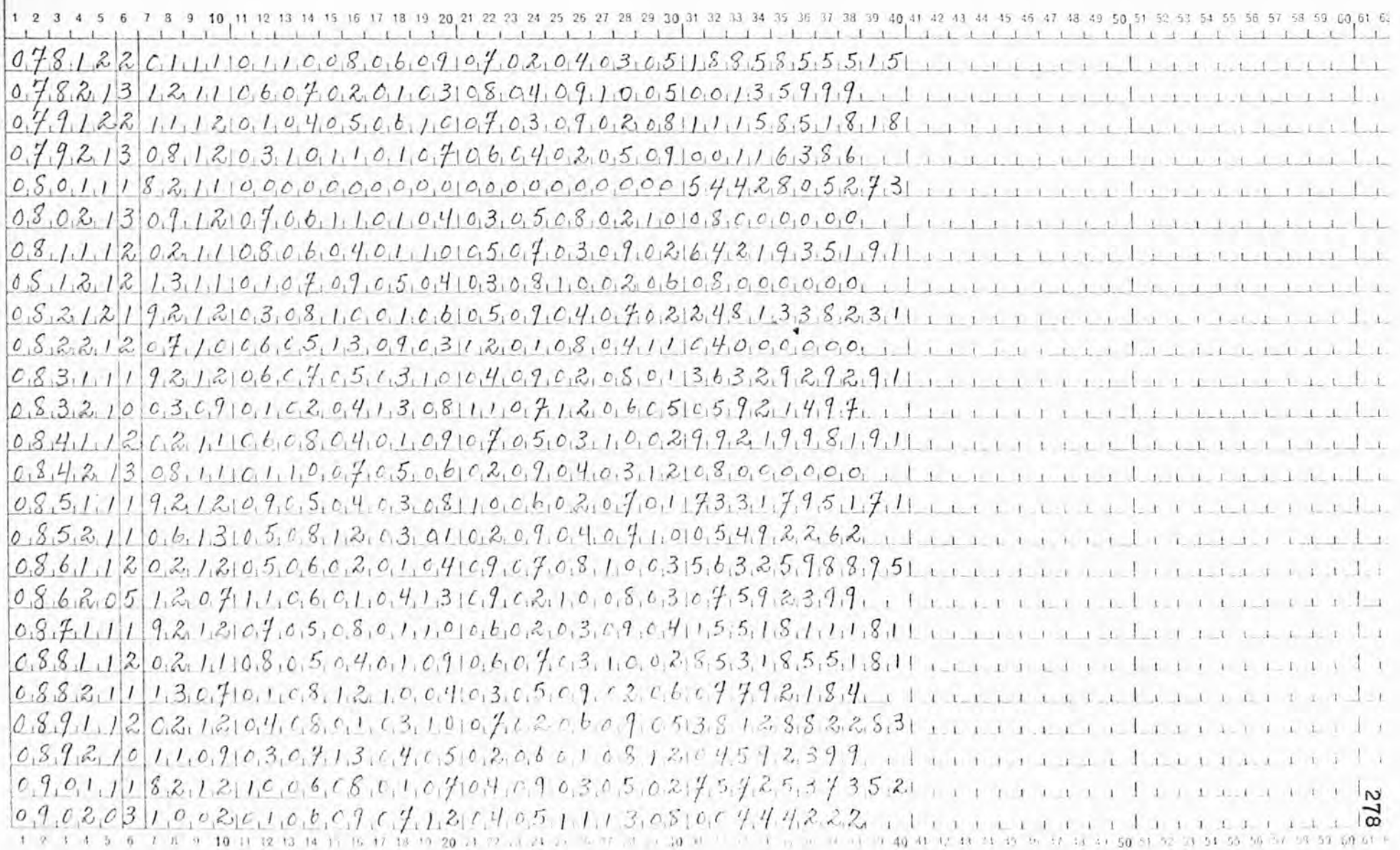

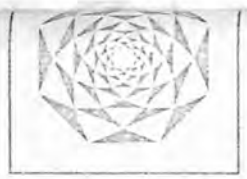

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05430402020304020402060401010404040100000033383782237360.069.220.099.99
05530505060805030305030703040608080119264504260170948520.080.060.040.00
05630403010603020301030403030104020319214068440965653555.010.080.080.00
```

APPENDIX 16

CODING FRAME FOR THE MAIN 74 VARIABLES OF THE STUDY

Column Number	Variable Number	Variable Name
1 - 3		Case Number
4		Card Number
5	1	Sex (1= Male; 2= Female)
6 - 7	2	Age
8	3	COLLEGE (1= Bedford; 2= Chelsea)
9	4	COURSE (1= Chemistry; 2= Physics)
10	5	Answer to "Have you decided what kind of work you will take up when you have finished your first degree?" (Yes=1, No=2, No Answer=3)
11 -12	6	Ranking of "Science teacher at School"
13 -14	7	Ranking of "Industrial Management"
15 -16	8	Ranking of "Lecturer in a University"
17 -18	9	Ranking of "Research Worker in Industry"
19 -20	10	Ranking of "Sales Executive"
21 -22	11	Ranking of "Routine Process Control in Industry"
23 -24	12	Ranking of "Lecturer in a Technical College"
25 -26	13	Ranking of "Research Worker in a Research Association"
27 -28	14	Ranking of "Administrative Work"
29 -30	15	Ranking of "Research Worker at a Governmental Establishment"
31	16	Rating of "Science Teacher at School"

32	17	Rating of "Industrial Management"
33	18	Rating of "Lecturer in a University"
34	19	Rating of "Research Worker in Industry"
35	20	Rating of "Sales Executive"
36	21	Rating of "Routine Process Control in Industry"
37	22	Rating of "Lecturer in a Technical College"
38	23	Rating of "Research Worker in a Research Association"
39	24	Rating of "Administrative Work"
40	25	Rating of "Research Worker at a Government Establishment"

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5 - 6	26	Ranking of "Difficulty of the Work" as a job disadvantage
7 - 8	27	Ranking of "Low Social Position" as a job disadvantage
9 - 10	28	Ranking of "Heavy Responsibility" as a job disadvantage
11 - 12	29	Ranking of "Low Salary" as a job disadvantage
13 - 14	30	Ranking of "Requires too much dedication" as a job disadvantage
15 - 16	31	Ranking of "Very Competitive" as a job disadvantage
17 - 18	32	Ranking of "Narrows one's Range of Interest too Much" as a job disadvantage
19 - 20	33	Ranking of "Results may be exploited for antisocial purposes" as a job disadvantage
21 - 22	34	Ranking of "Too Little Freedom to Pursue One's Own Ideas" as a job disadvantage
23 - 24	35	Ranking of "Requires Too Much Dedication, Even Outside Working Hours" as a job disadvantage
25 - 26	36	Ranking of "Intellectual Isolation, Except from Few Specialists" as a job disadvantage

27 - 28	37	Ranking of "Too Much Direction by Non-Scientists" as a job disadvantage
29 - 30	38	Ranking of "Occasionally Rewarding" as a job disadvantage
31 - 32	39	Number of "Job Disadvantages" to be faced
33	40	Rating of "Teaching"
34	41	Rating of "Administration"
35	42	Rating of "Pure Research"
36	43	Rating of "Applied Research"
37	44	Rating of "Sales"
38	45	Rating of "Development"

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5 - 6	46	16 P.F. Factor A - Reserved-outgoing
7 - 8	47	16 P.F. Factor B - Less Intelligent-More Intelligent
9 - 10	48	16 P.F. Factor C - Affected by Feelings-Emotionally Stable
11 - 12	49	16 P.F. Factor E - Humble-Assertive
13 - 14	50	16 P.F. Factor F - Sober-Happy-go-lucky
15 - 16	51	16 P.F. Factor G - Expedient-Conscientious
17 - 18	52	16 P.F. Factor H - Shy-Venturesome
19 - 20	53	16 P.F. Factor I - Tough-minded - tender-minded
21 - 22	54	16 P.F. Factor L - Trusting-Suspicious
23 - 24	55	16 P.F. Factor M - Practical-Imaginative
25 - 26	56	16 P.F. Factor N - Forthright-Shrewd
27 - 28	57	16 P.F. Factor O - Placid-Apprehensive
29 - 30	58	16 P.F. Factor Q1 - Conservative-Experimenting
31 - 32	59	16 P.F. Factor Q2 - Group Dependent-Self Sufficient

33 - 34	60	16 P.F. Factor Q3 - Undisciplined Self-Conflict - Controlled
35 - 36	61	16 P.F. Factor Q4 - Relaxed-Tense
37 - 38	62	Intelligence Score on Part I - AH5
39 - 40	63	Intelligence Score on Part II - AH5
41 - 42	64	Intelligence Score on Total - AH5
43 - 44	65	Score on the "Support" Value
45 - 46	66	Score on the "Conformity" Value
47 - 48	67	Score on the "Recognition" Value
49 - 50	68	Score on the "Independence" Value
51 - 52	69	Score on the "Benevolence"Value
53 - 54	70	Score on the "Leadership" Value
55 - 56	71	Score on the "Self-Orientation" Scale
57 - 58	72	Score on the "Interaction-Orientation" Scale
59 - 60	73	Score on the "Task-Orientation" Scale
61 - 62	74	Score on the "Conformity" Test

The
ORIENTATION INVENTORY

by

Bernard M. Bass, Ph. D.

DIRECTIONS

This test consists of 27 statements of opinions and attitudes. For each statement please indicate in the answer blocks which of the three alternatives, A, B, or C, is *most* true, or *most* preferred, or *most* important to you by writing A, B, or C in the *MOST* column.

Then choose the *least* true or *least* preferred of the three alternatives and write its letter in the *LEAST* column.

For every statement, be sure you mark one alternative in each column. If A is entered under *Most*, then either B or C should be marked under *Least*, and so on.

Do not debate too long over any one statement; your first reaction is desired.

TURN THE SHEET OVER AND BEGIN

(Do not unfold)

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Page 1 | Page 2 ← Page 2

Page 1 MOST	Page 1 LEAST	Page 2 MOST	Page 2 LEAST	
☐	☐	☐	☐	14. I like: A Being appreciated by others. B Being satisfied personally with my performance. C Being with friends with whom I can have a good time.
☐	☐	☐	☐	15. I would like to see a story about myself in the newspaper: A Describing a project I had completed. B Citing the value of my actions. C Announcing my election to a fraternal organization.
☐	☐	☐	☐	16. I learn best when my instructor: A Provides me with individual attention. B Stimulates me into working harder by arousing my curiosity. C Makes it easy to discuss matters with him and with others.
☐	☐	☐	☐	17. Nothing is worse than: A Having your self-esteem damaged. B Failure on an important task. C Losing your friends.
☐	☐	☐	☐	18. I like: A Personal praise. B Cooperative effort. C Wisdom.
☐	☐	☐	☐	19. I am considerably disturbed by: A Hostile arguments. B Rigidity and refusal to see the value of new ways. C Persons who degrade themselves.
☐	☐	☐	☐	20. I would like to: A Be accepted as a friend by others. B Help others complete a mutual task. C Be admired by others.
☐	☐	☐	☐	21. I like a leader who: A Gets the job done. B Makes himself respected by his followers. C Makes himself easy to talk to.
☐	☐	☐	☐	22. I would like to: A Have a committee meeting to decide what the problem is. B Work out by myself the correct solution to the problem. C Be valued by my boss.
☐	☐	☐	☐	23. Which type of book would you like to read? A A book on getting along with people. B An historical romance. C A how-to-do-it book.
☐	☐	☐	☐	24. Which would you prefer? A Teach pupils how to play the violin. B Play violin solos in concerts. C Write violin concertos.
☐	☐	☐	☐	25. Which leisure time activity is satisfying to you? A Watching westerns on TV. B Chatting with acquaintances. C Keeping busy with interesting hobbies.
☐	☐	☐	☐	26. Which would you prefer, assuming the same amount of money was involved? A Plan a successful contest. B Win a contest. C Advertise the contest and get others to participate.
☐	☐	☐	☐	27. Which is important to you? A To know what you want to do. B To know how to do what you want. C To know how to help others to do what they want.

Be sure to write your name and supply the other information requested in the space provided above.

Name (Please Print):

_____,
Last

_____
First *Initial*

_____ *Circle Sex:* M F
Age

6 7 8 9 10 11 12 13 14 15 16
Circle Highest School Grade Completed

Current Job:

_____
(If a student, major field of study)

(DO NOT WRITE BELOW THIS LINE)

	M	L				
s	____	− ____	= ____	+ 27	=	____
i	____	− ____	= ____	+ 27	=	____
t	____	− ____	= ____	+ 27	=	____

Standard Scores or Percentiles:
(Circle One)

s _____
i _____
t _____

Page 1

MOST LEAST

BEGIN HERE

1. One of the greatest satisfactions in life is:
   - **A Recognition for your efforts.**
   - **B The feeling of a job well done.**
   - **C The fun of being with friends.**

2. If I played football, I would like to be:
   - **A The coach whose planning pays off in victory.**
   - **B The star quarterback.**
   - **C Elected captain of the team.**

3. The best instructors are those who:
   - **A Give you individual help and seem interested in you.**
   - **B Make a field of study interesting, so you will want to know more about it.**
   - **C Make the class a friendly group where you feel free to express an opinion.**

4. Students downgrade instructors who:
   - **A Are sarcastic and seem to take a dislike to certain people.**
   - **B Make everyone compete with each other.**
   - **C Simply can't get an idea across and don't seem interested in their subject.**

5. I like my friends to:
   - **A Want to help others whenever possible.**
   - **B Be loyal at all times.**
   - **C Be intelligent and interested in a number of things.**

6. My best friends:
   - **A Are easy to get along with.**
   - **B Know more than I do.**
   - **C Are loyal to me.**

7. I would like to be known as:
   - **A A successful person.**
   - **B An efficient person.**
   - **C A friendly person.**

8. If I had my choice, I would like to be:
   - **A A research scientist.**
   - **B A good salesman.**
   - **C A test pilot.**

9. As a youngster I enjoyed:
   - **A Just being with the gang.**
   - **B The feeling of accomplishment I had after I did something well.**
   - **C Being praised for some achievement.**

10. Schools could do a better job if they:
    - **A Taught children to follow through on a job.**
    - **B Encouraged independence and ability in children.**
    - **C Put less emphasis on competition and more on getting along with others.**

11. The trouble with organizations like the Army or Navy is:
    - **A The rank system is undemocratic.**
    - **B The individual gets lost in the organization.**
    - **C You can never get anything done with all the red tape.**

12. If I had more time, I would like to:
    - **A Make more friends.**
    - **B Work at my hobby or learning something new and interesting.**
    - **C Just take it easy, without any pressure.**

13. I think I do my best when:
    - **A I work with a group of people who are congenial.**
    - **B I have a job that is in my line.**
    - **C My efforts are rewarded.**

Open this flap and continue with question 14.

Be sure

	S	C	R	I	B	L
RAW SCORE						
PERCENTILE	%	%	%	%	%	%
NORM GROUP						

Name_____ Grade or Occupation_____ School or Firm_____ Age_____ Sex_____ Date_____ Marital Status_____

SURVEY OF INTERPERSONAL VALUES

By LEONARD V. GORDON

DIRECTIONS

In this booklet are statements representing things that people consider to be important to their way of life. These statements are grouped into sets of three. This is what you are asked to do:

Examine each set. Within each set, find the **one statement** of the three which represents what you consider to be **most important** to you. Blacken the space beside that statement in the column headed M (for **most).**

Next, examine the remaining two statements in the set. Decide which **one** of these statements represents what you consider to be **least important** to you. Blacken the space beside that statement in the column headed L (for **least).**

For every set you will mark **one statement** as representing what is **most important** to you, **one statement** as representing what is **least important** to you, and you will leave **one statement unmarked.**

Example

	M	L
To have a hot meal at noon	:::::	▬
To get a good night's sleep	:::::	:::::
To get plenty of fresh air	▬	:::::

Suppose that you have examined the three statements in the example, and although all three of the statements may represent things that are important to you, you feel that "To get plenty of fresh air" is the **most important** to you. You would blacken the space in the column headed M (for **most)** beside the statement. Notice that this has been done in the example.

You would then examine the remaining two statements to decide which of these represents something that is **least important** to you. Suppose that "To have a hot meal at noon" is the **least important** to you. You would blacken the space in the column headed L (for **least)** next to this statement. Notice that this has been done in the example.

You would leave the remaining statement unmarked.

In some cases it may be difficult to decide which statement to mark. Make the best decision that you can. This is not a test; there are no right or wrong answers. Be sure to mark **only one M (most)** choice and **only one L (least)** choice in a set. Do not skip any sets. Answer every set. Turn this booklet over and begin.

SRA Science Research Associates, Inc.
259 East Erie Street, Chicago, Illinois 60611

A Subsidiary of IBM

Mark your answers in column B → B A

	B M	B L	A M	A L
To be a person of influence				
To be treated with kindness				
To always maintain the highest moral standards				
	M	L	M	L
To be praised by other people				
To be relatively unbound by social conventions				
To work for the good of society				
	M	L	M	L
To have the affection of other people				
To do things in the approved manner				
To go around doing favors for other people				
	M	L	M	L
To be allowed to do whatever I want to do				
To be regarded as the leader				
To do what is socially correct				
	M	L	M	L
To have others approve of what I do				
To make decisions for the group				
To share my belongings with other people				
	M	L	M	L
To be free to come and go as I want to				
To help the poor and needy				
To show respect to my superiors				
	M	L	M	L
To be given compliments by other people				
To be in a very responsible position				
To do what is considered conventional				
	M	L	M	L
To be in charge of a group of people				
To make all of my own decisions				
To receive encouragement from others				
	M	L	M	L
To be looked up to by other people				
To be quick in accepting others as friends				
To direct others in their work				
	M	L	M	L
To be generous toward other people				
To be my own boss				
To have understanding friends				
	M	L	M	L
To be selected for a leadership position				
To be treated as a person of some importance				
To have things pretty much my own way				
	M	L	M	L
To have other people interested in me				
To have proper and correct social manners				
To be sympathetic with those who are in trouble				
	M	L	M	L
To be very popular with other people				
To be free from having to obey rules				
To be in a position to tell others what to do				
	M	L	M	L
To always do what is morally right				
To go out of my way to help others				
To have people willing to offer me a helping hand				
	M	L	M	L
To have people admire me				
To always do the approved thing				
To be able to leave things lying around if I wish				

S	C	R	I	B	L	√

Mark your answers in column A ⟶ A

	M	L
To be free to do as I choose	:::::	:::::
To have others agree with me	:::::	:::::
To make friends with the unfortunate	:::::	:::::
	M	L
To be in a position of not having to follow orders	:::::	:::::
To follow rules and regulations closely	:::::	:::::
To have people notice what I do	:::::	:::::
	M	L
To hold an important job or office	:::::	:::::
To treat everyone with extreme kindness	:::::	:::::
To do what is accepted and proper	:::::	:::::
	M	L
To have people think of me as being important	:::::	:::::
To have complete personal freedom	:::::	:::::
To know that people are on my side	:::::	:::::
	M	L
To follow social standards of conduct	:::::	:::::
To have people interested in my well being	:::::	:::::
To take the lead in making group decisions	:::::	:::::
	M	L
To be able to do pretty much as I please	:::::	:::::
To be in charge of some important project	:::::	:::::
To work for the good of other people	:::::	:::::
	M	L
To associate with people who are well known	:::::	:::::
To attend strictly to the business at hand	:::::	:::::
To have a great deal of influence	:::::	:::::
	M	L
To be known by name to a great many people	:::::	:::::
To do things for other people	:::::	:::::
To work on my own without direction	:::::	:::::
	M	L
To follow a strict code of conduct	:::::	:::::
To be in a position of authority	:::::	:::::
To have people around who will encourage me	:::::	:::::
	M	L
To be friends with the friendless	:::::	:::::
To have people do good turns for me	:::::	:::::
To be known by people who are important	:::::	:::::
	M	L
To be the one who is in charge	:::::	:::::
To conform strictly to the rules	:::::	:::::
To have others show me that they like me	:::::	:::::
	M	L
To be able to live my life exactly as I wish	:::::	:::::
To do my duty	:::::	:::::
To have others treat me with understanding	:::::	:::::
	M	L
To be the leader of the group I'm in	:::::	:::::
To have people admire what I do	:::::	:::::
To be independent in my work	:::::	:::::
	M	L
To have people act considerately toward me	:::::	:::::
To have other people work under my direction	:::::	:::::
To spend my time doing things for others	:::::	:::::
	M	L
To be able to lead my own life	:::::	:::::
To contribute a great deal to charity	:::::	:::::
To have people make favorable remarks about me	:::::	:::::

B	L	√

Turn the page and go on.