THE RELATIONSHIP BETWEEN PERSONALITY CHARACTERISTICS AND JOB SATISFACTION OF SELECTED COMPUTER PROGRAMMERS

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The data processing industry suffers from a shortage of programmers and an alarming turnover rate. In a speech to the 1980 Data Training Conference, Ebert predicted "a 40% shortfall of programmers by 1985, even though some 300,000 will be in existence" (Ebert, p. 1). He also noted that there is a 34% average industry turnover rate. His findings are somewhat supported by a recent national survey which reported an annual turnover rate of 25.1 percent (Green, 1980) and a survey which reported a turnover rate of 28 percent (McLaughlin, 1979). Carlyle (1981) concurred with this prediction, noting that the expected length of service for a programmer is 18 months. He also noted that because it takes several months to train new employees before they begin to be productive, a considerable investment is lost if they leave in 18 months.

Woodhouse (1979), researching the impact of turnover on effectiveness, also observed that turnover has a negative impact on effectiveness. In his opinion, turnover reduces effectiveness which in turn leads to a decrease in productivity. This observation was supported by Ebert (1982) who stated:

> Turnover, once it becomes a factor in an organization, also can have a multiplying effect. Consider the effects upon the employees of an organization beset by high turnover--having to "double up on jobs," tightening up schedules, having vacations cancelled--in other words, working under added pressure (p. 6).

In 1979, the Diebold Group, Inc. researched the rewards of increased productivity and its effect on the business sector (Ranftl, 1979). The Diebold report discussed a study conducted in 1973 by Hughes Aircraft Company to identify techniques to increase productivity in technology-based organizations. The study found that superior productivity and skilled management cannot be separated. The study stated that "tomorrow's manager--in addition to being technically qualified--must be a respected, people-oriented leader skilled in the latest techniques of behavioral science and sound business practice" (p. 59). The group further recommended that management make a genuine effort to understand subordinates to ensure that people were optimally matched to the jobs for which they were best suited.

Argyris (1971) maintained that employees who desire jobs which include some challenge, control, and decision-making will feel frustrated if their desires are not met. He further speculated that they might adapt to the frustration by such activities as "apathy, indifference, work slow downs, goldbricking, the creation of unions, absenteeism, and turnover" (p. 276).

Barton and Cattell (1972) conducted research concerning the problem of whether personality characteristics are useful predictors of promotion and turnover. Their findings indicated those who are promoted are more warm-hearted, tend to be group dependent rather than self-sufficient, and are more dominant. Their findings also revealed that those individuals who are more practical and down-to-earth change jobs less often and have a higher chance of promotion. The authors concluded that a knowledge of a client's personality could aid counselors in suggesting what variables might be determiners of job promotion and turnover.

According to Patterson (1981), management must provide tasks and settings that will help workers maintain a positive attitude resulting in a positive behavior or action. This attitude was also held by Andrew (1978, p. 360) who said, "The way people view a situation is strongly influenced by their attitude, the mental position or emotional feeling with which they approach a fact or set of conditions." He further observed that managers might be able to increase their understanding of workers' attitudes by developing a knowledge of worker personality characteristics. In Patterson's opinion, the need structure of the programmer should be examined frequently for management to be effective. He stated that "the profile of the programmer/analyst is changing with an increasing number of people entering the lower-skilled positions of the data processing profession" (p. 25) from varied backgrounds.

In the data processing area it has been recommended that research be conducted in the area of personality. Mayer and Stalnaker (1970) identified five areas in which research is needed: effective evaluation procedures, stratification of skills, new observational techniques (especially into the personality characteristics), the role of creativity, and training. According to Cross (1971), there are three reasons for conducting research of personality factors:

1. The growing interest in the area of job satisfaction which may be better measured by personality and interest tests than by aptitude tests.

2. The belief that motivation does affect performance so personality and interest measures may be useful predictors of performance.

3. The ability to use personality and interest measures to supplement other tests such as aptitude tests.

The continuing research into the personality characteristics and job satisfaction of data processing professionals will enable managers to

gain a clearer understanding of their personnel and to use this knowledge to increase worker satisfaction, thus possibly increasing worker productivity and decreasing turnover.

Statement of the Problem

The purpose of this study was to identify personality characteristics of selected computer programmers employed by businesses located in Oklahoma and to compare these personality characteristics to the programmers' job satisfaction. Identification of the personality characteristics and job satisfaction was accomplished by an analysis of data received from the Sixteen Personality Factor Questionnaire, the Minnesota Satisfaction Questionnaire, and a demographic information survey mailed to selected Oklahoma programmers. The data collected by the personality and satisfaction instruments and the demographic survey were analyzed using a Statistical Analysis System (SAS) program to measure the strength of the relationship between the personality and satisfaction variables. The Pearson product-moment procedure was employed. The SAS program was also used to analyze the differences among the sample means of the demographic and satisfaction variables employing a series of one-way analysis of variance procedures and the F test for significance.

Specifically, the purposes of this study were:

1. to derive a satisfaction index of computer programmers as compared to the general population,
2. to derive a personality profile of computer programmers as compared to the general population, and
3. to analyze the relationship of personality characteristics and job satisfaction.

A secondary purpose of this study was to analyze the relationship of programmers' job satisfaction according to different environmental

factors including the size of the data processing center, educational background, gender, years of experience, and programming duties (systems or applications programming).

Need for the Study

In the past few years an increasing interest in the concept of a data processing personality has emerged. Many managers and researchers have formed the opinion that computer programmers, as an occupational group, are unusual individuals compared to people who select other careers.

Couger (1978), in his studies dealing with the motivation of data processors, noted that they exhibit unique psychological characteristics that set their motivational needs apart from workers in any other profession. In his book, The Psychology of Computer Programming, Weinberg (1971) noted differences between the computer programmer and so-called "others." Fitz-enz's (1978) study dealing with the data processing professionals' motivation to work showed that, to some degree, these professionals have motivational drives which do not fully correspond to other groups. Faecher (1976, p. 45) concurred with this, stating that "a programmer has traits similar to many professional employees, plus some very unique ones."

The concept of a data processing mentality could have far-reaching implications. In his article entitled "Probing the DP Psyche," Stevens (1980, p. In Depth 25) stated that "if a DP personality does exist and is observable in one form or another in large numbers of DPers, it probably has considerable impact on the industry as a whole." He believed that it could be useful to managers to understand the nature of the data

processing personality. Stevens (p. In Depth 26) cited the use of a "DP Profile" by one manager to "cool emotions, clear the air, and understand the roles that are, or should be played between data processing and its users."

Many experts have become increasingly concerned by the problems currently facing data processing managers. The computer industry is experiencing a high turnover rate as well as a decreased rate of productivity (Ebert, 1980; Couger and Zawacki, 1978). According to Slaughter (1982, p. In Depth 15) writing in Computerworld, "there has never been a more urgent need for a new approach to managing and motivating DP people." In his opinion, the complex work environment and scarce human resources have made old management approaches obsolete. Averch (1982) concurred with this statement; and in his recent article for Computerworld, he noted that the traditional use of financial rewards as a motivator for the emerging group of data processing professionals has not been effective.

Margolis (1979, p. 23) also agreed with this opinion, stating that "people are not satisfied with symbols of conventional success. They want something more". He observed that the new philosophy for success is to spend life in one's own way. As a result, Margolis maintained that there has been "a steady decrease in job satisfaction . . . and an increased desire to work in environments that enhance one's self-esteem" (p. 23).

Fitz-enz (1978) maintained that a basic knowledge of human behavior can assist management in coping with the attitudes, interests, needs, and values of employees. He believed that efficient and effective performance is directly dependent on management's ability to understand and

manage data processors. This opinion was supported by Faecher (1976), who believed that management must look to the nature of the programmer and develop a plan to utilize his/her talent and satisfy his/her needs. He stated that "management's efforts to increase programmer productivity would be maximized if they were to integrate viability and an understanding of these programmer needs with traditional methods and procedures" (p. 45).

The need for a basic understanding of data processing personality characteristics was also considered important by Weinberg (1971). He stated:

> No manager will be successful if he tries to make psychological judgments of people on the basis of external symptoms. But, if he takes these symptoms as indicators to attain further information before taking action--information which can only be obtained, if at all, through the people themselves--his actions are quite likely to be rewarded with success (p. 145).

Because of the complex nature of the programming task, Weinberg (1971, p. 158) believed that "the programmer's personality--his individuality and identity--are far more important factors in his success than is usually recognized."

Weinberg further suggested that it may be possible to select employees whose personalities suit them for programming. In an Infosystem article, Forest (1979) agreed with Weinberg and indicated that while technical skills are important, personality characteristics may be the determining factor between the "good" programmer and the "best" programmer. Mumford (1972, p. 52) supported this suggestion, stating that "at present most selection tests concentrate on identifying logical ability and general intelligence. Yet tests to ascertain whether candidates have the right personality qualities may be equally important".

According to Martin and Saunders (1970) in their study of personality patterns in selected professions, job-essential personality characteristics are as necessary as adequate educational preparation for the job. They stated:

> Often training has been adequate, opportunity has been provided, and the person is only then found to be unfitted for the job by reason of behavior patterns or personality traits which are unsuited to that particular field of endeavor (p. 5).

Not only is it important to determine the personality characteristics of data processing professionals, it is also necessary to identify areas of worker satisfaction and dissatisfaction. According to Lofquist and Dawis (1975), job satisfaction can be expressed in two ways: satisfaction with the job as a whole or satisfaction with particular aspects of the job. They maintained that employers should give attention to worker satisfaction in specific terms and to the restructuring of reinforcer systems for jobs in their organizations.

This importance is also pointed out by Couger and Zawacki (1978, p. 118) who noted that "individuals are seeking a more meaningful experience than just being part of a fast growing profession. The job itself must produce the essential elements of satisfaction".

A 1980 study conducted by International Data Corp's Information Systems Planning Service (ISPS) found that employees and management generally agree that salary is the most important factor in attracting potential employees. However, this importance decreases after a data processor is hired. The researchers reported that data processing professionals are strongly influenced by motivators, satisfiers, and dissatisfiers when considering accepting or remaining with a job. The ISPS study concluded that employers need to pay more attention to

employees' advancement opportunities, work environment, job facilities, and performance recognition.

Mumford (1972) maintained that needs within a work situation should not be viewed as being the same for all people. She noted that "values are not easy to change, and men and women, who have a strong sense of 'right' and 'wrong' may find it difficult to achieve job satisfaction if they have an employer whose values do not coincide with their own on matters which they regard as important" (p. 11). She concluded that in order to keep computer personnel it is important to secure some understanding of the kinds of things they are looking for in work and which a firm needs to provide.

A knowledge of data processing personality characteristics and job satisfaction could enable management to become more effective in dealing with employee motivation and personnel selection. This in turn could lead to a decrease in turnover and an increase in productivity. This study was undertaken to identify personality characteristics and job satisfaction of data processors in selected data processing centers. Data collected by the instruments may be used as a managerial tool to augment an understanding of data processing professionals.

Limitations of the Study

This study was limited to:

1. A survey of systems and applications programmers in Oklahoma businesses that are listed in both the Computer Directories, Inc.--Oklahoma (1981) and the Dun and Bradstreet Million Dollar Directory (1982).

2. Programmers who are engaged in business applications or systems software development.

3. Programmers who have been employed in their present capacity for at least one year.

Definition of Terms

To clarify the interpretation of data, the following terms are defined as used in this study:

Personality--The integration of all of an individual's characteristics into a unique organization that determines, and is modified by, his/her attempts at adaptations to the continually changing environment (Krech, et al., 1969).

Job Satisfaction--The positive orientation of an individual towards the work role which he/she is presently occupying (Vroom, 1964).

Data Processing--The execution of a systematic sequence of operations performed upon data. In this study, it is used synonymously with electronic data processing where data is mainly processed by electronic devices (Silver and Silver, 1981). Common abbreviations are DP and EDP.

Business Applications--The development of software programs (using COBOL, BASIC, or RPG as the primary language) which will be used to maintain the business functions of a company.

Programmer--One who is given an EDP problem (which may be specific or general) and creates a set of instructions to solve it. He/she generally works on all aspects of program production: design, writing (coding), debugging, and final writing (Kraft, 1977). For the purposes of this study, the programmer will have been employed in the current position for at least one year.

Applications Programmer--A person who designs, writes, and tests computer programs for business applications (Rosenberg, 1978).

Systems Programmer--A programmer who plans, generates, maintains, extends, and controls the use of an operating system with the aim of improving the overall productivity (Rosenberg, 1978).

Small Data Processing Center--For the purposes of this study, a data processing center employing fewer than ten programmers.

Medium-Sized Data Processing Center--For the purposes of this study, a data processing center employing at least ten but fewer than 25 programmers.

Large Data Processing Center--For the purposes of this study, a data processing center employing 25 or more programmers.

CHAPTER II

REVIEW OF RELATED LITERATURE

This study concerns the relationship between personality characteristics and job satisfaction of computer programmers. The following areas of research and literature were surveyed: (1) personality attributes of computer programmers; (2) job satisfaction and related personality research of computer programmers; (3) the Sixteen Personality Factor Questionnaire (16 PF); and (4) the Minnesota Satisfaction Questionnaire (MSQ).

Personality Attributes of Computer Programmers

A review of the literature concerning personality characteristics of computer programmers reveals that a considerable amount of research has conducted in the area.

Weinberg (1971) stated that a knowledge of personality attributes associated with the occupation of programming could be useful in selecting those people whose personalities suit them for programming. He maintained that personality is reflected in the manner in which programmers approach the tasks and the products that result from their labors.

Weinberg also speculated that the following characteristics might be necessary to be a good programmer:

1. the ability to tolerate stress,
2. the adaptability to rapid change,
3. neatness,

4. the ability to accept fallibility,
5. assertiveness, and
6. the ability to laugh at oneself.

In his opinion, it might be possible to isolate critical personality factors and associate them with the performance of particular programming tasks.

Brandon (1970) described the programmer as excessively independent, sometimes to the point of mild paranoia. He further claimed that the programmer is "often egocentric, slightly neurotic, and . . . borders upon a limited schizophrenia" (p. 9). However, the studies of Guarino (1969), Willoughby (1972), and Barnes (1975) contradicted this description.

Guarino's study showed that data processors have certain personality variables which distinguish them from people in other professions; however, there is no evidence of abnormality. Guarino also concluded that good performers have these traits:

> Succorance - tend not to need help from others
> Abasement - have a very low susceptibility to be influenced by opinions of others
> Order - like things to be orderly
> Achievement - like to see milestones tick off rapidly
> Dominance - like to be the dominant person in the situation
> Autonomy - do not like to be overruled (p. 974).

Willoughby's findings supported the view that data processors have different needs and interests than other professionals. Programmers have high needs for Ability Utilization, Achievement, Advancement, Compensation, Creativity, and Recognition along with a low need for Independence. This low need for Independence contradicted the findings of Guarino and Barnes. Because the variation in responses to the questionnaire was large, Willoughby also concluded that individual differences need to be considered. He suggested that while some members

of the occupation might be paranoid or schizoid, the large majority are not. He further speculated that younger data processors have different needs than their supervisors, and this different value system could account for the view that programmers are paranoid.

Barnes conducted research to ascertain if there are personality characteristics which tend to be common to computer programmers. She observed that, as a group, programmers indicate no pathological tendencies. From the results of her research, Barnes concluded (1975, p. 129) that programmers "might be described as quiet, reserved, independent, confident, introverted, logical, and analytical."

To provide a measure of factors related to success, Sprecher (1980) analyzed programmers and analysts employed in Fortune 500 companies. Sprecher used six of the 16 PF scales from the Sixteen Personality Factor Questionnaire, the Ghiselli Initiative Scale, and the Barron Symbol Equivalents Test. The results indicated that both "successful" and "other" respondents categorized themselves as getting much satisfaction from their work. According to Sprecher (1980):

> The highly successful individual has more initiative, is self assured and independent minded, works well with others and has a higher than average intelligence. Since the Other group also had intelligence scores as high as the Top group, this seems to be more of a prerequisite to success than a correlate (p. 39).

The study concluded that personality, initiative, and biographic factors represent major differences between highly successful and other programmers and analysts.

In his study of behavioral styles of computer programmers, Cross (1971) found the traits measured by four scales of the Job Analysis and Interest Measurement (JAIM) were useful for characterizing computer programmers. A relatively consistent image of the computer programmer

emerged from his studies. Based on his research, Cross observed that the programmer might be

> . . . a loner, an individual who wants to avoid confrontation, who wants to avoid being directed, is willing to do without much social interaction on his job, does not have an interest in social service, and just in general has no apparent desire to enter into the aggressive, competitive, confrontation-laden situation that is associated with line managerships (p. 197).

Cross further noted that programmers are motivated primarily by achievement rather than external reward, status, or approval of others. His implication was that data processors might not make good managers, and that "it may be preferable to utilize their skills in the consultative rather than a directive capacity" (1970, p. 84).

In his opinion, this portrayal of the computer programmer could be used in the personnel placement process by identifying attributes to be sought in the applicant and by making the placement process a cooperative venture where the individual could be advised of the personality attributes elicited by the job.

In 1972, Morris and Wise conducted a study of personality characteristics of Australian programmers and systems analysts. Their overall interpretation was that programmers and analysts tend to be poised and self-confident in personal and social interaction; to be motivated under conditions of autonomy and independence; to be flexible and assertive; to be somewhat cynical and concerned with personal satisfaction; to be nonconforming; and not to have a strong regard for ethical and moral issues.

In a Computerworld article, Stevens (1980) observed that it might be possible to determine a general profile for the computer programmer. Based on the observations and notes of an industrial psychologist, he concluded that the computer programmer tends to be more cool and

impersonal than other personnel; very perceptive; more serious and reserved; more persevering; more cautious and hesitant; more pragmatic; unpretentious; more anxious and uncertain; more conservative; and more group-active. Stevens speculated that the rate of information growth, the increasing level of detail, the increase in user confrontation and constant crisis-mode management could combine to "weed out" those who do not like or cannot tolerate the stressful environment. In his opinion, this could be a screening mechanism which creates a clearly identifiable data processing personality.

Robb (1974), in his study of students interested in a career in computer programming, used the Sixteen Personality Factor Questionnaire (16 PF) to determine if any personality factors could be used as predictors of success in an electronic data processing course. He concluded that none of the 16 PF scores can be used singularly as a predictor of success, but when the four variables Relaxed vs. Tense, Practical vs. Imaginative, Tough-minded vs. Tender-minded, and Conservative vs. Experimenting are considered collectively, they are significant predictors.

Woodruff (1977) conducted a research study to determine if there were significant relationships between the personality dimensions that characterized data processing professionals, their job satisfaction, and their job performance. Personality needs were assessed by means of the Personality Research Form, while job satisfaction was assessed by means of the Minnesota Satisfaction Questionnaire. He noted that data processing males and females possess remarkably similar personality needs profiles--high needs for Achievement, Cognitive Structure, Endurance, Harm-Avoidance, and Order. In addition, they possess low needs for

Aggression, Change, Exhibition, Impulsivity, Play, and Social Recognition. He found that job satisfaction and job performance relate significantly as do personality needs and job satisfaction; but job performance and personality needs of data processors are not significantly related.

In Woodruff's opinion, dissatisfaction with advancement and compensation represent very real problems--specifically motivation, turnover, and absenteeism problems. He believed that many data processing personnel feel locked into their present position with little opportunity for promotion. "When individuals hold such attitudes, their participation in the project effort will likely be less than significant" (1979, p. 16).

An investigation of the personality characteristics of computer programmers has shown that programmers tend to have certain personality attributes which distinguish them from people in other professions; however, these attributes have not been used successfully as a predictor of success on the job.

Related Personality Research on Computer Programmers

Although much personality research has been conducted solely based on the personality characteristics of computer programmers, several researchers have investigated the vocational interests and motivational attributes of programmers as well.

According to Simpson (1979), the emphasis in most research to date has been on whether people could do the job rather than on whether they would like to do it. He stated that "the relationship between enjoying a job, and being motivated . . . has been largely ignored" (p. 14).

Yates (1975, p. 88), in his discussion of programmer productivity, stated that programmer productivity can be increased by "changing incentives, providing motivation and developing a supportive organizational structure."

Patterson (1981) maintained that the use of positive motivational techniques is the key to programmers wanting to work harder and, as a result, boost productivity. In his opinion, by studying people's motivational attributes and determining how to shape their attitudes so they can lead a more personally satisfying life, the productivity of their firm can be increased. Patterson stated, "The process of motivating employees may be the least expensive and troublesome method of increasing productivity. Insight and ingenuity are the prime prerequisites for providing motivational opportunities" (p. 25).

Many of Patterson's ideas are based on the extensive research conducted by Couger and Zawacki (1978) on motivation and job enrichment for data processing personnel. As a result of their survey of 6,000 data processors, Couger and Zawacki found that job dissatisfaction resulting from insufficient motivation is a consideration in the high turnover rate. They discarded the idea that salary is at the root of employee turnover and attributed it instead to failure to pay proper attention to "hygienic factors" such as achievement, advancement, and recognition originally suggested by Herzberg (1959). Couger and Zawacki concluded that data processing professionals have some unique differences from the general population. They have a substantially higher growth need strength and the lowest social need strength among professionals. Couger and Zawacki also proposed the use of job matching and job redesign to increase satisfaction and productivity.

In 1978, Fitz-enz compared Herzberg's original findings on motivational factors to those of data processing professionals. He observed that "while data processing professionals display some idiosyncracies, they have much in common with other people" (p. 128). He suggested that in order for management to have motivated employees they must understand and bear with individual needs.

Barnes and Gotterer (1971) conducted a study to determine attributes of computer professionals and to determine their satisfaction on the job. These computer professionals indicated much satisfaction with their current jobs. Those who changed jobs or intended to change jobs indicated dissatisfaction with company policies or management rather than technical problems. According to the researchers, "the environment is at least as much the cause of the change and dissatisfaction as salary or professional considerations" (p. 170).

Tanniru and Taylor (1981) investigated the causes and incidence of turnover reported by a cross-sectional sample of data processing professionals at various stages of their careers. They studied the relationships of four variables--satisfaction with salary, satisfaction with type of work, satisfaction with supervisor, and the reception of unsolicited job offers--to the turnover behavior of data processing professionals. They found that DP professionals' satisfaction with pay and with type of work are both negatively and significantly related to intention to leave. Satisfaction with supervision is not a significant predictor of intention to leave; while unsolicited job offers contribute to turnover only if the DP professional is less committed to the organization.

Mumford (1972) surveyed English programmers and systems analysts to determine their job satisfaction. She discovered that programmers and systems analysts believe it is important to have the right temperament to succeed in data processing. "Temperament defects were seen as more disabling in terms of job success than an absence of problem-solving ability" (p. 51). She found that satisfied programmers were those programmers whose needs for self-development, responsibility, and recognition were being met. She also discovered that the nature of programming and the structure of tasks that comprise work responsibilities are major determinants of job satisfaction.

At the Fourth Annual Computer Personnel Research Conference, Perry and Cannon (1967) reported on a vocational interest scale for computer programmers. They maintained that because it is a relatively new field, data processing does not have the familiarity that many other occupations have. They further pointed out that the existence of a measure which could be used to direct properly qualified persons to the data processing field should be very valuable.

Based on their research, Perry and Cannon found a pattern of job-related interests which distinguished programmers from other professionals. They discovered that computer programmers are in the upper third in most scientific, computational, mechanical, and musical interests but in the middle third in clerical interests. They also noted that programmers are different from other professionals primarily in their interest in problem solving, mathematics, and mechanical pursuits, and their lesser interest in people. The previously mentioned study by Barnes (1975) supported these findings; however, Willoughby's

aforementioned 1972 study reported that data processors are in the middle on all five of these scales.

In 1977, Simpson and NCC (National Computing Center) carried out a survey in England to determine the vocational interests of data processing professionals employed in the computer industry at that time. Their findings confirmed Perry and Cannon's contention that computer programmers dislike jobs relating to people. They also revealed that data processors prefer having a few friends rather than many acquaintances and dislike jobs relating to clerical, religious, sales, and face-to-face public work. They further observed that there are real differences between systems and applications programmers. Based on their findings, they speculated that "it is not necessarily the best programmers who will make good systems analysts" (p. 16).

Mussio and Wahlstrom (1971) determined that certain personality measures significantly contribute to the prediction of performance in computer programming training. This was in contrast to the results obtained by Perry and Cannon (1967) in which only measures of reasoning ability accounted for a significant portion of variance. Mussio and Wahlstrom suggested that because reasoning, interest, and motivation all appear to be important factors as predictors of performance, the consideration of all three factors combined could be useful in personnel selection.

The research conducted in areas related to personality characteristics of computer programmers indicates that a knowledge of motivational attributes and interests can increase productivity. Researchers have suggested that job enrichment could be one method of increasing motivation and thus increasing productivity while decreasing turnover.

The Sixteen Personality Factor Questionnaire

The Sixteen Personality Factor Questionnaire (16 PF) was developed by Dr. Raymond Cattell in 1949 (IPAT Staff, 1979). The test measures 16 major "simple structure" personality traits. A list along with a description of the sixteen personality traits is found in Table I.

TABLE I

PERSONALITY FACTORS MEASURED BY THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

Factor	Low-Score Description	High-Score Description
A	Reserved, detached	Outgoing, warmhearted
B	Dull, low intelligence	Bright, high intelligence
C	Affected by feelings, Easily upset	Emotionally stable, mature
E	Submissive, humble	Assertive, dominant
F	Sober, taciturn	Happy-go-lucky, gay
G	Expedient, disregards rules	Conscientious, persistent
H	Shy, timid	Venturesome, uninhibited
I	Self-reliant, realistic	Sensitive, unrealistic
L	Trusting, accepting conditions	Suspicious, hard to fool
M	Practical, down-to-earth, conventional	Imaginative, absent-minded, unconventional
N	Natural, forthright	Shrewd, calculating
O	Self-assured, confident	Apprehensive, self-reproaching
Q1	Conservative, respecting established ideas	Experimenting, liberal
Q2	Group dependent, a "joiner"	Self-sufficient, resourceful
Q3	Careless of protocol, undisciplined self-conflict	Socially precise, controlled
Q4	Relaxed, tranquil	Tense, frustrated

According to Cattell (1970) in the Handbook of the 16 PF, its design ensures that all behavior patterns or traits universally known as

descriptors of personality are included. Although many personality questionnaires and inventories have been published in the last forty years, only a few of them have been founded on factor-analytic experiments with the simple structure criterion. Because of the extensive factoral analysis, Cattell maintains that the 16 PF consists of scales carefully oriented to basic concepts in human personality structure research.

While critics of the 16 PF (Bloxom, 1978; Walsh, 1978) claim that the instrument has inadequate content sampling and incomplete standardization; proponents of the 16 PF (Bolton, 1978; Karson and O'Dell, 1976) maintain that the 16 PF "compares favorably with any other inventory that purports to measure variations in normal personality functioning" (Bolton, 1978, p. 1080). For the past thirty years, Cattell's 16 factors have been used to measure adult personality comprehensively (16 PF Research Bibliography: 1971-1976). The 16 PF has been used extensively in the development of personality profiles for ethnic groups, occupations, and cultures, as well as in the evaluation of job applicants and in predicting successful attainment in a particular occupation.

Willis (1975), using the 16 PF, found that accountants' job satisfaction and personality traits do not seem to be related. He did, however, observe that individuals who reached the partnership level in accounting have personality characteristics which contribute to their success.

In 1982, Johnson and Dierks used the 16 PF to discover if men and women employed in accounting exhibit the same personality traits. They compared their findings to those of the 1972 Bowlay, Smith, and Cox study

of male accountants as noted in the Handbook for the 16 PF and reported that the male and female accountants appear to be similar.

Holtz (1979) used the 16 PF to survey women administrators in education, business, and government. She noted that women administrators have eleven of the sixteen personality traits in common which distinguish them from the general female population. Women administrators are significantly more intelligent, assertive, venturesome, trusting, imaginative, relaxed, astute, self-assured, controlled, and self-sufficient.

Strizenec (1973) conducted a psychodiagnostic investigation of computer operators and programmers at various Czechoslovakian computer centers and their relation to work efficiency. By using the 16 PF, an intelligence test, and an aptitude test, he discovered that more successful programmers at work possess higher IQs and achieve better results in the aptitude test. They also appear to be more stable, more self-assured, and more realistic.

In 1975, based on his 16 PF research, Fulkerson reported that personality characteristic comparisons are likely predictors of "performance" in an employee relationship and are also related to personnel performance in YMCA employees.

On the same note, Bernardin (1977) concluded that the 16 PF personality characteristics can be used to predict organizational withdrawal of sales people. He observed that employees with high levels of anxiety or low levels of conscientiousness are more likely to terminate employment than others in types of jobs that attract the so-called "job hopper."

As the literature suggests, the Sixteen Personality Factor Questionnaire has been used extensively in industrial settings to determine personality characteristics. This instrument has been shown to

be valid, reliable, and well-documented after many years of use by researchers in the field.

The Minnesota Satisfaction Questionnaire

The Minnesota Satisfaction Questionnaire is an instrument that measures satisfaction with several different aspects of the work environment. The twenty principal scales of the MSQ measure twenty reinforcers in the work environment. An overall measure of general job satisfaction is obtained by summing across all twenty categories. The respondent indicates how satisfied he/she is with the reinforcer on his/her present job. The twenty work reinforcers are listed below with an illustrative defining statement.

1. Ability utilization. The chance to do something that makes use of abilities.
2. Achievement. The feeling of accomplishment obtained from the job.
3. Activity. Being able to keep busy all the time.
4. Advancement. The chances for advancement on the job.
5. Authority. The chance to tell other people what to do.
6. Company policies and practices. The way company policies are put into practice.
7. Compensation. The amount of pay and the amount of work done.
8. Co-workers. The way co-workers get along with each other.
9. Creativity. The chance to try personal methods of doing the job.
10. Independence. The chance to work alone on the job.

11. Moral values. Being able to do things that do not go against the conscience.

12. Recognition. The praise obtained for doing a good job.

13. Responsibility. The freedom to use personal judgment.

14. Security. The way the job provides for steady employment.

15. Social service. The chance to do things for other people.

16. Social status. The chance to be recognized in the community.

17. Supervision--human relations. The way the supervisor handles employees.

18. Supervision--technical. The competence of the supervisor in making decisions.

19. Variety. The chance to do different things from time to time.

20. Working conditions. The physical surroundings.

According to one proponent, "the MSQ gives reasonably reliable, valid, well-normed indications of general satisfaction at work and of 20 aspects of that satisfaction, collapsible into intrinsic and extrinsic components" (Guion, p. 1052). He further maintained that the MSQ appears to be well developed; it can give detailed diagnostics or brief summary statements according to an investigator's needs. Because of this flexibility and reliability, it has been used extensively in business to determine the job satisfaction of employees.

Larouche (1972) investigated the impact of selected biographical factors on workers' job satisfaction using the MSQ. He discovered that age and occupation were the two variables having the most significant impact on the level of job satisfaction. Education and job tenure also had a significant impact on some aspects of job satisfaction.

Wanous (1974) conducted a study of the job satisfaction and performance relationship using the Job Descriptive Index and the Minnesota Satisfaction Questionnaire. The results indicated that there is probably no single "correct" relationship between satisfaction and performance. The data in his research are in general agreement with a "reciprocal causation" view of job satisfaction and performance.

In his study of the relationship between individual differences and preferences for type of work, O'Reilly demonstrated that "personality and work interact and are associated with changes in attitudes and performance in actual on-the-job settings" (1977, p. 43). His findings indicated that individual differences in personality are related in nonrandom ways to the type of job and work attitudes and performance.

The relationship between four goal-setting attributes and job satisfaction were investigated among scientists and engineers at a nuclear research and development center. Using the MSQ, Arvey and Dewhirst (1976) found positive relationships between the goal-setting attributes and satisfaction. The need for achievement, the need for autonomy, and the need for affiliation as measured by the Gough Adjective Checklist were not found to moderate the goal-setting attribute-job satisfaction relationship significantly.

In order to measure the relationship between job satisfaction and termination, Taylor and Weiss (1972) administered the MSQ to a group of employees of a discount store chain at the same time biographical data were collected. After a lapse of one year, personnel records were evaluated. The "leavers"--those employees who had terminated--were significantly less satisfied on ten of the twenty MSQ scales and differed from "stayers" on three of the eleven biographical items. Satisfaction

data alone were the most stable predictors of termination. According to the investigators, "the practical value of the prediction of 'leave' would be in identifying those individuals who might remain on the job if satisfaction could be increased" (p. 131). The results of this study suggested that prediction of job termination from measured job satisfaction is likely to be more fruitful than the use of biographical data. Taylor and Weiss maintained that the use of environmental manipulation could be used to increase job satisfaction in order to maintain low rates of job termination.

The Minnesota Satisfaction Questionnaire has been used in industrial settings to measure the job satisfaction of employees. The MSQ has been shown to be a valid and reliable instrument after many years of use by researchers in the field.

Summary

A review of the related research and literature revealed that most researchers believed a knowledge of personality attributes associated with data processing professionals could be very useful. The research has shown that programmers tend to have certain personality variables which distinguish them from people in other professions. The research surveyed indicated that personality characteristics cannot be used as a predictor of success, although some evidence exists that there is a relationship between personality needs and job satisfaction.

The research on job satisfaction tended to support the idea that satisfaction is related to turnover. There appeared to be some confusion as to the impact of salary on the job satisfaction of programmers. Some researchers suggested that compensation is

significantly related to intention to leave, while other researchers maintained that intention to leave is related to dissatisfaction with company policies or management.

Both the Sixteen Personality Factor Questionnaire and the Minnesota Satisfaction Questionnaire have been used extensively in industrial settings to determine personality characteristics and job satisfaction of employees. The instruments have been shown to be valid, reliable, and well-documented after many years of use by researchers in the field.

CHAPTER III

RESEARCH DESIGN AND PROCEDURES

The following steps were used in researching the problem, planning the study, conducting the survey of computer programmers, and presenting the results of the study on the personality characteristics and job satisfaction of computer programmers:

1. Review of related literature
2. Selection of the research instruments
3. Preparation of the cover letters and follow-up letters
4. Selection of the population
5. Collection of the data
6. Analysis and interpretation of the data
7. Presentation of conclusions and recommendations.

This study was designed to obtain data from computer programmers concerning their personality characteristics and job satisfaction. Data were obtained using two standardized research instruments and a brief demographic information survey. From the data obtained from the returned questionnaires, the programmers' personality characteristics and job satisfaction were were compared. The demographic data were analyzed along with the job satisfaction data to determine if environmental factors have an impact on programmers' job satisfaction. Environmental factors such as age, years of experience, size of the organization,

level of education, area of specialization, and programming duties were were considered in the analysis.

The research design and procedures chapter describes the research design by elaborating on each of the steps used in completing the study.

Survey of Related Literature

The available professional publications and literature dealing with data processing professionals were examined to determine if similar studies had been conducted and to review the literature concerning personality characteristics and job satisfaction of computer programmers as well as acceptable standardized research instruments. Sources used were the Business Index (1970-1983), the Business Education Index (1970-1983), the Comprehensive Dissertation Index (1970-1983), and numerous professional journals. On-line searches of the ERIC data base, the Psychological Abstracts data base, and the ABI Inform business data base were conducted by the Oklahoma State University Library. The researcher examined the literature from the 1970's to the present but was primarily interested in literature published since 1975 because of the rapidly changing technology in the field of data processing.

Selection of the Research Instruments

It seemed desirable to select standardized personality and job satisfaction instruments because of the difficulty in developing a valid and reliable measure of personality attributes. After consultation with an industrial psychology professor at Oklahoma State University and a review of the related literature (especially Buros' Mental Measurements Yearbook), the Cattell Sixteen Personality Factor Questionnaire and the

Minnesota Satisfaction Questionnaire were chosen as appropriate research instruments.

The 16 PF Test is a set of sixteen questionnaire scales. It is designed to make available information about an individual's standing on the majority of primary personality factors. The shorter version of the 16 PF--Form C--was purchased along with answer sheets, supplementary norm tables, and the materials for hand scoring the instruments. Form C contains 105 items written at a sixth-grade reading level and requires an average of 25 to 35 minutes to complete, whereas Form A requires 45 to 60 minutes per form for an average reader. Using the shorter form was an attempt to encourage the respondents to participate in the study.

The Minnesota Satisfaction Questionnaire measures satisfaction with several specific aspects of work and work environments. The long-form MSQ is comprised of 100 items and measures twenty separate work reinforcers as well as the general level of job satisfaction. A completion time of 15 to 20 minutes is required, and the items are written at a fifth-grade reading level. Permission to reproduce the MSQ Long Form in the implementation of this research was obtained from Vocational Psychology Research at the University of Minnesota. (See Appendix A, page 85.)

The demographic information sheet designed to gather data for this study was developed from a study of the literature, a review of similar questionnaires, and consultations with Oklahoma State University faculty members. The questionnaire was revised after consultations with the dissertation adviser, the committee chairperson, and a statistician at Oklahoma State University.

The final questionnaire along with the Minnesota Satisfaction Questionnaire* was printed on 8 1/2 X 11 inch paper, resulting in a two-page questionnaire. In order to improve the readability of the questionnaire, it is presented on five pages instead of two in Appendix B, page 87. This questionnaire, a 16 PF test booklet, and a 16 PF answer sheet comprised the entire research instrument. The questionnaire was unsigned to keep responses confidential; however, an identification number was used for purposes of follow-up by the researcher. Because permission to reproduce the Sixteen Personality Factor Questionnaire could not be obtained, copies of the test booklet and answer sheet are not included in Appendix B, page 88.

The questionnaire was designed in a manner that would facilitate completion by the respondents and tabulation by the researcher. Questions were formulated to be clear and concise, and directions were given at the beginning of each section of the questionnaire. Headings and spacing were utilized to ensure an attractive questionnaire.

Preparation of the Cover Letters and Follow-Up Letters

The initial cover letter was written for the purpose of encouraging those businesses receiving it to participate in the study and to submit a list of their computer programmers. The letter was reproduced on Oklahoma State University, College of Business Administration, stationery and was cosigned by the dissertation adviser, Dr. Richard Aukerman. (See Appendix C, page 94.) An addressed postage-paid return envelope

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along with a postal card was included for the data processing managers to indicate their firms' willingness to send a list of programmers and their desire to obtain a copy of the results. (See Appendix C, page 95.)

Approximately two weeks after the original mailing was completed, a follow-up letter, a similar postal card, and an addressed postage-paid return envelope were sent to all non-respondents. The follow-up letter was an additional attempt to encourage the businesses to submit a list of programmers for the study and to address the issue of confidentiality. The follow-up letter was also reproduced on Oklahoma State University, College of Business Administration stationery and cosigned by the dissertation adviser. (See Appendix C, page 96.)

Several comments were received from managers who declined to participate in the study. Examples of these comments include: "Against company policy to publish employee names" and "The job market for . . . programmers is very demanding--the names of our people are a treasured item." Because of these comments, managers who had initially declined to participate when they returned the postal card (and thus did not receive the follow-up letter) were contacted by telephone and asked to participate by distributing the questionnaires anonymously to their programmers. This procedure increased the sample size by 73 percent from 128 to 221.

The second cover letter was written for the purpose of encouraging those computer programmers receiving it to participate in the study. This letter was reproduced in the same manner as the previous cover letter. (See Appendix C, page 97.) An addressed, postage-paid envelope was included along with a postal card to allow programmers to request a copy of the results. (See Appendix C, page 98.)

Approximately four weeks after this cover letter was sent, a follow-up letter, a copy of the questionnaire, a postal card, and an addressed postage-paid return envelope were sent to all known non-respondents. No follow-up letter was sent to the anonymous programmers. Again, the letter was reproduced in the same manner as the previous letters. (See Appendix C, page 99.)

Selection of the Population

The researcher chose as the population for the study those computer programmers working for businesses listed in Computer Directories, Inc.--Oklahoma (1981) as well as in the Dun and Bradstreet Million Dollar Directory (1982). These criteria ensured that the businesses owned a computer and that they were large enough to support a data processing center. The Computer Directories, Inc.--Oklahoma provided the name and address of each firm as well as the name of the data processing manager.

Collection of the Data

Mailing envelopes with the researcher's return address typed on them were used for mailing the managers' cover letter, postal card, and return envelope. The return envelopes and postal cards also had the researcher's mailing address typed on them. Postage stamps were affixed to the mailing envelopes, postal cards, and return envelopes.

The timetable for the mailings of the initial cover letter and follow-up materials to managers was as follows:

1. Original mailing--January 20, 1983
   Date requested for return--January 30, 1983

2. Follow-up mailing--February 3, 1983
   Date requested for return--February 13, 1983.

Letters were mailed to 129 firms. Seventeen of these firms were deleted from the population for the following reasons:

1. Six firms were not at the addresses given in the directory and the mailing was not deliverable.

2. Two firms had closed their offices.

3. Nine firms no longer employed in-house programmers.

Thirty-nine (30.2 percent) of the 129 businesses contacted by phone and/or mail agreed to submit a list of computer programmers or to distribute the questionnaires anonymously. A summary of the returns and non-returns is reported in Table II.

TABLE II

DISTRIBUTION OF THE POPULATION BY RETURNS AND NON-RETURNS TO THE INITIAL PARTICIPATION REQUEST

Category	Number	Percent Total (N=129)
Total firms in population	129	100.0
Total firms thought to have been contacted	123	95.3
Total firms with incorrect addresses not contacted	6	4.7
Total affirmative respondents from original mailing	22	17.0
Total affirmative respondents from follow-up mailing	12	9.3
Total affirmative respondents from telephone follow-up	5	3.9
Total affirmative respondents	39	30.2
Total negative or non-respondents	90	69.8

For the mailing of the research instrument to the computer programmers, 9 X 12 manila envelopes were used. Mailing labels were used for addresses on both the cover letter envelope and the return envelope. The mailing envelopes were sent by bulk mail, and the return envelopes were metered.

The timetable for the mailings of the cover letter and the follow-up materials to the programmers was as follows:

1. Original mailing--March 21, 1983
   Date requested for return--March 31, 1983

2. Follow-up mailing--April 20, 1983
   Date requested for return--April 30, 1983.

Questionnaires were mailed to 221 programmers either directly or through their managers. Twenty-five of these programmers were deleted from the sample for the following reasons:

1. One respondent was no longer employed by a participating firm.

2. Four respondents had been employed for less than one year.

3. Twenty respondents were not business applications or systems software programmers.

One hundred seventy-six questionnaires were returned from the 221 programmers contacted for a 79.6 percent response rate. One hundred fifty-four of those questionnaires returned were usable, which resulted in a 69.7 percent usable response rate. An analysis of the returns and non-returns is reported in Table III, page 38.

Analysis and Interpretation of the Data

Responses obtained from returned questionnaires were coded and entered on the computer terminal for use in computer tabulations. A Statistical Analysis System (SAS) program was used to show relationships

between the personality and satisfaction variables. This analysis was performed using a Pearson product-moment correlation.

Further analyses were conducted using a SAS program to indicate differences between general population means and the personality and satisfaction means of the programmers surveyed. This analysis was performed using a t test. The effect of environmental factors on programmers' job satisfaction was analyzed using a series of one-way analysis of variance tests and the F test for significance.

TABLE III

DISTRIBUTION OF THE POPULATION BY RETURNS AND NON-RETURNS TO THE QUESTIONNAIRE

Category	Number	Percent Total (N=221)
Total programmers in population	221	100.0
Total programmers thought to have been contacted	220	99.5
Total programmers with incorrect addresses not contacted	1	0.5
Total respondents from original mailing	144	65.2
Total respondents from follow-up mailing	32	14.4
Total respondents	176	79.6
Total usable returns	151	68.3
Total non-usable returns	25	11.3
Total non-respondents	45	20.4

Presentation of Conclusions and Recommendations

Conclusions and recommendations, made on the basis of the findings reported in Chapter IV, are presented in Chapter V.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF THE DATA

The questionnaire was sent to 221 computer programmers employed in selected Oklahoma businesses. The data gathered from the questionnaire were used to analyze the demographic information, personality characteristics, and job satisfaction of programmers. Findings are presented from a detailed analysis of the responses to the questionnaire.

Method of Analyzing the Data

The first section of the questionnaire was designed to obtain demographic information about the data processing professionals. Specifically, this section contained questions concerning the age and gender of the respondents, the years of programming experience, the number of companies by which the programmers had been employed, the primary business purpose of the firm, the primary programming language used, the number of hours spent per week in connection with work, and the educational background of the programmers. Allowance was made in this section for the addition and clarification of "other" responses.

The second section of the questionnaire was the Minnesota Satisfaction Questionnaire*, which is designed to measure the general level of job satisfaction as well as satisfaction with 20 individual reinforcers.

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The third section of the questionnaire was the Sixteen Personality Factor Questionnaire, which is designed to measure 16 primary personality characteristics.

A Statistical Analysis System (SAS) program was used to analyze the responses of each item of the questionnaire. The results from each response to a question in the first section were tabulated according to frequency of occurrence, cumulative frequency, percentage, and cumulative percentage.

The data from the second and third sections of the questionnaire (the MSQ and the 16 PF) were also analyzed using a SAS program. The resulting scores obtained from these instruments were analyzed to determine the group mean for each of the job satisfaction and personality variables. The group means were then compared to general population means obtained from the manuals of norms. Significant differences in the two groups of means were determined by using a t test.

The Pearson product-moment correlation method was performed by SAS to determine whether the job satisfaction variables were related to the different personality characteristics.

A series of one-way analysis of variance procedures was utilized in the SAS program to determine whether different environmental factors are related to the job satisfaction variables.

The general level of job satisfaction was converted to percentile ranks according to norms developed by the Minnesota Satisfaction Questionnaire researchers. Based on their research, a percentile rank of 25 or below indicates a low level of job satisfaction; a percentile rank of 75 or above indicates a high level of job satisfaction; and a percentile rank between 25 and 75 indicates a moderate level of job

satisfaction. Care must be taken in categorizing by percentile rankings because the percentile rankings generated by the MSQ researchers are based on a fairly small sample size (N=380).

The three levels of job satisfaction were compared to the 16 personality variables using a series of one-way analysis of variance procedures in SAS to determine if any of the personality variables were significantly related to the programmers' job satisfaction. Tables of findings are presented in the following discussion.

Data Analysis

Responses were received from 176 data processing professionals in Oklahoma. Twenty-five of these respondents were deleted from the sample for the following reasons:

1. One respondent was no longer employed by a participating firm.
2. Four respondents had been employed for less than one year.
3. Twenty respondents were not business applications or systems software programmers.

The analysis of data utilized responses from 151 questionnaires. The analysis is divided into five sections:

1. a description of the demographic data concerning programmers
2. an analysis of the general job satisfaction level by percentile ranks
3. an analysis of the differences between the general population means and the programmer means for both job satisfaction and personality characteristics
4. an analysis of the relationship among the personality and job satisfaction variables, and

5. an analysis of the relationship of various demographic factors as compared with programmers' job satisfaction.

The first section, regarding the description of the demographic information concerning the computer programmers, was sub-divided into two areas: demographic data describing the respondents and demographic data concerning the data processing environment in which the respondents were employed. Each area was analyzed using frequencies and percentages.

The second section, regarding the analysis of the general satisfaction level by percentile rank, was also analyzed using frequencies and percentages.

The third section, regarding the analysis of differences between general population means and programmer means, was sub-divided into two areas: personality variables and satisfaction variables. Each area was analyzed using the t test.

The fourth section, regarding the analysis of the relationship among the personality and job satisfaction variables, was analyzed using the Pearson product-moment procedure.

The fifth section, regarding the analysis of the relationship of various demographic variables as compared with job satisfaction, was sub-divided into nine areas:

1. size of the data processing center
2. gender
3. age
4. years of programming experience
5. area of educational specialization
6. number of companies by which the programmer has been employed
7. highest educational degree

8. city in which the programmer is employed, and

9. programming duties (systems or business applications).

Each area was analyzed using a series of one-way analysis of variance procedures and the F test for significance.

Description of Demographic Information

A review of the demographic data obtained from the 151 respondents who completed usable questionnaires for this study is provided here as a description of pertinent characteristics of the sample and population. The demographic information section included eleven questions and a coded number for follow-up identification. Space was provided for some items on the questionnaire for respondents to specify a response of "other". The city of employment was ascertained from the coding used by the researcher as was the size of the data processing center. The size of the data processing center was determined by the number of programmers employed by the organization--fewer than ten programmers, small; 10-25 programmers, medium; more than 25 programmers, large.

Table IV, page 45, shows specific demographic data describing respondents. Of the 151 respondents, about 60 percent were male. About one-fourth were under age 25 and approximately one-half were between 26 and 35, while about one-fourth were over age 35.

A large majority (87.42 percent) had fewer than ten years of programming experience, with 66.89 percent of that majority having fewer than five years. Almost all (95.36 percent) were business applications programmers. The vast majority (90.73 percent) had been employed by three companies or fewer as a computer programmer.

TABLE IV

DEMOGRAPHIC DATA DESCRIBING
THE RESPONDENTS

Variable	Frequency	Cum. Frequency	Percent	Cum. Percent
Gender				
Male	92	92	60.93	60.93
Female	59	151	39.07	100.00
Age				
16-25	40	40	26.49	26.49
26-35	75	115	49.67	76.16
36-45	27	142	17.88	94.04
46-55	8	150	5.30	99.34
Older than 55	1	151	0.66	100.00
Years of Programming Experience				
Fewer than 5	101	101	66.89	66.89
6-10	31	132	20.53	87.42
11-15	14	146	9.27	96.69
16-20	4	150	2.65	99.34
More than 20	1	151	0.66	100.00
Number of Companies Worked for				
3 or fewer	137	137	90.73	90.73
4-6	11	148	7.28	98.01
More than 6	3	151	1.97	100.00
Hours Spent on the Job/Week				
30 or fewer	4	4	2.67	2.67
31-40	57	61	38.00	40.67
41-50	86	147	57.33	98.00
51-60	1	148	0.67	98.67
More than 60	2	150	1.33	100.00
Programming Duties (Systems or Business Applications)				
Systems Software	7	7	4.64	4.64
Bus. Applications	144	151	95.36	100.00

TABLE IV (Continued)

Variable	Frequency	Cum. Frequency	Percent	Cum. Percent
Highest Educational Degree				
High School	26	26	17.22	17.22
2-Year Degree	38	64	25.17	42.38
Bachelor's	68	132	45.03	87.42
Master's	12	144	7.94	95.36
Doctorate	0	144	0.00	95.36
Other	7	151	4.64	100.00
Area of Educational Specialization				
Computer Science	57	57	40.14	40.14
Business	36	93	25.35	65.49
Math	24	117	16.90	82.39
Other	25	142	17.61	100.00

Participants in the survey were asked to indicate the number of hours they spent on a weekly basis in connection with their job. A majority of the programmers (59.32 percent) indicated that they worked over 40 hours per week.

A little less than half of the programmers (45.03 percent) had received a bachelor of science degree, while approximately one-fourth (25.17 percent) had received a 2-year associate degree or vocational degree. Very few programmers had advanced degrees, and several respondents indicated that they had taken college courses but had received no actual degree.

Approximately 40 percent of the programmers had specialized in Computer Science. A specialization in Business was indicated by about

one-fourth (25.35 percent) of the respondents, while a specialization in Math was indicated by almost one-fifth (16.90 percent) of the programmers. Twenty-five of the respondents had an area of specialization other than those listed on the questionnaire. These responses are shown in Table V, page 48.

Table VI, page 49, reports the demographic data acquired concerning the data processing environment in which the respondents were working. A few more than half of the programmers (52.32 percent) were employed in Tulsa, while 41.06 percent were employed in Oklahoma City. Approximately one-half of the programmers (50.33 percent) were employed by small data processing centers, and about one-third (34.44 percent) were employed by large data processing centers.

Most of the respondents (79.47 percent) indicated that COBOL was their primary programming language, while 7.95 percent indicated RPG. All other languages were indicated by less than 4 percent of the respondents. These "others" are summarized in Table VII, page 50.

The percentages indicating the primary business purpose of the employing firms are also presented in Table VI. The response of "other" was indicated by 59.72 percent of the respondents. About 40 percent (41.57 percent) of the programmers who listed the purpose of their firm as "other" indicated that the primary business purpose of their firm was Oil and Gas, while approximately one-fourth (26.97 percent) indicated Manufacturing. The only other business purpose which was mentioned quite frequently (15.73 percent) was Energy.

TABLE V

AREAS OF EDUCATIONAL SPECIALIZATION NOT LISTED ON THE QUESTIONNAIRE BUT SPECIFIED UNDER "OTHER"

Area of Specialization	Frequency
General High School	5
Education	4
Political Science	3
Accounting	2
English	1
Speech Communication/Human Relations	1
Psychology	1
Data Processing in the Business College	1
Executive Secretarial	1
Music Education	1
Science	1
Auto Mechanics	1
Meteorology	1
Engineering	1
Foreign Language	1
Systems Analysis	1
Finance and Banking	1

TABLE VI

DEMOGRAPHIC DATA DESCRIBING THE DATA PROCESSING ENVIRONMENT

Variable	Frequency	Cum. Frequency	Percent	Cum. Percent
City of Employment				
Oklahoma City	62	62	41.06	41.06
Tulsa	79	141	52.32	93.38
Other	10	151	6.61	100.00
Size of Data Processing Center				
Small (fewer than 10)	76	76	50.33	50.33
Medium (10-25)	23	99	15.23	65.56
Large (more than 25)	52	151	34.44	100.00
Primary Programming Language				
COBOL	120	120	79.47	79.47
RPG	12	132	7.95	87.42
BASIC	2	134	1.32	88.74
FORTRAN	6	140	3.97	92.71
Other	11	151	7.28	100.00
Primary Business Purpose of Firm				
Agriculture	2	2	1.39	1.39
Mining	3	5	2.08	3.47
Wholesale/Retail	21	26	14.58	18.06
Construction	2	28	1.39	19.44
Communication	3	31	2.08	21.53
Government	1	32	0.69	22.22
Transportation	9	41	6.25	28.47
Finance/Insurance/ Real Estate	14	55	9.72	38.19
Service	3	58	2.08	40.27
Other	86	144	59.72	100.00

TABLE VII

PRIMARY PROGRAMMING LANUGAGES NOT LISTED ON THE QUESTIONNAIRE BUT SPECIFIED UNDER "OTHER"

Primary Programming Language	Frequency
NEAT/3	3
Databus	1
ALC	1
ASM	1
TAL (Tandem)	1
DYL260	1
Project/2	1
Mark IV	1
Assembler	1
Natural	1
Vendor-Supplied High Level Development Languages	1
None	1

Analysis of General Satisfaction Level of Computer Programmers

The general satisfaction score of the Minnesota Satisfaction Questionnaire was converted to a percentile rank as indicated by the norm tables supplied by Vocational Psychology Research. Because these rankings are based on a rather small sample size (N=380), caution should be exercised in generalizing the interpretation of these results.

TABLE VIII

PRIMARY BUSINESS PURPOSE OF THE FIRM NOT LISTED ON THE QUESTIONNAIRE BUT SPECIFIED UNDER "OTHER"

Primary Business Purpose	Frequency	Percent
Oil and Gas	37	41.57
Manufacturing	24	26.97
Energy	14	15.73
Banking	7	7.87
Newspaper	2	2.25
Fertilizer	1	1.12
Natural Resources	1	1.12
Architecture/Engineering Consulting	1	1.12
Supply Company	1	1.12
Diversified	1	1.12
Total	89	100.00

Based on previous MSQ research (Weiss, et al., 1967), a percentile rank of 75 or greater ordinarily indicates a high degree of satisfaction. A percentile rank of 25 or less indicates a low degree of satisfaction. Scores in the middle range of percentiles (26 to 74) indicate average satisfaction.

Table IX, page 52, contains an analysis of the general satisfaction of computer programmers. Just under half of the programmers reported an average or a low level of job satisfaction (42.95 percent and 46.31

percent respectively), while only about ten percent (10.74 percent) reported a high degree of job satisfaction.

TABLE IX

GENERAL SATISFACTION LEVEL OF PROGRAMMERS

Satisfaction Level	Frequency	Cum. Frequency	Percent	Cum. Percent
High	16	16	10.74	10.74
Average	64	80	42.95	53.69
Low	69	149	46.31	100.00

Analysis of Satisfaction and Personality Mean Differences as Compared to Population Means

The means of the 20 separate work reinforcers and the general satisfaction score as indicated by the Minnesota Satisfaction Questionnaire were computed for the 151 computer programmers. An analysis was made of the differences between the programmer means and the general population means as found in the Manual for the Minnesota Satisfaction Questionnaire (Weiss et al., 1967). The general population means were based on a sample size of 2,995 and were considered to be a sample of the same population from which the computer programmers were drawn. A t test was used to determine whether any significant differences between the general population means and the programmer means

were observed at the 0.05 level of significance. These results are reported in Table X, page 54.

The general level of programmer satisfaction was significantly less than that of the general population. The programmers were also significantly less satisfied than the general population with 10 of the 20 individual work reinforcers. The computer programmers were less satisfied in the following areas:

1. Achievement
2. Co-Workers
3. Creativity
4. Independence
5. Moral Values
6. Responsibility
7. Security
8. Social Service
9. Supervision--Human Relations
10. Supervision--Technical

This indicates that the programmers were significantly less satisfied with the feeling of accomplishment they obtained from the job as well as their chance to work alone on the job. They were also less satisfied with their chance to try personal methods of doing the job and their freedom to use personal judgment. The programmers were less satisfied with their chance to do things for other people in relation to their job as well as less satisfied with their ability to do things that do not go against the conscience. These data processing professionals were also less satisfied with their job security than the general population besides being less satisfied with the way their co-workers got

TABLE X

SUMMARY OF JOB SATISFACTION T TEST COMPARING COMPUTER PROGRAMMERS AND THE GENERAL POPULATION

Satisfaction Variable	Programmer Mean	Population Mean	t Value	p
Ability Utilization	19.28	19.1	0.64	0.5235
Achievement	18.04	20.1	-5.61	0.0001*
Activity	21.07	20.3	3.02	0.0030*
Advancement	19.42	16.5	11.77	0.0001*
Authority	17.89	18.2	-0.86	0.3937
Company Policies and Practices	17.28	17.3	-0.08	0.9401
Compensation	18.17	16.9	3.43	0.0008*
Co-Workers	17.47	20.1	-11.11	0.0001*
Creativity	14.97	18.2	-7.44	0.0001*
Independence	16.85	19.2	-5.14	0.0001*
Moral Values	17.95	20.9	-7.42	0.0001*
Recognition	17.21	17.6	-0.92	0.3606
Responsibility	18.36	19.3	-2.29	0.0237*
Security	15.19	20.2	-11.32	0.0001*
Social Service	16.81	20.7	-9.08	0.0001*
Social Status	19.67	18.0	6.46	0.0001*
Supervision-- Human Relations	18.01	18.7	-2.15	0.0330*
Supervision-- Technical	16.34	18.7	-5.33	0.0001*
Variety	19.37	19.0	1.16	0.2461
Working Conditions	18.93	18.6	1.06	0.2914

TABLE X (Continued)

Satisfaction Variable	Programmer Mean	Population Mean	t Value	p
General Satisfaction	71.52	75.6	-4.12	0.0001*

*p < 0.05

along with one another. In addition, the computer programmers were less satisfied with their supervisors' handling of employees and their competence in decision making.

Only two of these ten areas of dissatisfaction are classified by the Manual for the Minnesota Satisfaction Questionnaire as extrinsic motivators. The majority of the areas of dissatisfaction are of an intrinsic nature, indicating that the job itself rather than the external environmental factors is the major cause for concern. The only extrinsic areas of dissatisfaction deal with the supervisors' ability to handle their employees and to make decisions.

In 4 of the 20 individual work reinforcers, the computer programmers were significantly more satisfied than the general population. The data processing professionals were more satisfied with the following reinforcers:

1. Activity
2. Advancement
3. Compensation
4. Social Status

Based on these findings, it appears that programmers were more satisfied with their ability to keep busy all the time. They were also more satisfied with the social status they were able to achieve because of their position. In addition, these data processors were significantly more satisfied with their opportunities for advancement and the compensation they received for the work they accomplished.

A graphical representation of these findings is presented in Figure 1, page 57.

The 16 PF scores for each of the respondents were converted to sten scores. Sten scores are distributed over 10 equal-interval standard score points (assuming normal distribution) from 1 through 10, with the population mean fixed at 5.5. Sten scores of 4 through 7 would normally be considered to be average and therefore represent approximately two-thirds of all the obtained scores. Sten scores of 1, 2, 3 and 8, 9, 10 are generally considered to be of greater importance for profile interpretation since they are more extreme and occur far less frequently in a normal population (IPAT Staff, 1979).

The means of the 16 personality factors as indicated by the sten scores of the Sixteen Personality Factor Questionnaire were computed for the 151 computer professionals. An analysis was made of the differences between the programmer means and the general population means as found in the Tabular Supplement No. 2 to the 16 PF Handbook (IPAT Staff, 1972). The general population means were based on a sample size of 5,077 and were considered to be a sample of the same population from which the computer programmers were drawn. A t test was used to determine whether any significant differences between the general population means and the

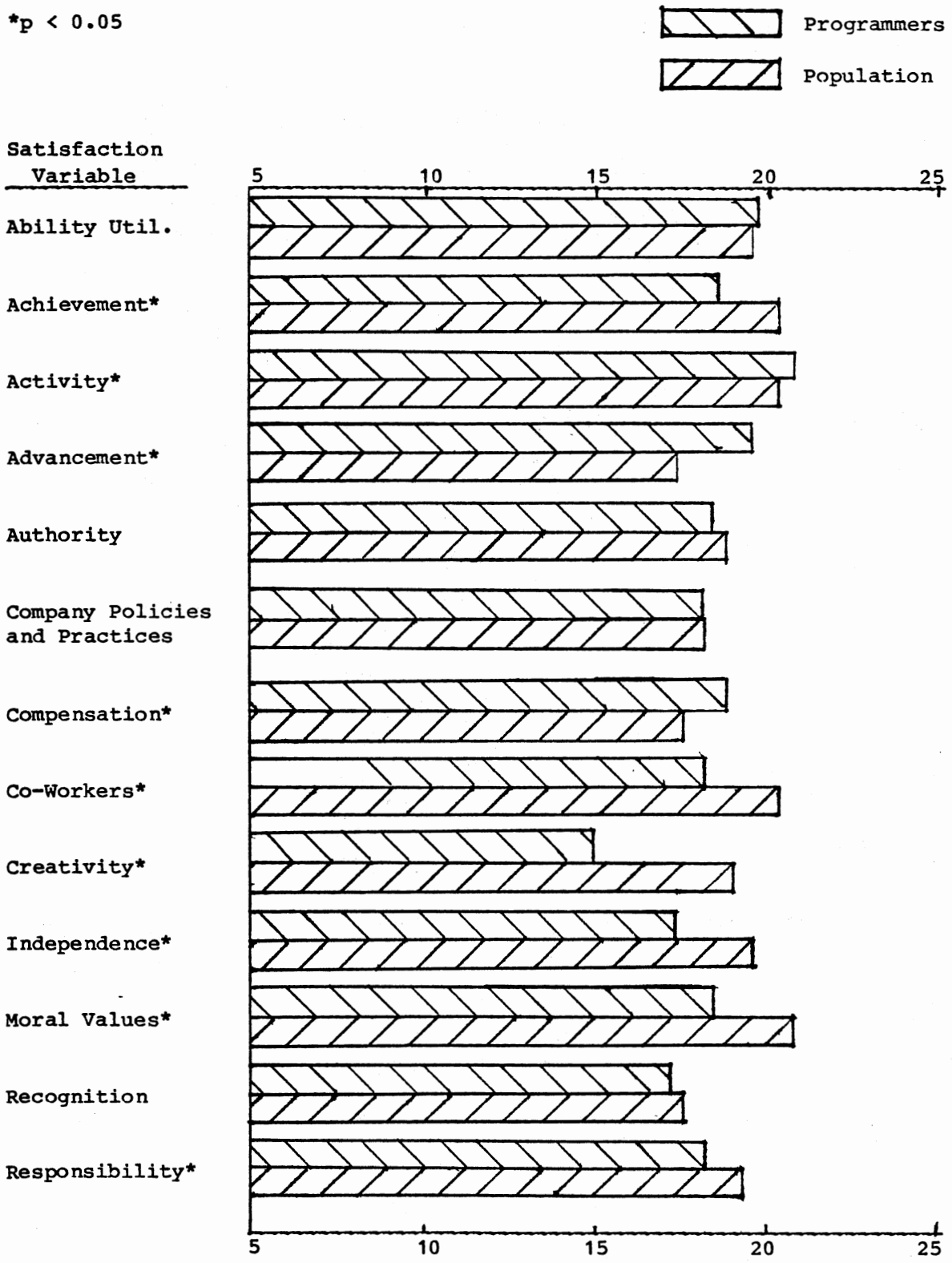

Figure 1. Graphical Representation of the Satisfaction Profile of Computer Programmers as Compared to the General Population

*p < 0.05

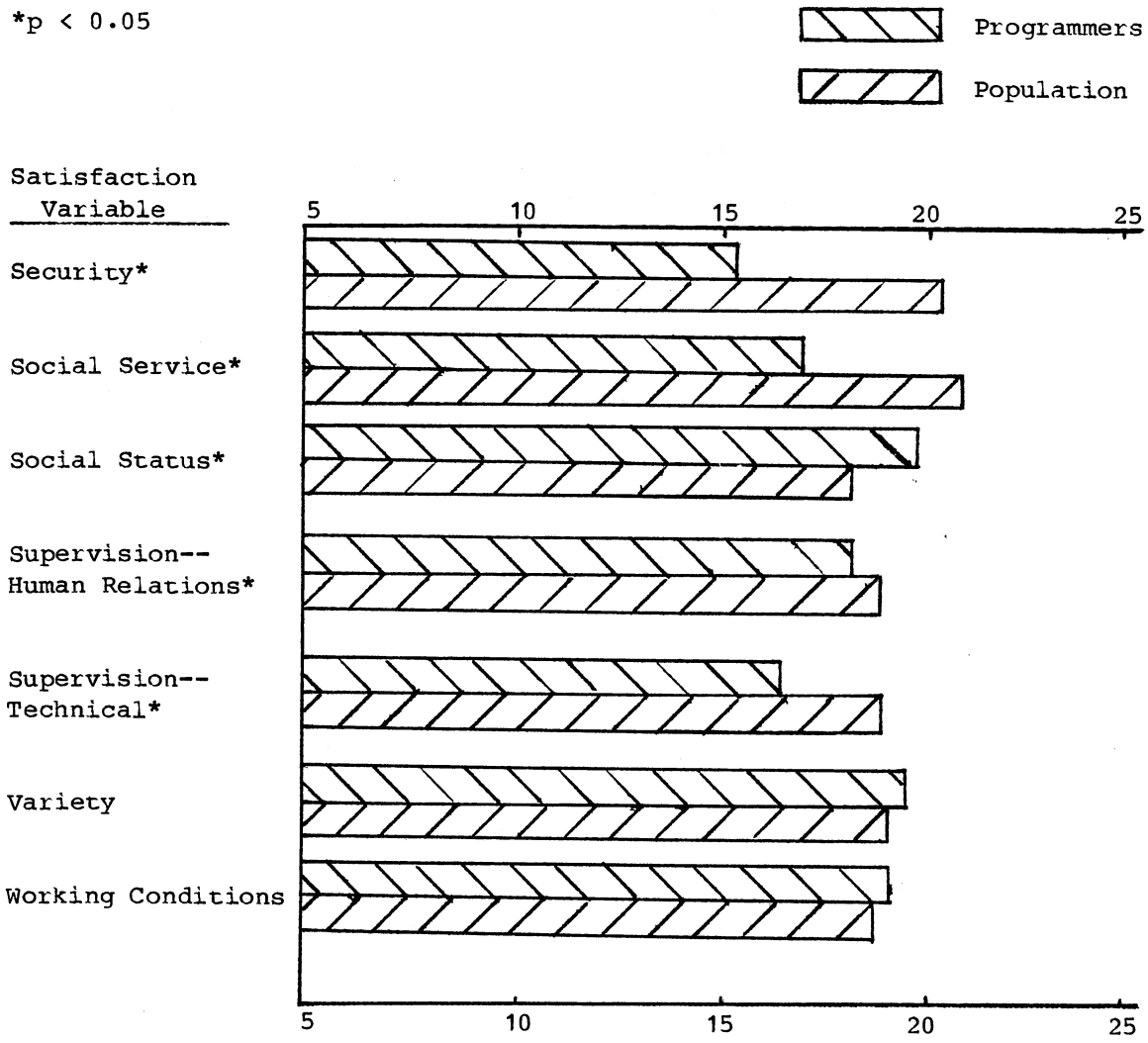

Figure 1 (Continued)

programmer means were observed at the 0.05 level of significance. These results are reported in Table XI, page 60.

The computer programmers were significantly different from the general population on 14 of the 16 personality factors. The personality factors which were significantly different from the general population are listed below:

1. Factor A--Reserved vs. Outgoing
2. Factor B--Less Intelligent vs. More Intelligent
3. Factor C--Easily Upset vs. Emotionally Stable
4. Factor E--Submissive vs. Assertive
5. Factor F--Sober vs. Happy-Go-Lucky
6. Factor G--Expedient vs. Conscientious
7. Factor H--Shy vs. Venturesome
8. Factor I--Self-Reliant vs. Sensitive
9. Factor M--Practical vs. Imaginative
10. Factor N--Natural vs. Shrewd
11. Factor O--Self-Assured vs. Apprehensive
12. Factor Q1--Conservative vs. Experimenting
13. Factor Q2--Group Dependent vs. Self-Sufficient
14. Factor Q3--Careless of Protocol vs. Socially Precise

A brief description of these factors as they relate to computer programmers is listed below:

1. Factor A--Reserved vs. Outgoing

The computer programmers tend to be less emotionally expressive and less attentive to people than the general population. They also tend to be more afraid of criticism.

TABLE XI

SUMMARY OF PERSONALITY FACTOR T TEST COMPARING COMPUTER PROGRAMMERS AND THE GENERAL POPULATION

Personality Variable	Programmer Mean	Population Mean	t Value	p
A Reserved vs Outgoing	5.37	8.67	-19.25	0.0001*
B Dull vs Bright	7.23	4.34	21.31	0.0001*
C Easily Upset vs Emotionally Stable	5.86	7.25	-8.09	0.0001*
E Submissive vs Assertive	5.80	5.30	3.03	0.0029*
F Sober vs Happy-Go-Lucky	4.77	6.89	-12.99	0.0001*
G Expedient vs Conscientious	6.26	7.44	-7.59	0.0001*
H Shy vs Venturesome	4.70	6.94	-13.69	0.0001*
I Self-Reliant vs Sensitive	5.05	6.38	-9.64	0.0001*
L Trusting vs Suspicious	4.99	5.33	-1.94	0.0548
M Practical vs Imaginative	4.72	5.71	-6.41	0.0001*
N Natural vs Shrewd	5.65	4.82	4.84	0.0001*
O Self-Assured vs Apprehensive	5.26	6.21	-5.46	0.0001*

TABLE XI (Continued)

Personality Variable	Programmer Mean	Population Mean	t Value	p
Q1 Conservative vs Experimenting	5.23	6.67	-7.91	0.0001*
Q2 Group Dependent vs Self-Sufficient	6.92	3.95	20.15	0.0001*
Q3 Careless of Protocol vs Socially Precise	6.55	7.75	-7.37	0.0001*
Q4 Relaxed vs Tense	5.48	5.75	-1.44	0.1529

*p < 0.05

2. Factor B--Less Intelligent vs. More Intelligent

Computer programmers are more likely than the general population to grasp ideas quickly and be fast learners.

3. Factor C--Easily Upset vs. Emotionally Stable

Data processing professionals tend to be less realistic about life and less able to maintain solid group morale than the general population.

4. Factor E--Submissive vs. Assertive

Programmers tend to be less conforming and less dependent than the general population.

5. Factor F--Sober vs. Happy-Go-Lucky

Computer professionals tend to be more reticent and introspective than the general population.

6. Factor G--Expedient vs. Conscientious

Computer programmers tend to have more freedom from group influence and to expend less effort in group undertakings. They also tend to be less bound by rules than the general population.

7. Factor H--Shy vs. Venturesome

Programmers tend to be more cautious and retiring as well as less able to express themselves than the general population.

8. Factor I--Self-Reliant vs. Sensitive

Data processors are more likely to be less emotionally sensitive and less fanciful as well as more cynical than the general population.

9. Factor M--Practical vs. Imaginative

Computer programmers tend to be more attentive to practical matters and more concerned over detail than the general population.

10. Factor N--Natural vs. Shrewd

Programmers tend to have less natural warmth and less genuine liking for people than the general population.

11. Factor O--Self-Assured vs. Apprehensive

Computer professionals are more likely to have confidence in themselves and their capacity to deal with matters than the general population.

12. Factor Q1--Conservative vs. Experimenting

Programmers tend to be more cautious and compromising in regard to new ideas and more inclined to go along with tradition than the general population.

13. Factor Q2--Group Dependent vs. Self-Sufficient

Data processing professionals tend to be less dependent on social approval and prefer to make decisions and take action on their own.

14. Factor Q3--Careless of Protocol vs. Socially Precise

Computer programmers tend to be less socially aware and have less of a high regard for social reputation than the general population.

The only two personality variables which were not significantly different from the general norms were Factor L (Trusting vs. Suspicious) and Factor Q4 (Relaxed vs. Tense). The mean scores for these two factors were slightly less than the general population means, but they were not significantly different.

A graphical representation of these findings is presented in Figure 2, page 64.

Analysis of the Relationship Among Personality and Job Satisfaction Variables

In order to determine whether relationships existed among the personality and job satisfaction variables, a Pearson product-moment procedure was employed. The 0.05 level of significance was selected for this procedure. Only 149 subjects were included in the analysis because two of the respondents did not return the Sixteen Personality Factor Questionnaire.

Correlation coefficients were determined for each of the 16 personality variables as they relate to the 21 measured job satisfaction variables. The correlation matrix is presented in Appendix D, page 100.

Of the 16 personality variables, Factor L (Trusting vs. Suspicious) showed the most marked relationship with the various job satisfaction variables. Factor L showed a significant negative correlation with 16 of the 21 job satisfaction variables. These 16 satisfaction variables were: (1) Achievement ($r=-0.16$), (2) Activity ($r=-0.20$), (3) Authority

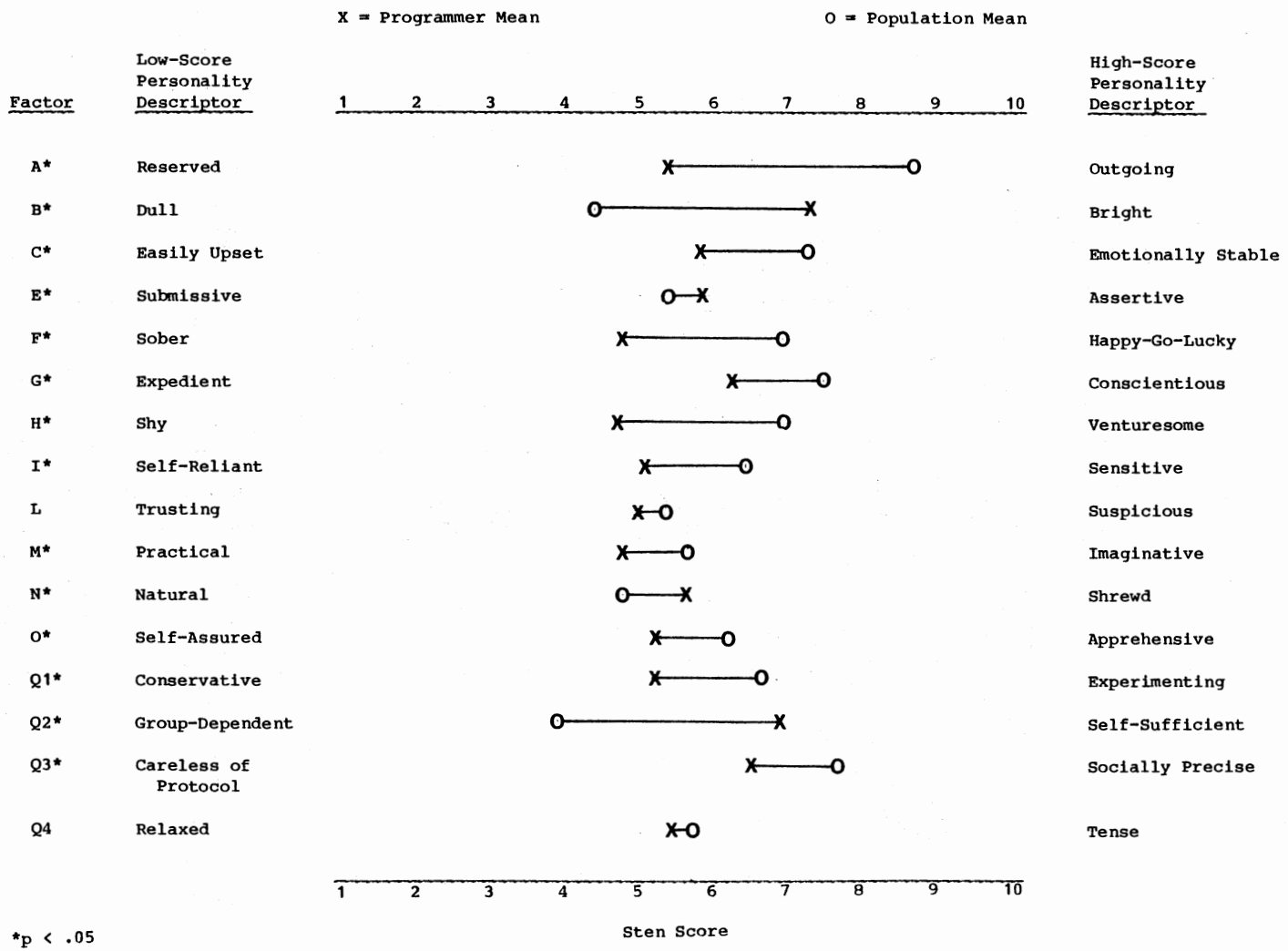

Figure 2. Graphical Representation of the Personality Profile of Computer Programmers as Compared to the General Population

(r=-0.22), (4) Company Policies and Practices (r=-0.17), (5) Compensation (r=-0.19), (6) Co-Workers (r=-0.28), (7) Creativity (r=-0.33), (8) Independence (r=-0.28), (9) Moral Values (r=-0.26), (10) Recognition (r=-0.19), (11) Security (r=-0.31), (12) Social Service (r=-0.27), (13) Supervision--Human Relations (r=-0.18), (14) Supervision--Technical (r=-0.28), (15) Variety (r=-0.18), and (16) General Satisfaction (r=-0.32).

This relationship indicates that as programmers are more suspicious, they tend to be less satisfied with most areas of their employment. Programmers who are more trusting tend to be more satisfied with most areas of their employment.

Factor Q4 (Relaxed vs. Tense) also showed a significant negative correlation with five of the 21 satisfaction variables. These five variables were: (1) Authority (r=-0.27), (2) Creativity (r=-0.23), (3) Security (r=-0.20), (4) Variety (r=-0.16), and (5) General Satisfaction (r=-0.18).

This relationship indicates that as programmers are more relaxed, they tend to be more satisfied with their employment in general. They also tend to be more satisfied with the amount of authority their job provides as well as their ability to try personal methods of doing the job and their chance to be involved in different activities from time to time. In addition, as programmers are more relaxed, they tend to be more satisfied with their job security.

Factor B (Low Intelligence vs. High Intelligence) showed a significant positive correlation with six of the 21 satisfaction variables, including: (1) Compensation (r=0.17), (2) Creativity

(r=0.17), (3) Independence (r=0.24), (4) Security (r=0.22), (5) Social Service (r=0.21), and (6) Supervision--Technical (r=0.21).

This relationship indicates that programmers with a higher level of intelligence tend to be more satisfied with their ability to be creative on the job and their chance to work alone on the job. They are also more satisfied with their opportunity to be of service to other people. These programmers, in addition, are more satisfied with their level of compensation and the security provided by their job. Their satisfaction with their supervisors' competence in decision making also increases.

Of the 21 satisfaction variables, only Security showed a marked relationship with several of the personality variables. Six of the personality variables were significantly correlated with the satisfaction variable of security. These six factors were: (1) Factor A--Reserved vs. Outgoing (r=0.17), (2) Factor B--Low Intelligence vs. High Intelligence (r=0.22), (3) Factor L--Trusting vs. Suspicious (r=-0.31), Factor Q1--Conservative vs. Experimenting (r=-0.17), Factor Q3--Careless of Protocol vs. Socially Precise (r=0.19), and Factor Q4--Relaxed vs. Tense (r=-0.20).

This relationship indicates that programmers who are more outgoing, more intelligent, or more trusting tend to be more satisfied with their job security. Programmers who are less suspicious, less experimenting, or less socially precise also tend to be more satisfied with their job security.

Although other personality and job satisfaction variables were found to correlate to some degree, none of the remainder was significantly correlated with more than four of the variables. Appendix D, page 100, contains a complete summary of the correlation matrix.

Analysis of the Relationship of Demographic Factors as Compared to Job Satisfaction

Several environmental factors were analyzed to determine whether they were related to the job satisfaction variables. One-way analysis of variance procedures were employed to test for a significant relationship among the variables. The F Test for significance was used, and a 95 percent confidence level was selected for this procedure. A summary of the results of these procedures is presented in Appendix E, page 102.

One hundred eighty-nine analysis of variance procedures were calculated. Only 13 of the 189 comparisons were significantly different at the 0.05 level. Because multiple comparisons were calculated, the reported 0.05 level of significance may have been compromised. If 100 analysis of variance procedures had been calculated, five of the analyses would have been expected to test significant by chance. When 189 analysis of variance procedures were calculated, approximately ten of the analyses would have been expected to test significant by chance. Because only 13 analyses tested significant, no further discussion of these comparisons will be undertaken in this study. The reader may refer to these findings in Appendix E, page 102.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

An increasing interest in the concept of a data processing personality has emerged in the past few years. By attaining a basic knowledge of computer programmers' personality needs, managers can cope more effectively with the attitudes, interests, needs, and values of employees. This, in turn, could lead to an increase in programmers' job satisfaction as well as a decrease in turnover and an increase in productivity.

Summary

Purpose and Design of the Study

The purposes of this study were:

1. to derive a satisfaction index of computer programmers as compared to the general population,
2. to derive a personality profile of computer programmers as compared to the general population, and
3. to analyze the relationship of personality characteristics and job satisfaction.

A secondary purpose of this study was to analyze the relationship the programmers' job satisfaction according to various environmental factors. To obtain this information, the Sixteen Personality Factor Questionnaire, the Minnesota Satisfaction Questionnaire, and a demographic information survey were mailed to computer programmers in

Oklahoma who were employed by businesses listed in both the Computer Directories, Inc.--Oklahoma (1981) and the Dun and Bradstreet Million Dollar Directory (1982). The data from the returned questionnaires were interpreted and analyzed to determine the personality characteristics and job satisfaction of computer programmers.

Thirty-nine businesses of the 129 businesses in the selected population agreed to participate for a 30.2 percent response rate. The research instrument was mailed to 221 computer programmers from these 39 Oklahoma business firms in the spring of 1983. One hundred fifty-one usable questionnaires (or 68.3 percent) were received from the computer programmers.

Frequency counts and percentages were calculated for the descriptive data. Significant differences in the programmer means and the general population means were determined for the personality and satisfaction variables using a t test. The Pearson product-moment correlation method was employed to determine whether the job satisfaction variables were related to the different personality characteristics. A series of one-way analysis of variance procedures was utilized to determine whether various environmental factors were related to the job satisfaction variables.

Results of the Study

The results of the study are summarized in four sections according to (1) the job satisfaction of computer programmers as compared to the general population, (2) the personality characteristics of computer programmers as compared to the general population, (3) the relationship among the personality and job satisfaction variables, and (4) the

relationship of various environmental factors as compared to programmers' job satisfaction.

The Job Satisfaction of Computer Programmers as Compared to the General Population. The general level of programmer satisfaction was significantly less than that of the general population. Just under half of the programmers reported an average or a low level of job satisfaction (42.95 percent and 46.31 percent respectively), while only about ten percent (10.74 percent) reported a high degree of job satisfaction. These figures are based on percentile rankings of a fairly small sample size (N=380); therefore, care must be taken in interpreting and generalizing this categorization.

The programmers were also significantly less satisfied than the general population with 10 of the 20 individual work reinforcers. These ten work reinforcers were:

1. Achievement
2. Co-Workers
3. Creativity
4. Independence
5. Moral Values
6. Responsibility
7. Security
8. Social Service
9. Supervision--Human Relations
10. Supervision--Technical

In 4 of the 20 individual work reinforcers, the computer programmers were significantly more satisfied than the general population. These four work reinforcers were:

1. Activity
2. Advancement
3. Compensation
4. Social Status

The results of this study indicate that computer programmers are significantly less satisfied than the general population with many areas of their employment. The majority of these areas of dissatisfaction are intrinsic and are related to the characteristics of the job itself. The only extrinsic areas of dissatisfaction deal with the programmers' feelings about their supervisors' ability to handle employees and their competence in decision making.

Programmers are more satisfied than the general population with their opportuntiy for Advancement and the Compensation they receive for the amount of work they do. They are also more satisfied with the Social Status they gain by working as programmers. In addition, they are more satisfied with their ability to keep busy on the job.

The Personality Characteristics of Computer Programmers as Compared to the General Population. The computer programmers were significantly different from the general population on 14 of the 16 personality factors. These factors were:

1. Factor A--Reserved vs. Outgoing
2. Factor B--Less Intelligent vs. More Intelligent
3. Factor C--Easily Upset vs. Emotionally Stable
4. Factor E--Submissive vs. Assertive
5. Factor F--Sober vs. Happy-Go-Lucky
6. Factor G--Expedient vs. Conscientious
7. Factor H--Shy vs. Venturesome

8. Factor I--Self-Reliant vs. Sensitive
9. Factor M--Practical vs. Imaginative
10. Factor N--Natural vs. Shrewd
11. Factor O--Self-Assured vs. Apprehensive
12. Factor Q1--Conservative vs. Experimenting
13. Factor Q2--Group Dependent vs. Self-Sufficient
14. Factor Q3--Careless of Protocol vs. Socially Precise

The results of this study indicate that the computer programmers were significantly more Shy, Reserved, and Sober than the general population. These programmers were also less Emotionally Stable and more Assertive. The data processors were more Intelligent than the general population and had a more Conservative outlook. In addition, the programmers were more Self-Reliant and more Self-Assured besides being more Practical and Shrewd. Finally, these data processing professionals were less Group Dependent, and they were more Careless of Protocol and Expedient (disregarding of rules).

The Relationship Among the Personality and Job Satisfaction Variables. Of the 16 personality variables, Factor L (Trusting vs. Suspicious) showed the most marked relationship with the various job satisfaction variables. A significant negative correlation was indicated with 16 of the 21 satisfaction variables. This correlation, although significant, indicated a rather weak relationship since the correlation coefficients ranged from -0.16 to -0.33. This relationship indicates that as programmers score higher (toward Suspicion), they tend to be less satisfied with their employment.

Factor Q4 (Relaxed vs. Tense) showed a significant negative correlation with five of the 21 satisfaction variables. These

correlations were also weak, ranging from -0.16 to -0.27. As programmers score higher (toward Tense), they tend to be less satisfied with their employment.

Factor B (Low Intelligence vs. High Intelligence) showed a significant, though weak, positive correlation with six of the 21 satisfaction variables. These correlations ranged from 0.17 to 0.24. Programmers who score higher (toward High Intelligence), tend to be more satisfied with their employment.

Security showed a significant, though weak, correlation with six of the 16 personality factors. These correlations ranged from -0.17 to -0.31 and from 0.17 to 0.22. Programmers tend to be more satisfied with their Job Security if they are more Outgoing, more Intelligent, or more Socially Precise. They also tend to be more satisfied with their Job Security if they are more Trusting, more Conservative, or more Relaxed.

The Relationship of Environmental Factors as Compared to Job Satisfaction. One hundred eighty-nine analysis of variance procedures were calculated to determine whether various environmental factors were related to the job satisfaction variables. Only 13 of the 189 comparisons were significantly different at the 0.05 level of significance. Because multiple comparisons were calculated, the reported 0.05 significance level may have been compromised; therefore, no further discussion of these comparisons was undertaken.

Conclusions

The following conclusions are based on the results of the analysis of the data received from the computer programmers and on the review of the related literature.

1. Very few programmers are highly satisfied with their employment; the large majority of the programmers indicate a moderate or low level of job satisfaction.

2. In many areas, data processing professionals are less satisfied with their employment than the general population. The majority of these areas of dissatisfaction are intrinsic; the only extrinsic areas of dissatisfaction both deal with supervision.

3. Programmers are more satisfied with their Activity level, their opportunity for Advancement, their level of Compensation, and their Social Status than the general population.

4. Computer professionals have distinct personality characteristics which distinguish them from the general population.

5. A relationship exists between the personality characteristics of programmers and their job satisfaction; however, this relationship is weak and it would be difficult to determine the programmers' job satisfaction using only a knowledge of their personality characteristics.

6. No significant relationship exists among the environmental factors as compared to the job satisfaction variables.

Recommendations

The recommendations which have emerged based on the results of this study concern the need for changes in job design and the work environment to satisfy programmers, the need for changes in selection and/or training procedures of data processing managers, and the need for more research.

1. Because of the large number of intrinsically dissatisfied programmers, business firms should attempt to redesign programming duties

so that computer programmers can gain an intrinsic motivation from their work. An effort should be made to give programmers more freedom to use personal judgment and to be creative when working on programs. Since data processing professionals are dissatisfied with their inability to work by themselves on the job, individual programming assignments rather than group programming assignments could increase satisfaction with their level of independence as well as give them a greater feeling of accomplishment.

2. Dissatisfaction with the work environment was also indicated by the data processors in the areas of Security, Moral Values, and Co-Workers. Business firms should attempt to redesign the work environment so that programmers believe that their job will provide steady employment and that they will not be required to be involved in activities which go against their conscience. An effort should also be made to increase group loyalty so that the programmers can become a more cohesive group.

3. Data processing professionals indicated dissatisfaction with their supervisors--both in their decision-making ability and their ability to handle employees. This dissatisfaction with the data processing supervisors could be a result of many data processing managers being promoted from the ranks of the programmers. A review of the related research has suggested that computer programmers may not make good managers. Furthermore, programmers have generally not been trained in effective managerial techniques and human relations. This could greatly inhibit their ability to make decisions and handle their employees. Therefore, business firms should give their managers training in human relations and effective managerial techniques, or they should

reevaluate their procedure for selecting data processing managers. Proficiency as a programmer may not be the most effective criteria for selecting good data processing managers.

4. Business firms have been attempting to reduce programmer turnover during the past few years by increasing salaries and advancement opportunities. Their success in these two areas is evident from the fact that programmers are more satisfied than the general population in the areas of Compensation and Advancement. However, it is ironic that increasing programmers' opportunities for advancement actually increases the turnover in the ranks of the programmers, since many programmers are promoted to positions such as systems analysts or data processing managers. By promoting programmers to positions such as these, business firms can retain their employees but they lose programmers, thus defeating their purpose. Businesses should decide whether they want to retain employees or retain programmers. If firms decide that they want to retain programmers, then the use of advancement as a motivator is inappropriate unless it is advancement to another level of programming. Redesign of the programming assignments themselves, as was previously discussed in the first recommendation, might be a more effective method of retaining satisfied programmers.

5. Since data processors have a unique personality profile, standard managerial techniques may not be effective when dealing with programmers. Supervisors should attempt to gain a basic understanding of their programmers' personality needs so that they can more effectively manage these employees.

6. Studies of data processing managers should be conducted to determine whether promotion from the ranks of the programmers inhibits managerial effectiveness.

7. Studies of data processing managers should also be conducted to determine their level of job satisfaction and their satisfaction with computer programmers.

8. Studies of the procedures used by business firms to select their data processing managers should be conducted to determine the effectiveness of these methods.

9. Studies of the personality needs and job satisfaction of computer programmers in other geographical areas should be conducted to determine if the findings are consistent with the results of this study.

10. This study should be duplicated periodically to assess the personality profile and job satisfaction level of data processing professionals.

BIBLIOGRAPHY

Andrew, Charles G. "Leadership and Motivation: The People Side of Systems Implementation." 21st Annual Conference Proceedings, American Production and Inventory Control Society, (1978), 352-387.

Argyris, Chris. "Management Information Systems: The Challenge to Emotionality and Rationality." Management Science, 17B (February, 1971), 275-292.

Arvey, Richard D. and H. Dudley Dewhirst. "Goal-Setting Attributes, Personality Variables, and Job Satisfaction. Journal of Vocational Behavior, 9, (1976), 179-189.

Averch, Vern. "The Rush to Greener Pastures." Computerworld, January 11, 1982, 4.

Barnes, Patsy H. "A Study of Personality Characteristics of Selected Computer Programmers and Computer Programmer Trainees." Microfilm copy. (Unpub. Ed.D. dissertation, Auburn University, 1974.)

Barnes, Patsy H. "Programmer Paranoia Revisited." Proceedings of the Thirteenth Annual Computer Personnel Research Conference, (1975), 114-131.

Barnes, Bruce H. and Malcolm H. Gotterer. "Attributes of Computer Professionals." Proceedings of the Ninth Annual Computer Personnel Research Conference, (1971), 167-175.

Barton, K. and R. B. Cattell. "Personality Factors Related to Job Performance and Turnover." Journal of Counseling Psychology, 19, 5 (1972), 430-435.

Bernardin, H. J. "The Relationship of Personality Variables to Organizational Withdrawal." Personnel Psychology, 30 (1977), 17-27.

Bloxom, Bruce M. The Eighth Mental Measurements Yearbook: Vol. 1. Ed., Oscar Krisen Buros. Highland Park, N. J.: The Gryphon Press, 1978, 1077-1078.

Bolton, Brian F. The Eighth Mental Measurements Yearbook: Vol. 1. Ed., Oscar Krisen Buros. Highland Park, N. J.: The Gryphon Press, 1978, 1078-1080.

Brandon, Dick H. "The Economics of Computer Programming." On the Management of Computer Programming. Ed. G.F. Weinwurm. Princeton: Auerbach Publishers, Inc., 1970, 3-16.

Buros, Oscar Krisen, Ed. The Eighth Mental Measurements Yearbook. Volume 1. Highland Park, N. J., The Gryphon Press, 1978.

Carlyle, Kim. "Programmer's Job Service Averages 18 Months." Computerworld, (March 30, 1981), 19-20.

Cattell, Raymond B., Herbert W. Eber, and Maurice M. Tatsuoka. Handbook for the 16 PF. Champaign, Ill.: Institute for Personality and Ability Testing, 1970.

Computer Directories, Inc.--Oklahoma, Volume IV, No. 4. Hockley, Tx., October, 1981.

Couger, J. Daniel and Robert A. Zawacki. "What Motivates DP Professionals?" Datamation, 24 (September, 1978), 116-123.

Cross, Edward M. "The Behavioral Styles of Computer Programmers." Proceedings of the Eighth Annual Computer Personnel Research Conference, (1970), 69-91.

Cross, Edward M. "Behavioral Styles of Computer Programmers - Revisited." Proceedings of the Ninth Annual Computer Personnel Research Conference, (1971), 140-165.

Dun and Bradstreet, Inc. Million Dollar Directory, Vol. I. New Jersey: Dun's Marketing Services, 1982.

Ebert, Terry. Address to Data Training '80, Cambridge, Mass. as reported by Bruce Hoard. "'TLC' Education Diet Urged." Computerworld, December 15, 1980, 1.

Ebert, Terry. "Upward or Onward." Data Training, (June, 1982), 6-9.

Faecher, Barry. "Programmers Are Special." Infosystems, (February, 1976), 45.

Fitz-enz, Jac. "Who Is the DP Professional?" Datamation, 24 (September, 1978), 124-128.

Forest, Robert. "Perspective: The 10 Percent Difference." Infosystems, 26 (April, 1979), 76.

Fulkerson, Robert V. "Use of Selected Interpersonal Variables as a Counseling Aid in Reducing Employee Turnover in a YMCA." (Unpub. Ph.D. dissertation, United States International University, 1975.)

Gibson, Cyrus F. and Richard L. Nolan. "Organizing and Managing Computer Personnel: Conceptual Approaches for the MIS Manager." Proceedings of the Eleventh Annual Computer Personnel Research Conference, (1973), 25-49.

Green, S. L. The Hansen/Weber Supplementary Survey of Personnel Practices for Data Processing Positions, Lake Bluff, Ill: A. S. Hansen, Inc., 1980.

Guarino, Sr., Roger C. "Managing Data Processing Professionals." Personnel Journal, 48, 12 (December, 1969), 972-975.

Guion, Robert M. The Eighth Mental Measurements Yearbook: Vol. I. Ed., Oscar Krisen Buros. Highland Park, N. J.: The Gryphon Press, 1978, 1679-1680.

Herzberg, F., B. Mausner, and B. Snyderman. The Motivation to Work. New York: John Wiley and Sons, 1959.

Holtz, Mary Ann. "A Comparison of the Personality Characteristics and Background Factors Among Women Administrators in Education, Business and Government." (Unpub. Ph.D. dissertation, University of Minnesota, 1979.)

Hussong, Mary Ann, Jay L. Sherman, and Gerald R. Ferris. 16 PF Research Bibliography: 1971-1976. Champaign, Ill.: Institute for Personality and Ability Testing, 1977.

International Data Corp Information Systems Planning Service (ISPS). "Acquiring and Retaining EDP Personnel." Computerworld, (December 1, 1980), 5.

IPAT Staff. Administrator's Manual for the 16 PF. Champaign, Ill.: Institute for Personality and Ability Testing, 1979.

IPAT Staff. Tabular Supplement No. 2 to the 16 PF Handbook. Champaign, Ill.: Institute for Personality and Ability Testing, 1972.

Johnson, Patricia L. and Paul A. Dierks. "What Are Women Accountants Really Like?" Management Accounting, (March, 1982), 25-28, 46.

Karson, Samuel and Jerry O'Dell. A Guide to the Clinical Use of the 16 PF. Champaign, Ill.: Institute for Personality and Ability Testing, 1976.

Kraft, Philip. Programmers and Managers. New York: Springer-Verlag, 1977.

Krech, D., R. S. Crutchfield, and N. Livson. Elements of Psychology, Second Edition. New York: Knopf, 1969.

Larouche, Viateur. "A Multivariate Investigation of Biographical Factors in Job Satisfaction." (Unpub. Ph.D. dissertation, University of Minnesota, 1972.)

Lofquist, Lloyd H. and Rene V. Dawis. "Vocational Needs, Work Reinforcers, and Job Satisfaction." The Vocational Guidance Quarterly, (December, 1975), 132-139.

Margolis, Jan. "Productivity, Performance and Professionalism." Training and Development Journal, (October, 1979), 22-25.

Martin, Dorothy R. and David R. Saunders. An Analysis of Personality Patterns of Women in Selected Professions. Boulder, Colo.: HEW Office of Education Final Report, 8-H-026, 1970.

Mayer, David B. and Ashford W. Stalnaker. "Selection and Evaluation of Computer Personnel." On the Management of Computer Programming. Ed., G. F. Weinwurm. Princeton: Auerbach Publishers Inc., 1970, pp. 133-157.

McLaughlin, R. A. "That Old Bugaboo, Turnover." Datamation, (October, 1979), 97-103.

Morris, J. L. and J. J. Wise. "Personality Characteristics of Data Processing Personnel." Australian Psychologist, 7, 3 (November, 1972), 173-179.

Mumford, Enid. Job Satisfaction: A Study of Computer Specialists. London: Longman Group Limited, 1972.

Mussio, Jerry and Merlin W. Wahlstrom. "Predicting Performance of Programmer Trainees in a Post-High School Setting." Proceedings of the Ninth Annual Computer Personnel Research Conference, (1971), 26-39.

O'Reilly, Charles, III. "Personality--Job Fit: Implications for Individual Attitudes and Performance." Organizational Behavior and Human Performance, 18 (1977), 36-45.

Patterson, M. B. "Motivating your Staff." Data Management, 19 (April, 1981), 23-30.

Perry, D. K. and W. M. Cannon. "Vocational Interests of Computer Programmers." Journal of Applied Psychology, 51 (1967), 28-34.

Perry, D. K. and W. M. Cannon. "Vocational Interests of Female Computer Programmers." Journal of Applied Psychology, 52 (1968), 31-35.

Ranftl, Robert M. "Productivity--A Critical Challenge of the 1980s." Infosystems, 26 (October, 1979), 55-66.

Robb, James A. "A Study in the Selection of Predictors for Success in an Electronic Data Processing Course." (Unpub. Ph.D. dissertation, Southern Illinois University, 1974.)

Rosenberg, Jerry M. Dictionary of Business and Management. New York: John Wiley and Sons, 1978.

Silver, Gerald A. and Joan B. Silver. Data Processing for Business, Edition. New York: Harcourt Brace Jovanovich, Inc., 1981.

Simpson, Dan. "Pitfalls in dp Promotion." Data Processing, 21, 8 (October, 1979), 16-18.

Simpson, Dan. "What are Computer People Really Like?" Data Processing, 21, 7 (September, 1979), 14-16.

Slaughter, Gary. "Managing the Maverick: A Three-Point Approach for DP Professionals, Part 1." Computerworld, (March 22, 1982), In Depth 12-In Depth 20.

Sprecher, Jerry. "Personality and Behavioral Factors Related to Success in Computing." (Unpub. M.S. thesis, California State University, Fresno, CA, 1980.)

Stevens, Barry A. "Probing the DP Psyche." Computerworld, (July 21, 1980), In Depth 25-In Depth 29.

Strizenec, M. "Psychological Analysis of Work and Selection of Computer Operators and Programmers." Studia Psychologica, 15, 3, (1973), 194-203.

Tanniru, Mohan and Susan Taylor. "Causes of Turnover Among Data Processing Professionals--Some Preliminary Findings." Proceedings of the Eighteenth Annual Computer Personnel Research Conference, (1981), 224-241.

Taylor, Kenneth E. and David J. Weiss. "Prediction of Individual Job Termination from Measured Job Satisfaction and Biographical Data." Journal of Vocational Behavior, 2, (1972), 123-132.

Vroom, V. H. Work and Motivation. New York: Wiley, 1964.

Walsh, James A. The Eighth Mental Measurements Yearbook: Vol. 1. Ed., Oscar Krisen Buros. Highland Park, N. J.: The Gryphon Press, 1978, 1081-1083.

Wanous, John P. "A Causal-Correlational Analysis of the Job Satisfaction and Performance Relationship." Journal of Applied Psychology, 59, 2, (1974), 139-144.

Weinberg, Gerald M. The Psychology of Computer Programming. New York: Van Nostrand Reinhold Co., 1971.

Weiss, David J., Rene V. Dawis, George W. England, and Lloyd H. Lofquist. Manual for the Minnesota Satisfaction Questionnaire. Minneapolis, Minn.: University of Minnesota, 1967.

Willis, Eugene. "Job Satisfaction and Personality Traits of Certified Public Accountants." (Unpub. Ph.D. dissertation, University of Cincinnati, 1975.)

Willoughby, Theodore C. "Are Programmers Paranoid?" Proceedings of the Tenth Annual Computer Personnel Research Conference, (1972), 47-54.

Woodhouse, Robert H. "The Impact of Turnover on Effectiveness: An Experimental, Simulation Study." (Unpub. Ph.D. dissertation, The University of Iowa, 1979.)

Woodruff, Charles K. "An Empirical Study of Individual Congruence and the Perceived Organizational Practices - Job Satisfaction - Job Performance Relationship in Selected Electronic Computer Data Processing Centers." (Unpub. Ph.D. dissertation, Georgia State University, 1977.)

Woodruff, Charles K. "Consideration of Selected Personality-Job Satisfaction Constructs Relevant to Project Management in Data Processing Organizations." Proceedings of the Sixteenth Annual Computer Personnel Research Conference, (1979), 13-17.

Yates, Arthur. "A Strategy for Computer Programmer Productivity Improvement." Proceedings of the Thirteenth Annual Computer Personnel Research Conference, (1975), 72-90.

APPENDIX A

CORRESPONDENCE TO VOCATIONAL PSYCHOLOGY RESEARCH

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74078
(405) 624-5064

February 23, 1983

Ms. Nancy Holt
N620 Elliott Hall
75 East River Road
University of Minnesota
Minneapolis, MN 55455

Dear Ms. Holt:

I am seeking permission to reproduce the long-form Minnesota Satisfaction Questionnaire for my doctoral research. I will be examining the relationship of personality characteristics and job satisfaction of computer programmers in Oklahoma. Data will be collected using Cattell's Sixteen PF Questionnaire and the Minnesota Satisfaction Questionnaire along with a demographic information survey.

Your cooperation would be greatly appreciated.

Sincerely,

Nancy Allison

Nancy Allison
Doctoral Candidate

Dr. Richard Aukerman
Thesis Adviser

UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Psychology
Elliott Hall
75 East River Road
Minneapolis, Minnesota 55455

Ms. Nancy Allison
Oklahoma State University
College of Business Administration
Stillwater, Oklahoma 74078

March 3, 1983

Dear Nancy:

Thank you for expressing interest in the instruments published by Vocational Psychology Research. You are hereby granted permission to administer, score and interpret results received in your use of the Minnesota Satisfaction Questionnaire, Long Form.

Vocational Psychology Research also waives copyright and royalty fees in granting you permission to reproduce the MSQ Long Form in the implementation of your dissertation research. Any citation included in your dissertation should read as follows: "Reproduced by permission of Vocational Psychology Research, University of Minnesota, Copyright 1977."

Best wishes for quick and successful completion of your dissertation. If there is any additional information or service we can provide throughout this process, or in future research, please do not hesitate to contact me.

Sincerely,

Nancy Holt

Nancy Holt
Coordinator, Vocational Psychology Research

David J. Weiss
Director, Vocational Psychology Research

APPENDIX B

THE QUESTIONNAIRE

INFORMATION SHEET

Please answer the following questions by circling the correct answer or filling in the blank:

1. What is your age?
   a. 16-25 b. 26-35 c. 36-45 d. 46-55 e. Over 55

2. Gender? Male Female

3. How many years have you worked as a programmer in a business? _____

4. For how many different companies have you worked as a programmer? _____

5. What is the primary business purpose of your firm?

   a. Agriculture
   b. Mining
   c. Wholesale/Retail
   d. Construction
   e. Communication
   f. Government
   g. Transportation
   h. Finance/Insurance/Real Estate
   i. Service
   j. Other _____

6. Which of the following job titles best describes your current position?
   a. Business Applications Programmer
   b. Systems Software Programmer
   c. Research Applications Programmer
   d. Other _____

7. What is the primary language in which you write your programs?
   a. COBOL
   b. RPG
   c. BASIC
   d. FORTRAN
   e. Other _____

8. Approximately how many hours do you spend on a weekly basis in connection with your work?
   a. 30 or less
   b. 31-40
   c. 41-50
   d. 51-60
   e. More than 60

9. What is the highest educational degree you hold?
   a. High school diploma
   b. Two-year associate degree or vocational certificate
   c. Bachelor's degree
   d. Master's degree
   e. Doctoral degree
   f. Other _____

10. At what institution did you receive your highest degree?

    Name _____

    Place _____

11. In completing your highest degree, what was your area of specialization?
    a. Computer Science
    b. Business
    c. Math
    d. Other _____

minnesota satisfaction questionnaire*

The purpose of this questionnaire is to give you a chance to tell **how you feel about your present job,** what things you are **satisfied** with and what things you are **not satisfied** with.

On the basis of your answers and those of people like you, we hope to get a better understanding of the things people **like and dislike about their jobs.**

*Ask yourself: How **satisfied** am I with this aspect of my job?*

***Very Sat.** means I am very satisfied with this aspect of my job.*

***Sat.** means I am satisfied with this aspect of my job.*

***N** means I can't decide whether I am satisfied or not with this aspect of my job.*

***Dissat.** means I am dissatisfied with this aspect of my job.*

***Very Dissat.** means I am very dissatisfied with this aspect of my job.*

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. The chance to be of service to others.	☐	☐	☐	☐	☐
2. The chance to try out some of my own ideas.	☐	☐	☐	☐	☐
3. Being able to do the job without feeling it is morally wrong.	☐	☐	☐	☐	☐
4. The chance to work by myself.	☐	☐	☐	☐	☐
5. The variety in my work.	☐	☐	☐	☐	☐
6. The chance to have other workers look to me for direction.	☐	☐	☐	☐	☐
7. The chance to do the kind of work that I do best.	☐	☐	☐	☐	☐
8. The social position in the community that goes with the job.	☐	☐	☐	☐	☐
9. The policies and practices toward employees of this company.	☐	☐	☐	☐	☐
10. The way my supervisor and I understand each other.	☐	☐	☐	☐	☐
11. My job security.	☐	☐	☐	☐	☐
12. The amount of pay for the work I do.	☐	☐	☐	☐	☐
13. The working conditions (heating, lighting, ventilation, etc.) on this job.	☐	☐	☐	☐	☐
14. The opportunities for advancement on this job.	☐	☐	☐	☐	☐
15. The technical "know-how" of my supervisor.	☐	☐	☐	☐	☐
16. The spirit of cooperation among my co-workers.	☐	☐	☐	☐	☐
17. The chance to be responsible for planning my work.	☐	☐	☐	☐	☐
18. The way I am noticed when I do a good job.	☐	☐	☐	☐	☐
19. Being able to see the results of the work I do.	☐	☐	☐	☐	☐
20. The chance to be active much of the time.	☐	☐	☐	☐	☐
21. The chance to be of service to people.	☐	☐	☐	☐	☐
22. The chance to do new and original things on my own.	☐	☐	☐	☐	☐
23. Being able to do things that don't go against my religious beliefs.	☐	☐	☐	☐	☐
24. The chance to work alone on the job.	☐	☐	☐	☐	☐
25. The chance to do different things from time to time.	☐	☐	☐	☐	☐
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

*Ask yourself: How **satisfied** am I with this aspect of my job?*

***Very Sat.** means I am very satisfied with this aspect of my job.*

***Sat.** means I am satisfied with this aspect of my job.*

***N** means I can't decide whether I am satisfied or not with this aspect of my job.*

***Dissat.** means I am dissatisfied with this aspect of my job.*

***Very Dissat.** means I am very dissatisfied with this aspect of my job.*

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
26. The chance to tell other workers how to do things.	☐	☐	☐	☐	☐
27. The chance to do work that is well suited to my abilities.	☐	☐	☐	☐	☐
28. The chance to be "somebody" in the community.	☐	☐	☐	☐	☐
29. Company policies and the way in which they are administered.	☐	☐	☐	☐	☐
30. The way my boss handles his/her employees.	☐	☐	☐	☐	☐
31. The way my job provides for a secure future.	☐	☐	☐	☐	☐
32. The chance to make as much money as my friends.	☐	☐	☐	☐	☐
33. The physical surroundings where I work.	☐	☐	☐	☐	☐
34. The chances of getting ahead on this job.	☐	☐	☐	☐	☐
35. The competence of my supervisor in making decisions.	☐	☐	☐	☐	☐
36. The chance to develop close friendships with my co-workers.	☐	☐	☐	☐	☐
37. The chance to make decisions on my own.	☐	☐	☐	☐	☐
38. The way I get full credit for the work I do.	☐	☐	☐	☐	☐
39. Being able to take pride in a job well done.	☐	☐	☐	☐	☐
40. Being able to do something much of the time.	☐	☐	☐	☐	☐
41. The chance to help people.	☐	☐	☐	☐	☐
42. The chance to try something different.	☐	☐	☐	☐	☐
43. Being able to do things that don't go against my conscience.	☐	☐	☐	☐	☐
44. The chance to be alone on the job.	☐	☐	☐	☐	☐
45. The routine in my work.	☐	☐	☐	☐	☐
46. The chance to supervise other people.	☐	☐	☐	☐	☐
47. The chance to make use of my best abilities.	☐	☐	☐	☐	☐
48. The chance to "rub elbows" with important people.	☐	☐	☐	☐	☐
49. The way employees are informed about company policies.	☐	☐	☐	☐	☐
50. The way my boss backs up his/her employees (with top management).	☐	☐	☐	☐	☐
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Ask yourself: How ***satisfied*** *am I with this aspect of my job?*

Very Sat. *means I am very satisfied with this aspect of my job.*

Sat. *means I am satisfied with this aspect of my job.*

N *means I can't decide whether I am satisfied or not with this aspect of my job.*

Dissat. *means I am dissatisfied with this aspect of my job.*

Very Dissat. *means I am very dissatisfied with this aspect of my job.*

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
51. The way my job provides for steady employment.	☐	☐	☐	☐	☐
52. How my pay compares with that for similar jobs in other companies.	☐	☐	☐	☐	☐
53. The pleasantness of the working conditions.	☐	☐	☐	☐	☐
54. The way promotions are given out on this job.	☐	☐	☐	☐	☐
55. The way my boss delegates work to others.	☐	☐	☐	☐	☐
56. The friendliness of my co-workers.	☐	☐	☐	☐	☐
57. The chance to be responsible for the work of others.	☐	☐	☐	☐	☐
58. The recognition I get for the work I do.	☐	☐	☐	☐	☐
59. Being able to do something worthwhile.	☐	☐	☐	☐	☐
60. Being able to stay busy.	☐	☐	☐	☐	☐
61. The chance to do things for other people.	☐	☐	☐	☐	☐
62. The chance to develop new and better ways to do the job.	☐	☐	☐	☐	☐
63. The chance to do things that don't harm other people.	☐	☐	☐	☐	☐
64. The chance to work independently of others.	☐	☐	☐	☐	☐
65. The chance to do something different every day.	☐	☐	☐	☐	☐
66. The chance to tell people what to do.	☐	☐	☐	☐	☐
67. The chance to do something that makes use of my abilities.	☐	☐	☐	☐	☐
68. The chance to be important in the eyes of others.	☐	☐	☐	☐	☐
69. The way company policies are put into practice.	☐	☐	☐	☐	☐
70. The way my boss takes care of the complaints of his/her employees.	☐	☐	☐	☐	☐
71. How steady my job is.	☐	☐	☐	☐	☐
72. My pay and the amount of work I do.	☐	☐	☐	☐	☐
73. The physical working conditions of the job.	☐	☐	☐	☐	☐
74. The chances for advancement on this job.	☐	☐	☐	☐	☐
75. The way my boss provides help on hard problems.	☐	☐	☐	☐	☐
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Ask yourself: How ***satisfied*** *am I with this aspect of my job?*

Very Sat. *means I am very satisfied with this aspect of my job.*

Sat. *means I am satisfied with this aspect of my job.*

N *means I can't decide whether I am satisfied or not with this aspect of my job.*

Dissat. *means I am dissatisfied with this aspect of my job.*

Very Dissat. *means I am very dissatisfied with this aspect of my job.*

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
76. The way my co-workers are easy to make friends with.	☐	☐	☐	☐	☐
77. The freedom to use my own judgment.	☐	☐	☐	☐	☐
78. The way they usually tell me when I do my job well.	☐	☐	☐	☐	☐
79. The chance to do my best at all times.	☐	☐	☐	☐	☐
80. The chance to be "on the go" all the time.	☐	☐	☐	☐	☐
81. The chance to be of some small service to other people.	☐	☐	☐	☐	☐
82. The chance to try my own methods of doing the job.	☐	☐	☐	☐	☐
83. The chance to do the job without feeling I am cheating anyone.	☐	☐	☐	☐	☐
84. The chance to work away from others.	☐	☐	☐	☐	☐
85. The chance to do many different things on the job.	☐	☐	☐	☐	☐
86. The chance to tell others what to do.	☐	☐	☐	☐	☐
87. The chance to make use of my abilities and skills.	☐	☐	☐	☐	☐
88. The chance to have a definite place in the community.	☐	☐	☐	☐	☐
89. The way the company treats its employees.	☐	☐	☐	☐	☐
90. The personal relationship between my boss and his/her employees.	☐	☐	☐	☐	☐
91. The way layoffs and transfers are avoided in my job.	☐	☐	☐	☐	☐
92. How my pay compares with that of other workers.	☐	☐	☐	☐	☐
93. The working conditions.	☐	☐	☐	☐	☐
94. My chances for advancement.	☐	☐	☐	☐	☐
95. The way my boss trains his/her employees.	☐	☐	☐	☐	☐
96. The way my co-workers get along with each other.	☐	☐	☐	☐	☐
97. The responsibility of my job.	☐	☐	☐	☐	☐
98. The praise I get for doing a good job.	☐	☐	☐	☐	☐
99. The feeling of accomplishment I get from the job.	☐	☐	☐	☐	☐
100. Being able to keep busy all the time.	☐	☐	☐	☐	☐
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

IMPORTANT: Before beginning the next questionnaire, please be sure to read the instructions on the front of the test booklet. Mark all answers on the enclosed one-page answer sheet and return the entire packet of completed information (including test booklet) in the stamped envelope provided. PLEASE DO NOT WRITE YOUR NAME ON THE ANSWER SHEET. Thank you for your cooperation in this research effort.

APPENDIX C

CORRESPONDENCE TO DATA PROCESSING PROFESSIONALS

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74078
405 624-5054

January 20, 1983

Dear Data Processing Manager:

SUBJECT: JOB SATISFACTION SURVEY

Your company could be losing thousands of dollars from increased training expenses and decreased levels of productivity due to dissatisfied programmers. To combat this problem, many organizations are reviewing their methods of personnel selection as well as their managerial strategies. It may be that executives who take the time to discover programmers' personality characteristics can use this knowledge to manage their employees more effectively. Knowledge of these characteristics could also be beneficial in selecting programmers who will be satisfied with their job responsibilities.

We are conducting a survey aimed at developing a personality profile for computer programmers. The relationship between these personality characteristics and programmers' job satisfaction will then be analyzed to discover if highly satisfied programmers tend to have certain personality characteristics.

Since our survey will include prominent Oklahoma businesses, your help would be appreciated. To participate in this study, you need only supply us with a list of your programmers' names. We will then randomly select several programmers to complete the personality and job satisfaction questionnaires. The time required to complete the instrument is approximately one-half hour. We will merge the data with that received from programmers in other companies. All information will be handled in strict confidence. The results will be reported in group form only, and individual responses will in no way be identified with specific companies. When the study is completed, you will receive a copy of the findings.

We need your help to complete an accurate, valid study. Please fill out and return the enclosed card immediately, indicating your willingness to participate in this study. Then send a complete list of your computer programmers in the stamped envelope by January 30.

With your cooperation, we can promote a greater understanding of computer professionals and provide information which will aid in solving the critical problem of job turnover.

Sincerely,

Nancy Allison

Nancy Allison
Doctoral Candidate

Richard Aukerman

Dr. Richard Aukerman
Thesis Advisor

___ Yes, my company will participate in your study. I will send a list of programmers.

___ No, my company does not wish to participate in your study.

___ Please send a copy of the findings at no charge.

Name _____

Job title _____

Address _____

_____

Telephone _____

Oklahoma State University
COLLEGE OF BUSINESS ADMINISTRATION
STILLWATER, OKLAHOMA 74078
(405) 624-5064

February 3, 1983

Dear EDP Manager:

SUBJECT: FOLLOW-UP OF JOB SATISFACTION SURVEY

Recently you received a letter requesting your firm's participation in a study to determine the relationship between job satisfaction and personality characteristics of computer programmers in Oklahoma. At the time this letter was mailed, a list of computer programmers had not been received from your organization. If the list has since been completed and returned, I thank you.

As the EDP manager of your company, would you please send a list of programmers so that your firm can be included in the survey? If possible, the list of programmers should be returned on or before February 13. I would be happy to answer any questions you have concerning the use of your list of programmers. You can reach me at (405) 624-6286 during regular business office hours. A stamped, self-addressed envelope has been included for your convenience in returning the list of programmers.

Your cooperation is very much appreciated. By participating in this study, you could learn more about your computer programmers and possibly reduce the critical problem of job turnover.

Sincerely,

Nancy Allison
Doctoral Candidate

Richard Aukerman
Thesis Advisor

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74078
405/624-5064

March 21, 1983

SUBJECT: PERSONALITY AND JOB SATISFACTION SURVEY

"If my boss only understood me, things would be a lot better here at work." This feeling seems to be fairly common among computer programmers in this fast-paced, high-demand business setting.

In an effort to better understand their programmers' needs and level of job satisfaction, your company has agreed to participate in a state-wide survey. You have been selected to complete the enclosed questionnaire along with several other programmers within your firm. The questionnaire is aimed at identifying personality characteristics of computer programmers and the possible relationship between personality and job satisfaction. Once identified, these factors could be used in career path development and career counseling as well as being used to increase management's understanding of their computer professionals.

This questionnaire has been designed to measure these factors and should take approximately one-half hour of your time. Your answers will be merged with those of computer professionals throughout Oklahoma, and all information will be handled in strict confidence. The results will be reported in group form only, and individual responses will in no way be identified with specific companies.

Please complete the questionnaire and return it in the enclosed, stamped envelope by March 31, 1983. The post card may be used to request a copy of the results of the study.

With your cooperation, we can promote a greater understanding of computer professionals and provide information which could aid in increasing your job satisfaction.

Sincerely,

Nancy Allison

Nancy Allison
Doctoral Candidate

Richard Aukerman

Richard Aukerman
Thesis Adviser

Please send me a copy of the findings of your completed study. I understand that there will be no charge for this.

Name _____

Job title _____

Address _____

_____

Telephone _____

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74078
(405) 624-5064

April 20, 1983

Dear Computer Professional:

SUBJECT: FOLLOW-UP OF PERSONALITY AND JOB SATISFACTION SURVEY

Recently you received a letter requesting your participation in a study to determine the relationship between job satisfaction and personality characteristics of computer programmers in Oklahoma. At the time this letter was mailed, a response had not been received from you. If the questionnaire has since been completed and returned, I thank you.

As an experienced computer professional, would you please complete the enclosed questionnaire? If possible, the questionnaire should be returned on or before April 30. A stamped, self-addressed envelope has been included for your convenience in returning the questionnaire.

Your cooperation is very much appreciated. By participating in this study, you can promote a greater understanding of computer professionals and provide information which might aid in increasing your job satisfaction.

Sincerely,

Nancy Allison
Doctoral Candidate

Richard Aukerman
Thesis Advisor

APPENDIX D

SUMMARY TABLE OF CORRELATION COEFFICIENTS FOR PERSONALITY AND JOB SATISFACTION VARIABLES

Personality Variable / Satisfaction Variable	A	B	C	E	F	G	H	I	L	M	N	O	Q1	Q2	Q3	Q4
Abil. Util.	-.015	.087	.044	.018	-.149	.082	.023	-.089	-.087	-.099	.053	-.069	.003	.028	-.098	-.068
Achievement	-.014	.050	.047	.030	-.143	.062	.014	-.015	-.161*	-.002	-.026	-.038	-.070	.034	.051	-.152
Activity	-.036	.049	.102	-.102	-.169*	.103	-.047	-.039	-.204*	-.119	.022	.013	-.148	.006	.107	-.071
Advancement	-.125	-.015	-.009	-.180*	-.219*	.023	-.032	.031	-.122	-.128	-.016	.057	-.118	.106	.071	-.113
Authority	-.018	.131	.173*	-.038	-.086	.099	.040	-.001	-.224*	-.045	-.106	-.050	-.071	-.029	.162*	-.271*
Company Pol.	.060	.039	.051	-.101	-.066	.038	-.003	-.069	-.173*	-.071	.065	-.076	-.103	-.001	.149	-.143
Compensation	-.034	.165*	-.021	-.019	-.112	.100	-.101	-.032	-.185*	.042	.027	.057	-.079	.045	.109	-.125
Co-Workers	-.003	.056	.011	-.149	-.071	.105	.047	-.040	-.282*	-.264*	-.040	-.029	-.131	-.016	.125	-.041
Creativity	.038	.174*	.063	-.056	-.109	.131	.048	-.120	-.332*	.068	-.104	-.112	-.099	-.073	.190*	-.228*
Independence	.102	.237*	.074	-.080	-.108	.146	.086	-.069	-.284*	-.096	-.090	-.112	-.143	-.087	.116	-.118
Moral Values	-.018	.002	.070	-.094	-.060	.087	.069	-.075	-.258*	.004	.004	-.070	-.030	-.068	.032	-.113
Recognition	.073	.055	.063	-.003	-.045	.053	.081	-.083	-.194*	-.140	.091	-.037	-.043	-.088	.049	-.079
Respons.	.089	.046	.034	-.037	-.115	.127	-.002	-.155	-.079	-.112	-.044	.083	-.082	-.047	.121	-.127
Security	.174*	.216*	.086	-.031	-.098	.147	.047	-.040	-.309*	-.145	-.079	-.111	-.169*	-.107	.190*	-.203*
Soc. Service	.100	.209*	.075	-.068	-.111	.120	.083	-.093	-.265*	-.111	-.088	-.021	-.179*	-.091	.150	-.145
Soc. Status	.039	.068	.063	-.138	-.091	.117	-.010	.002	-.090	-.126	-.020	-.020	-.134	.074	.128	.010
Supv-Hum Rel	-.049	.103	.044	-.050	-.224*	.141	-.011	-.033	-.179*	-.082	.035	-.016	-.123	.036	.044	-.082
Supv-Tech	.030	.213*	.061	-.055	-.136	.108	.084	-.106	-.277*	-.133	-.075	-.010	-.158	-.076	.018	-.126
Variety	.008	.097	.138	-.009	-.140	.099	.059	-.047	-.178*	-.096	-.054	-.027	-.052	-.072	.048	-.160*
Working Cond.	.035	-.014	.118	.129	-.099	.101	-.066	.028	-.003	.008	-.042	.015	.085	.089	-.014	-.040
Gen. Satis.	.046	.179	.091	-.087	-.158	.159	.047	-.078	-.322*	-.117	-.050	-.033	-.161*	-.054	.141	-.184*

*p < .05

APPENDIX E

SUMMARY OF ANALYSIS OF VARIANCE PROCEDURES

TABLE XIII

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON SIZE OF DP CENTER (*p < .05; df are 2, 148)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.839	0.26	0.7742
Achievement	20.497	0.44	0.6436
Activity	9.742	0.79	0.4556
Advancement	9.369	0.22	0.8064
Authority	19.475	0.41	0.6655
Company Policies	12.871	0.05	0.9495
Compensation	21.050	0.14	0.8676
Co-Workers	8.547	0.27	0.7659
Creativity	28.721	0.56	0.5736
Independence	30.412	3.61	0.0294*
Moral Values	22.739	4.60	0.0115*
Recognition	27.087	0.89	0.4120
Responsibility	25.381	0.80	0.4520
Security	29.824	0.32	0.7233
Social Service	27.031	2.70	0.0704
Social Status	10.021	1.31	0.2728
Supv--Human Relations	15.554	0.19	0.8269
Supv--Technical	29.833	0.25	0.7810
Variety	15.495	0.13	0.8820
Working Conditions	15.091	0.59	0.5562
Gen. Satisfaction	150.008	0.01	0.9918

TABLE XIV

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON GENDER
(*p < .05; df are 1, 149)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.784	0.21	0.6482
Achievement	20.441	0.29	0.5896
Activity	9.765	0.24	0.6282
Advancement	9.161	2.80	0.0962
Authority	19.291	1.23	0.2684
Company Policies	12.785	0.09	0.7590
Compensation	20.908	0.29	0.5891
Co-Workers	8.428	1.64	0.2030
Creativity	28.743	0.00	0.9516
Independence	31.643	0.19	0.6658
Moral Values	23.914	0.48	0.4905
Recognition	27.212	0.09	0.7617
Responsibility	25.351	0.77	0.3813
Security	29.666	0.44	0.5080
Social Service	27.749	0.44	0.5083
Social Status	9.967	2.43	0.1208
Supv--Human Relations	15.389	0.97	0.3252
Supv--Technical	29.724	0.04	0.8470
Variety	15.349	0.66	0.4170
Working Conditions	15.056	0.53	0.4685
Gen. Satisfaction	148.273	0.75	0.3886

TABLE XV

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON AGE
(*p < .05; df are 4, 146)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.855	0.58	0.6788
Achievement	20.197	1.27	0.2830
Activity	9.670	1.17	0.3252
Advancement	9.197	1.30	0.2729
Authority	19.492	0.67	0.6119
Company Policies	12.815	0.69	0.6008
Compensation	20.610	1.36	0.2493
Co-Workers	8.544	0.65	0.6312
Creativity	27.657	2.21	0.0704
Independence	31.666	0.77	0.5469
Moral Values	23.730	1.16	0.3316
Recognition	26.728	1.45	0.2209
Responsibility	25.079	1.35	0.2546
Security	29.712	0.80	0.5255
Social Service	27.139	1.70	0.1534
Social Status	9.690	2.44	0.0495*
Supv--Human Relations	15.309	1.19	0.3187
Supv--Technical	29.917	0.52	0.7216
Variety	15.141	1.43	0.2272
Working Conditions	15.196	0.54	0.7096
Gen. Satisfaction	147.235	1.20	0.3130

TABLE XVI

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON YEARS OF EXPERIENCE (*p < .05; df are 4, 146)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.192	2.77	0.0293*
Achievement	20.641	0.46	0.7637
Activity	9.696	1.07	0.3724
Advancement	9.331	0.76	0.5533
Authority	19.587	0.49	0.7419
Company Policies	12.805	0.72	0.5826
Compensation	20.594	1.39	0.2392
Co-Workers	8.436	1.12	0.3478
Creativity	27.503	2.43	0.0503
Independence	31.027	1.54	0.1945
Moral Values	23.423	1.65	0.1643
Recognition	26.702	1.49	0.2094
Responsibility	25.369	0.92	0.4559
Security	29.199	1.46	0.2179
Social Service	27.489	1.21	0.3079
Social Status	10.273	0.23	0.9203
Supv--Human Relations	15.444	0.86	0.4905
Supv--Technical	29.653	0.85	0.4963
Variety	15.289	1.06	0.3773
Working Conditions	14.793	1.55	0.1918
Gen. Satisfaction	149.191	0.71	0.5887

TABLE XVII

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON AREA OF SPECIALIZATION (*p < .05; df are 3, 138)

Satisfaction Variable	Error	F Value	p
Ability Utilization	12.034	0.14	0.9327
Achievement	19.192	0.46	0.7128
Activity	9.789	0.59	0.6292
Advancement	9.381	0.43	0.7335
Authority	18.157	0.65	0.5891
Company Policies	12.072	2.66	0.0498*
Compensation	20.926	0.10	0.9569
Co-Workers	8.275	1.42	0.2379
Creativity	28.339	1.52	0.2098
Independence	29.592	4.65	0.0041*
Moral Values	23.657	1.84	0.1404
Recognition	25.612	1.39	0.2467
Responsibility	24.641	0.74	0.5312
Security	29.632	1.07	0.3663
Social Service	25.620	4.37	0.0058*
Social Status	10.570	0.85	0.4737
Supv--Human Relations	15.132	0.71	0.5494
Supv--Technical	28.551	2.19	0.0909
Variety	14.958	0.34	0.8011
Working Conditions	15.537	0.15	0.9247
Gen. Satisfaction	142.591	1.26	0.2913

TABLE XVIII

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON NUMBER OF COMPANIES (*p < .05; df are 2, 148)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.791	0.56	0.5745
Achievement	19.865	2.81	0.0633
Activity	9.738	0.82	0.4408
Advancement	9.377	0.15	0.8579
Authority	19.071	1.98	0.1411
Company Policies	12.774	0.62	0.5412
Compensation	20.233	3.14	0.0463*
Co-Workers	8.546	0.28	0.7583
Creativity	28.863	0.19	0.8255
Independence	31.337	1.32	0.2695
Moral Values	23.998	0.48	0.6219
Recognition	27.108	0.83	0.4370
Responsibility	25.613	0.12	0.8857
Security	28.897	2.71	0.0700
Social Service	27.426	1.60	0.2059
Social Status	10.063	0.99	0.3730
Supv--Human Relations	15.360	1.13	0.3267
Supv--Technical	29.605	0.82	0.4427
Variety	15.447	0.36	0.7003
Working Conditions	15.165	0.23	0.7967
Gen. Satisfaction	148.397	0.81	0.4462

TABLE XIX

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON HIGHEST DEGREE RECEIVED (*p < .05; df are 4, 146)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.866	0.54	0.7030
Achievement	20.666	0.42	0.7958
Activity	9.574	1.55	0.1896
Advancement	8.977	2.23	0.0686
Authority	19.342	0.96	0.4308
Company Policies	12.792	0.75	0.5570
Compensation	20.996	0.67	0.6154
Co-Workers	8.072	2.82	0.0273*
Creativity	27.429	2.54	0.0426*
Independence	31.262	1.25	0.2917
Moral Values	23.503	1.52	0.1984
Recognition	27.446	0.46	0.7677
Responsibility	25.375	0.91	0.4614
Security	29.423	1.17	0.3271
Social Service	27.470	1.24	0.2973
Social Status	9.765	2.14	0.0784
Supv--Human Relations	15.397	0.97	0.4248
Supv--Technical	29.194	1.44	0.2248
Variety	15.193	1.30	0.2727
Working Conditions	15.098	0.78	0.5417
Gen. Satisfaction	146.253	1.45	0.2193

TABLE XX

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON CITY OF EMPLOYMENT (*p < .05; df are 2, 148)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.842	0.24	0.7899
Achievement	20.475	0.52	0.5950
Activity	9.814	0.25	0.7816
Advancement	9.370	0.21	0.8134
Authority	19.458	0.47	0.6238
Company Policies	12.656	1.31	0.2725
Compensation	20.954	0.48	0.6178
Co-Workers	8.354	1.99	0.1407
Creativity	28.689	0.64	0.5286
Independence	28.704	8.23	0.0004*
Moral Values	23.314	2.66	0.0730
Recognition	27.388	0.07	0.9343
Responsibility	25.155	1.47	0.2331
Security	28.840	2.86	0.0603
Social Service	24.851	9.43	0.0001*
Social Status	10.142	0.41	0.6617
Supv--Human Relations	15.128	2.28	0.1057
Supv--Technical	26.943	8.21	0.0004*
Variety	15.039	2.37	0.0969
Working Conditions	15.163	0.24	0.7908
Gen. Satisfaction	145.408	2.35	0.0990

TABLE XXI

ANALYSIS OF VARIANCE OF MINNESOTA SATISFACTION QUESTIONNAIRE SCORES ON PROGRAMMING DUTIES (*p < .05; df are 1, 149)

Satisfaction Variable	Error	F Value	p
Ability Utilization	11.750	0.63	0.4271
Achievement	20.467	0.10	0.7506
Activity	9.707	1.12	0.2907
Advancement	9.231	1.65	0.2011
Authority	19.433	0.14	0.7090
Company Policies	12.778	0.18	0.6697
Compensation	20.903	0.33	0.5660
Co-Workers	8.520	0.01	0.9253
Creativity	28.691	0.27	0.6021
Independence	31.537	0.69	0.4088
Moral Values	23.990	0.00	0.9575
Recognition	26.955	1.52	0.2202
Responsibility	24.976	3.02	0.0842
Security	29.679	0.38	0.5395
Social Service	27.702	0.69	0.4074
Social Status	10.043	1.30	0.2570
Supv--Human Relations	15.454	0.34	0.5617
Supv--Technical	29.674	0.29	0.5905
Variety	15.346	0.69	0.4077
Working Conditions	15.103	0.06	0.8009
Gen. Satisfaction	148.266	0.76	0.3863

VITA

Nancy Louise Allison

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP BETWEEN PERSONALITY CHARACTERISTICS AND JOB SATISFACTION OF SELECTED COMPUTER PROGRAMMERS

Major Field: Business Education

Biographical:

Personal Data: Born in Chanute, Kansas, July 2, 1952, the daughter of Mr. and Mrs. G. W. Allison.

Education: Graduated from Chanute High School, Chanute, Kansas, in May, 1970; received Associate of Arts degree from Neosho County Community College in 1972; received Bachelor of Science degree in Spanish Education from the University of Kansas in 1975; received Master of Science in Counseling from Pittsburg State University in 1979; completed requirements for the Doctor of Education degree at Oklahoma State University in July, 1983.

Professional Experience: Spanish instructor, Field Kindley High School, Coffeyville, Kansas, 1975-1979; counselor, Roosevelt Junior High School, Coffeyville, Kansas, 1979-1981; off-campus instructor, Pittsburg State University, 1979-1980; graduate teaching associate, Oklahoma State University, School of Business Administration, 1981-1983.

Professional Organizations: Data Processing Management Association; Society of Data Educators; American Society for Training and Development; Delta Pi Epsilon; Beta Gamma Sigma; Phi Beta Kappa; Phi Kappa Phi.