

A STUDY OF PERCEIVED NEED SATISFACTION
IN COMPUTER PROGRAMMERS

A Thesis Presented to the Graduate Faculty
of
California State University, Hayward

In Partial Fulfillment
of the Requirements for the Degree
Master of Business Administration in
Management Sciences

By
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May, 1973

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May 8, 1973
May 15, 1973
May 15, 1973

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Chapter 1

INTRODUCTION: THE FOCUS OF THE STUDY

The plethora of studies concerning job satisfaction found in literature is an indication of the perplexed state of the art. Part of the confusion is a result of the broad range of job classifications measured and the different criteria utilized. Closely associated with the concepts of satisfaction are the motivational processes that drive an individual to his level of expectancy. Motives comprise psychological components based on, among other things, cultural and environmental influences.

This paper examines the perceived need satisfactions experienced by a relatively new technical profession, computer programmers. For purposes of this study, the job description of a programmer is an individual who designs, codes, or programs a computer software system in a time sharing enterprise. This system is composed of a library of application programmers available to the consumer under a service contract. Applications are designed for routine business, scientific, and mathematical problems. The work organization is made up of functional departments designed to maintain current programs, design new applications as the demand arises, improve the

executive program that directs users to their needs, and account for user time for billing purposes. Programmers in such an organization are the technical middlemen between the marketing and operating functions.

The firm whose programmers are surveyed is Tymshare, Incorporated of Cupertino, California. With sales in the \$12 million bracket, the company is an aggressive leader in the time sharing industry. In its short history, it has followed an aggressive strategy of mergers and acquisitions of marginal time sharing companies. Tymshare has gained notoriety with the completion of a fully integrated data communications network. They have a sales force throughout the country and a corporate headquarters and technical division located locally.

The Technical Division is composed of programmers and a small hardware force. Permission was granted to survey all programmers in the Technical Division. Originally, the measuring instrument was to be administered on an interprogrammer "mail system," whereby the programmer signs on to his teletype and a message appears that there is some "mail" waiting. The programmer then responds in code to receive the memo. It was thought that a fairly high response rate could be obtained since this would require the minimum amount of inconvenience and would be more conducive to a programmer's style. Unfortunately, the management could not comply for reasons of precedence

to other surveys and the occupancy of disk space on the system. Thus, a questionnaire was handed out and responses were collected in the usual manner.

Limitations of the Study

It must be pointed out at the outset that no definitive statement is being made about programmers' motivation to work or the relationships between motivation and job satisfaction. The research instrument is not designed to measure these latter aspects nor was there any attempt to secure such information from the sample.

The present research merely measures the attitudes of computer programmers in terms of fulfillment, satisfaction, and importance of five needs based on Maslow's hierarchial model. The findings from this sample may be quite different from the replication of this method on scientific programmers. Differences may also be great from company to company in the same time sharing industry. Therefore the conclusions and inferences discussed in this paper only indicate one measure of one sample of programmers.

The measuring instrument, which has been referred to as the Porter questionnaire, has been successfully applied to various groups of managers. There is no reason that it should not produce comparable data from members of professions other than managers, namely, computer programmers. Since managers and programmers have such things

in common as educational achievement, comparatively high salaries, and problem solving capabilities, their needs may coincide in some areas. Differences in attitude perceptions between the two professions will also be examined. The details of the methodology and administration are explained below.

Preview of the Findings

The subject of job satisfaction is presented in Chapter 2. While this review is not exhaustive, it does narrow down the topic in relation to the questions raised in the present study. Chapter 3 explains the framework of the questionnaire and the manner the data were categorized. Chapter 5 draws parallels between the results of the survey and the works of two major references directly related to computer programmers. Chapters 4 and 6 contain the basic analyses of the data collected from the questionnaires. Each attitude is discussed in terms of its relative score and then each need is ranked in relation to overall satisfaction. Finally, Chapter 7 summarizes the study in terms of expectations, research findings, and some implications of the results.

Chapter 2

REVIEW OF THE RELEVANT LITERATURE

The purpose of this section is to bring the broad theory of job satisfaction into a logical and workable framework to apply the data from this experiment. A good review of the organizational perspective of this topic is found in the writings of Mayo (1945), McGregor (1960), Maslow (1964), and Schien (1965). Their works categorize workers' attitudes about work as rational-economic, social, self-actualizing, and complex.

Research Contributions

A distinction must be made between the concepts of motivation and satisfaction. "Satisfaction is an end state, while motivation is a force ('drive') to achieve an end state."¹ The displacement of needs occurs as lower level needs become satiated and higher order needs are desired. Frustration sets in when the barriers to gratify that need become impassable. This dissatisfaction of a need is a deficiency of motive. "Job motivation occurs

¹Martin G. Wolf, "Need Gratification Theory: A Theoretical Reformation of Job Satisfaction/Dissatisfaction and Motivation," Journal of Applied Psychology, 1970, 54, 90.

when an individual perceives an opportunity to gratify an active need through job-related behavior."² Wolf's gratification theory departs at this point to discuss the degrees of satisfaction and dissatisfaction associated with varying conditions of need attainment. For example, Wolf proposes that satisfaction is greater when a previously deficient need becomes satisfied than if it were gratified immediately. This is a reasonable extension of Maslow's theory that is being tested in the literature.

One researcher who has contributed a great amount of work based on Maslow's theory is Lyman W. Porter. Most of his experiments were performed on the managerial occupational group. These works perfected the so-called Porter need satisfaction questionnaire used in the present study. Porter (1961) found among other things that Self-Actualization was the most critically deficient and important need category for bottom and middle management jobs.³ Then in four successive studies by Porter, his results suggested that the vertical location of a management job was related to need satisfaction;⁴ that the level or

²Ibid., p. 91.

³Lyman W. Porter, "A Study of Perceived Need Satisfaction in Bottom and Middle Management Jobs," Journal of Applied Psychology, 1961, 45, 1-10.

⁴Lyman W. Porter, "Job Attitudes in Management: I, Perceived Deficiencies as a Function of Job Level," Journal of Applied Psychology, 1962, 46, 375-384.

position of a job within management is related to the degree of perceived importance of needs;⁵ that line managers perceive greater need fulfillment than staff managers but they did not differ on the importance attached to each type of need;⁶ and that lower levels of management in small companies are more satisfied than large company managers, but higher levels of management in large companies are more satisfied than small company executives.⁷

Another study using a similar type of measuring instrument found that organizational structure may affect need satisfaction. Ghiselli and Johnson (1970) found that organizations characterized by a flat, broad span of control are more conducive to satisfaction than those that have tall or multi-level management structure with narrow spans of control. Friedlander (1964) found that,

. . . there are significant differences between the importance that an employee ascribes to various job characteristics as a source of satisfaction as opposed to these same job characteristics as a source of

⁵Lyman W. Porter, "Job Attitudes in Management: II, Perceived Importance of Needs as a Function of Job Level," Journal of Applied Psychology, 1963, 47, 141-148.

⁶Lyman W. Porter, "Attitudes in Management: III, Perceived Deficiencies in Need Fulfillment as a Function of Line Versus Staff Type of Job," Journal of Applied Psychology, 1963, 47, 267-275.

⁷Lyman W. Porter, "Attitudes in Management: IV, Perceived Deficiencies in Need Fulfillment as a Function of Size of Company," Journal of Applied Psychology, 1963, 47, 386-397.

dissatisfaction. Respondents who find certain aspects of the job particularly important to their satisfaction may not find the lack of or negative aspect of this same characteristic particularly important to their dissatisfaction.⁸

What About Computer Programmers?

To bring this broad spectrum of need satisfaction into a programming perspective, it was necessary to find studies that were performed on programmers or similar technically-oriented occupational groups. One such study performed by Wernimont, Toren, and Kapell (1970) surveyed a group of scientists and technicians and found a difference between motivating and satisfying job characteristics. Personal satisfaction was comprised of personal accomplishment, praise for good work, getting along with co-workers, company location, and receiving due credit for original ideas. Job effort or motivation was based on knowing what is expected of one, having a capable supervisor, having challenging work, and responsibility.

There have been studies done on the profession of computer programming and programmers including a book by Gerald M. Weinberg entitled, The Psychology of Computer Programming. In reference to motivation, ". . . programmers as a group are overmotivated, which is a major

⁸Frank Friedlander, "Job Characteristics of Satisfiers and Dissatisfiers," Journal of Applied Psychology, 1964, 48, 391.

reason why so many programming projects fall apart as the pressure grows."⁹ Having performed some preliminary informal studies, Weinberg summarizes some of the results of trying to find out what external factors motivate programmers.

. . . Among software programmers at one large shop, we found that 'a salary increase and/or bonus' would 'make a large effect on the results my manager would see in getting me to work at a sustained fast pace or keeping me diligently at work.' A very close second, as we expected from social psychology, was 'personal involvement in planning of our task.' Then, tied for third place were two items--'a promotion' and 'more time to give my work a personal touch of quality.'

. . . Next of the four was 'placement in a prestige position,' which seems to contradict 'promotion.' Further investigation revealed that 'promotion' was essentially associated with 'more money' rather than the acquisition of a new title--which goes to show the difficulty of taking opinion surveys.¹⁰

The responses in this opinion poll point up the prepotency of certain motives. However, money is treated in this research in a cursory manner because the information is too sensitive to risk not having questionnaires returned, and because it may have tended to bias responses all in one direction since most people would rather be earning more than at present. The assumption is made here, as was done in the Porter studies, that wages provide the satisfaction of most primary needs for the typical programmer.

⁹Gerald M. Weinberg, The Psychology of Computer Programming (New York: Van Nostrand Reinhold, 1971), p. 182.

¹⁰Ibid., p. 183.

The second most important motivator according to Weinberg's survey concerned the opportunity to become involved in task strategies. This seems to coincide to a question in the present study in the Autonomy category concerning independent thought and action. This will be elaborated in Chapter 6.

Supportive Studies

Finally, another study that can be related to Weinberg and inferred to the present study is a British study by P. F. Sheldrake (1971). In this study interviews and questionnaires were administered to a sample of fifty-one programmers in a service bureau. Sheldrake (1971) concludes:

. . . Computing is an essentially applied activity; at the same time it is a complex technology, with its own 'language,' skills, etc. A similar divergence in views has been found to underly the varying perspectives of programmers in the bureau, even to inform their understandings of 'objective' features of their work.¹¹

Summary

Much has been written on the topic of job motivation and satisfaction. In this chapter, highlights of the most relevant and applicable literature were reviewed. Beginning with a basic organizational perspective of self-actualizing man, Maslow's hierarchy of needs was introduced.

¹¹Peter F. Sheldrake, "Orientations Towards Work Among Computer Programmers," Sociology, 1971, 5, 222.

Then a distinction between the terms motivation and satisfaction was made; the former being an inner directing force, while the latter an end state of being.

Various literature has made use of Maslow's theories as a systematic approach to measuring need satisfaction. Specifically, Porter developed an original need questionnaire based on the principle of a given level of prepotency for a given need. His research was performed mainly on managerial personnel in broad cross sections of industrial organizations. The studies that most closely relate to the content of the present research are the works of Weinberg and Sheldrake. Programmers are the common element and need satisfaction is the dependent variable. Chapter 5 discusses their studies in greater detail.

Chapter 3

FRAMEWORK AND METHODOLOGY

The Hypotheses

With the background of theory and research just presented in some motivational and job satisfaction studies, this paper explores the attitudes of computer programmers as an occupational group. Specifically, there are three main hypotheses.

Based on observations by Weinberg and Sheldrake concerning the nature of programming, the first hypothesis states that computer programmers are more satisfied in their positions than their managers as a profession. Comparing scores from a national study of managers answering the same type of questions, it will be determined which group is more content with his job. As a corollary to this hypothesis, it should follow that programmers experience a higher degree of need fulfillment in their work. A justification for this hypothesis is that programmers have many of the same qualities of managers such as intelligence, status, and high salaries, but do not have the responsibilities attached to management.

Secondly, in the context of the sample case, it should follow that programmers are more satisfied than

their own project and group managers. In this case, scores will be compared within the same company. A logical corollary to follow is that programmers score higher in the fulfillment attitude than their own managers.

Third, the attitude of importance attached to the five needs is the basis for the last hypothesis that states that programmers and managers arrange their needs in the theoretical hierarchy differently.

In general, what is being investigated is the measure of satisfaction derived from a programmer's job compared to a manager's job. Since individuals differ in their expectations and desires with their jobs, each group would be expected to arrange a priority of needs characteristic with their work. It has been found, for instance, that Self-Actualization is highly deficient and important to managers. How is this need satisfied for programmers? Do they have another need that is characteristically deficient?

Methodology

As indicated earlier, the research instrument utilized in this experiment is based on the Porter need satisfaction questionnaire. The only basic revision was the use of "in your programming position" for the original "in your management position" for all eleven characteristics. The following is a brief description of the method developed by Porter.

The modified version of the questionnaire is based on the Maslow hierarchy of needs except for the absence of Physiological needs. The five need categories investigated are, in order of their theoretical appearance, Security, Social, Esteem, Autonomy, and Self-Actualization. The questions were randomly arranged to avoid biasing the responses. The need categories and their individual items within the categories are as follows:

Security - The feeling of security in my programming position.

Social - The opportunity to give help to other people.
- The opportunity to develop close friendships.

Esteem - The feeling of self-esteem a person gets from being in my programming position.
- The prestige of my programming position inside the company (that is, the regard received from others in the company).
- The prestige of my programming position outside the company (that is, the regard from others not in the company).

Autonomy - The authority connected with my programming position.

- The opportunity for independent thought and action in my programming position.

Self-Actualization - The opportunity for personal growth and development.

- The feeling of self-fulfillment a person gets from being in my programming position (that is, the feeling of being able to use one's own unique capabilities, realizing one's own potentialities).
- The feeling of worthwhile accomplishment in my programming position.

For each of the eleven items, the respondent was asked to answer the following questions on a seven-point rating scale:

- (a) How much is there now?
- (b) How much should there be?
- (c) How important is this to me?

A check of 1 on a given rating scale meant there was a minimum amount of that characteristic, and a check of 7 meant there was a maximum amount.

From each item, the response to question (a) measured fulfillment, the response to question (b) minus the response to question (a) measured satisfaction, and the response to question (c) measured importance of the need. Question (a) is intended to gauge the actual amount the respondent perceives of a given characteristic. Question (b) is the amount he perceives as potential to his position. Consequently, the operational definition for need satisfaction is the difference between the actual and potential amount of the need. Any negative differences, that is, any

response to question (b) that was less than the response to question (a), were set at zero; or there was no need deficiency. The complete questionnaire presented to the respondents appears in Appendix A.

Source of the Data

The sample of programmers was drawn from the Technical Division of Tymshare, Incorporated. There were about 50 programmers employed at this division at the time of the experiment but only 40 received the questionnaire because of absences due to distance, vacations, and business. There were 37 returned questionnaires for a response rate of 92.5 percent. A breakdown of the sample is presented in Table 3.1. Since there were only five female respondents, two of which were managers, no statistical analysis was performed. Appendix B supplies their scores on each attitude.

Table 3.1 Tymshare Sample

	No.	Avg. Yrs. Experience	Avg. Age	Avg. Yrs. Formal Ed.	% Major in Science and Math
Managers	11	11.3	33.6	16.2	72.7
Nonmanager Programmers ^a	26	6.5	29.9	16.1	46.2
Total	37	7.7	31.0	16.1	64.9

^aFor the sake of brevity, the word "programmers" will mean all 26 nonmanager programmers in subsequent tables.

To understand the nature of this sample, it is necessary to place programmers in a proper perspective. The total populations of programmers would, of course, include all those employed in computer development around the world. A subset of these programmers are a population of programmers involved in the time sharing industry. This is a representative sample of one company in that industry. Therefore, any findings or inferences stated in relation to programmers should, at best, be limited to software programmers in time sharing.

Naturally, with a sample from one company in an industry, there is considerable bias inherent in the findings. There are no controls for location, size of the organization, or company policies. However, for reasons of economy and convenience, the Tymshare programmers will be considered fairly representative of typical software programmers. At the very least, the findings presented below may be considered a measurement of need satisfaction within one division of one firm.

Whereas Porter examined managers in this realm, this experiment chose programmers for four reasons. First of all, programming is a relatively new field that has a wide span of applications in almost every professional field; and this necessitates the programmer to have a dual knowledge of a capacity to understand a specific problem faced by a user and the expertise to apply algorithmic

logic for the computer hardware. In a sense, a programmer then has the opportunity to receive criteria on a particular problem, place parameters around the scope of the project, and usually see the progression of results to a satisfactory end. There is a sense of affecting direct consequence in the organizational goals. The time element is also a factor that permits programmers assigned to a particular project to set the pace for its completion as conditions permit. Managers in general can only affect the speed of change by increasing the factor inputs but cannot set limits on the timing of change by their own ability. The point is that programmers have a unique position in terms of controlling their productivity through personal effort.

Secondly, programmers, like most managers, are assumed to be unconcerned about fulfilling their primary needs of food, shelter, and clothing. The reason is the same assumption made for managers, that wages are sufficient to provide these provisions. Another factor is that the mean years of experience at Tymshare was 7.7 years with a range of 3 to 17 years.

Third, studies have suggested that managers are more likely to achieve management positions because they attain certain educational standards. Tymshare programmers had a mean educational level of 16.1 years with a range from high school graduates to doctoral degrees.

Finally, programmers, at least at Tymshare, are blessed with conditions of work that rival any job in this profession. Hours of work are extremely flexible for very good reasons. Primarily most projects are based on time limitations usually set by the programmers themselves. This condition is often a function of machine turn-around time rather than company policy. For example, the fewer users on any one machine, the faster the results can be transmitted to the user. Sometimes this can mean working in the evening, early morning hours, and on weekends. The choice is up to the programmer. Also, most systems programmers have remote terminals in their homes that connect on-line over regular telephone lines. It is possible to have a programmer who physically comes into work once or twice a month. These points are made to illustrate the overall flexibility inherent in a programmer's position. Comparatively speaking, there are few middle management positions that offer these fringe benefits.

Chapter 4

PROGRAMMERS' ATTITUDES

Need Satisfaction

The measure of the satisfaction a respondent perceived was obtained by subtracting the value of question (a) from the value in question (b). The rationale for this is that the larger the difference between the perceived equitable amount of a need and the desired potential for that need should produce a need deficiency value. In other words, the larger the respondents actual fulfillment of a need from its potential achievement, the larger the need deficiency. Conversely, the smaller the difference, the smaller the degree of need satisfaction. No difference meant perfect satisfaction.

Several respondents commented on the difficulty in answering the second question in each item. A typical response was that it is extremely difficult to judge how much, say, "opportunity to help other people in their job" or "how much there should be" because some people may feel that they help others to a point where it obstructs their own work. Consequently, they may not want to help others. The control for this, of course, was that it would be scored as a negative need deficiency and subsequently

counted as zero. A shortcoming of the measuring instrument in this case, however, was the value of that zero deficiency. For example, if the amount of self-esteem is actually scored as 6 and the potential is scored as 6, the deficiency is zero. But if another respondent for the same item answers 2 for each question, the deficiency is still zero. The lack of a weight given these differences is made up in the averages of the total sample. None of the Porter work surveyed nor any of the others using this type of questionnaire has mentioned these two objections raised by some of the respondents. It was dealt with here to allow the reader to understand some of the problems encountered in such an experiment.

Sample Managers Versus U.S. Managers

Table 4.1 summarizes the average raw score for each category in the sample. The classification of U.S. Managers was drawn from a study by Haire, et al. and is used for comparative purposes throughout this thesis.¹

¹M. Haire, E. Ghiselli, and L. Porter, Managerial Thinking: An International Study (New York: John Wiley & Sons, 1966), pp. 73-108.

Table 4.1 Average Need Satisfaction (raw scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	.29 (1.49)	.38 (.80)	.60 (.80)	.93 (1.04)	1.20 (1.09)
Managers	.20 (.25)	.73 (1.28)	1.55 (1.24)	.77 (1.20)	1.30 (1.47)
Programmers	1.31 (1.55)	.75 (1.81)	.89 (1.19)	1.00 (1.10)	1.62 (1.47)
Total Sample	.95 (1.45)	1.76 (.75)	1.12 (1.29)	.93 (1.10)	1.52 (1.53)

^aHigher values indicate greater dissatisfaction. Standard deviations are given in parentheses.

The raw scores illustrate how closely the national manager sample compares to Maslow's theoretical hierarchy and how the present sample deviates. The Tymshare manager group follows its U.S. manager counterpart fairly closely except that Esteem replaces Self-Actualization as the need most deficient. Comparing the Esteem category between U.S. managers and the Tymshare managers, it was found that this difference was statistically significant ($t = 2.543$, $p < .05$). In other words, Tymshare's managers suffer from a notable greater need deficiency than most U.S. managers. None of the other deficiencies were found significant. (For the sake of brevity, analyses throughout this study utilized the two-tailed t-test with 10 d.f. on sample

managers versus U.S. managers, and 25 d.f. on programmers versus U.S. managers and programmers versus sample managers.)

Programmers Versus U.S. Managers

Comparing programmers to managers in general also reveals some interesting results. The purpose here, according to the first hypothesis, was to see if the profession of programming yields less need deficiencies in the hierarchy than the management profession in terms of scores from the same research instrument. Analysis showed that in only one category, Security, were programmers significantly more satisfied than U.S. managers ($t = 3.359$, $p < .005$). In one other item, Self-Actualization, the highest order need of the five, the programmers' difference from the managers' score approached significance ($t = 1.457$, $p < .10$). Therefore, the hypothesis is partially supported by the data.

Programmers Versus Their Managers

The next set of analyses compares the scores of the sample's managers and programmers. Statistically significant differences appeared in two of the five needs. Programmers expressed a higher degree of dissatisfaction with Security in their work ($t = 3.656$, $p < .005$) compared to their managers. However, programmers expressed greater

satisfaction in the Esteem category ($t = 2.819, p < .005$). No other significant differences were found. These findings are interesting in the light of the fact that Tymshare managers were highly unsatisfied in terms of Esteem when compared to the national index. The second hypothesis is supported partially by another need category.

Standard Scores

Next, the ranking of standard scores for need satisfaction in Table 4.2 makes the comparison of subsamples convenient.

Table 4.2 Need Satisfaction (standard scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	-.28	-.38	-.02	-.03	.05
Managers	-.52	-1.40	.35	-.15	-.14
Programmers	.25	-1.37	-.19	.06	.06

^aPositive values indicate greater dissatisfaction than the average respondent; negative values indicate less dissatisfaction.

It presents the sample data in standard score form. This is obtained by subtracting the mean score of the total sample from the mean score for a group of respondents (managers, programmers) and dividing this value by the standard deviation for the total sample. This allows quick

comparisons of the attitude with various subsamples. There appears to be a unanimous opinion among the sample that Social need is least deficient at Tymshare, even though that need was not reported to be greatly fulfilled by any one group. Within the managerial classification, Esteem is the least satisfied need followed by the most deficient need of the national index, Self-Actualization.

Programmers ranked Security the most deficient need with Self-Actualization and Autonomy tied for next most dissatisfied positions. This prepotency of Security deficiency in programmers is puzzling since one of the main assumptions about this group is its above average pay scale. One possible explanation is that the pace of change in the industry is not conducive to stable salary rates or secure positions due to competitiveness.

Need Fulfillment

The response to question (a) under each item indicated the degree of need fulfillment. The purpose of the measure is to obtain a quantification of the respondent's own evaluation of his actual perception of the expectation of his needs. Table 4.3 summarizes the average raw score for each category in the sample.

Table 4.3 Average Need Fulfillment (raw scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	5.25	5.11	4.81	4.80	4.96
Managers	4.91	5.14	4.15	4.96	4.58
Programmers	3.96	4.44	4.08	4.08	4.24
Total Sample	4.24	4.65	4.10	4.33	4.34

^aHigher values indicate greater need fulfillment.

The Haire, Ghiselli, and Porter (1966) study used responses from over 3,600 managers with about 464 Americans. In each case, the number of lower management respondents far outweighed the number of upper-level executives. The Tymshare managers in the sample are all lower to middle level managers all subordinate to one vice-president at the Technical Division. Hence, the scores of both groups of managers were complementary.

It is interesting to note that the Tymshare managers scored the highest within the sample in all five need categories. They also scored higher than the U.S. manager average in the Social and Autonomy categories. When the Tymshare managers are compared to this national sample in a need by need analysis, no statistically significant differences in the fulfillment attitude are found. Consequently, these Tymshare middle managers conform to the

attitude of the managers posited in the national study in terms of need fulfillment.

Table 4.4 Need Fulfillment (standard scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	-.11	.30	-.26	-.26	-.09
Managers	.46	.29	.03	.39	.13
Programmers	-.19	-.12	-.01	-.16	-.06

^aPositive values indicate greater fulfillment than for the average respondent; negative values indicate lesser fulfillment.

Table 4.4 presents the standard scores of the need fulfillment motives. It is obvious that managers are the most fulfilled of this sample. However, since Esteem was the least satisfied need among the sample's managers, it follows that it would be the least fulfilled. Accordingly, programmers indicated Security as their least fulfilled need.

Programmers Versus U.S. Managers

The raw scores of need fulfillment were consistently lower for the 26 nonmanagerial programmers in every need category than in the national manager sample. It should be understood that the purpose of comparing programmers to managers is to ascertain the differences with

the use of a common measuring instrument. According to the corollary to the first hypothesis, programmers are to experience more fulfillment than managers. In other words, a typical manager would be less fulfilled in all levels of needs in the hierarchy.

The data indicate that programmers are significantly less fulfilled than the manager index in every need category. (Security: $t = -4.444$, $p < .05$; Social: $t = -1.954$, $p < .05$; Esteem: $t = -2.414$, $p < .025$; Autonomy: $t = -2.257$, $p < .025$; Self-Actualization: $t = -2.009$, $p < .05$.) Therefore, the data do not support the hypothesis that programmers are more fulfilled in their positions than managers.

Programmers Versus Their Managers

The second corollary stated that programmers' fulfillment in their jobs would exceed that of their managers. When the programmers' responses were compared to their own managers', the results were similar to the comparisons with the national index. In this case, the programmers were significantly less fulfilled in the categories of Security, Social, and Autonomy. (Security: $t = -3.273$, $p < .005$; Social: $t = -2.046$, $p < .05$; Autonomy: $t = -2.758$, $p < .005$.) The Esteem and Self-Actualization scores were not significantly different from those of the managers. In particular, it would be expected that programmers would be deficient in

terms of Autonomy if only because of their job classification. This was observed as a check to see if the results were logically consistent. As will be discussed below, Autonomy needs were the least important to the typical programmer.

Need Importance

The response to question (c) is the measure used to obtain the quantitative value of importance. The purpose of evaluating the importance of each need category is to obtain a sense of value the respondents hold for the five needs. Studies using the Porter need questionnaire have omitted the importance scale for a variety of reasons. One study even replicated the method in the Haire, et al. (1966) study omitting any reference to an importance scale.²

The first thing to notice in Table 4.5 is the general magnitude of the responses of the U.S. managers compared to the present sample.

²J. M. Ivanovich and J. C. Baker, "A Comparative Study of the Satisfaction of Domestic United States Managers and Overseas United States Managers," Academy of Management Journal, 1970, 13, 69-77.

Table 4.5 Average Need Importance (raw scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	5.30 (1.43)	5.37 (1.10)	5.09 (1.15)	5.80 (.88)	6.30 (.71)
Managers	4.73 (1.29)	4.27 (2.05)	5.52 (1.28)	5.77 (1.63)	5.52 (1.23)
Programmers	4.81 (1.64)	4.50 (1.69)	4.45 (2.02)	4.96 (2.02)	5.81 (1.24)
Total Sample	4.78 (1.55)	4.43 (1.81)	4.77 (1.89)	5.07 (1.92)	5.78 (1.25)

^aHigher values indicate greater importance. Standard deviations are given in parentheses.

The Tymshare sample attaches considerably less value to these needs compared to the U.S. managers. Tymshare managers place Autonomy as most important while the programmers place a higher value on Self-Actualization. Further discussion on rankings of individual needs appears below in the comparisons of standard scores.

Sample Managers and Programmers Versus U.S. Managers

As was done in other sections, comparisons were made between managers and programmers in the sample and the U.S. manager average. It was discovered that Tymshare managers held significantly less importance to Self-Actualization when compared to U.S. managers ($t = -2.096$,

$p < .05$). They also had less regard for Security and Social needs but the differences only approached statistical significance (Security: $t = -1.470$, $p < .10$; Social: $t = -1.781$, $p < .10$).

Programmers indicated statistically significant differences in all but the Security and Esteem categories when compared to U.S. managers (Social: $t = -2.620$, $p < .01$; Esteem: $t = 1.618$, $p < .10$; Autonomy: $t = -2.121$, $p < .025$; Self-Actualization: $t = -2.013$, $p < .05$). In other words, managers find the needs of Social, Esteem, Autonomy, and Self-Actualization more important than programmers as an occupational group.

Programmers Versus Their Managers

However, when programmers in the sample were compared to their own managers, two significant differences emerged. The first is a significantly lesser amount of Autonomy purported to be important by programmers ($t = -2.046$, $p < .05$). Secondly, programmers place a greater amount of importance on Self-Actualization than their managers ($t = 1.192$, $p < .05$). This supports the notion that a programmer's efforts in his work routine are held to be at a relatively high priority.

Standard Scores

Finally, the rank of the standard scores, derived from Table 4.6, illustrates the importance factor from most

important (indicated by the positive values) to the least important (negative values).

Table 4.6 Need Importance (standard scores)^a

	Secur- ity	Social	Esteem	Auton- omy	Self- Actualization
U.S. Managers	-.38	.00	-.13	-.11	.07
Managers	-.37	-.09	.40	.13	-.17
Programmers	.02	.04	-.17	-.06	.07

^aPositive values indicate greater importance attached to a need than for the average respondent; negative values indicate lesser importance.

Tymshare's managers find Esteem at the top of their priority needs. Self-Actualization is relatively unimportant while that category was indicated as most important by their U.S. manager colleagues.

Programmers placed Self-Actualization at the head of their list and Esteem at the bottom. There seems to be a pattern developing between programmers and managers such that what need is fulfilled or important for one is not for the other. The data also indicate a relative lack of importance attached to Autonomy for programmers.

Summary of the Dependent Variables

In this chapter, a direct analysis was performed on the data obtained from the Tymshare sample of managers and

programmers. The three dependent variables of fulfillment, satisfaction, and importance of various needs were examined. The data indicated that in a professional sense, programmers are less fulfilled in the categories of needs surveyed than a typical U.S. manager, but at the same time, they consider these needs less important and satisfactory. On the whole, programmers felt a greater need for fulfillment in their work compared to their own managers. In particular, programmers are more deficient in Security but more esteemed than their supervisors. Programmers experience a relatively higher regard for Self-Actualization needs in their programming positions than their managers. A list of significant differences is given in Table 4.7.

Table 4.7 Summary of Significant Differences

	Fulfillment	Satisfaction	Importance
Sample Managers Compared to U.S. Managers	n.s.	+Esteem ^c	-Security ^a -Social ^a -Self-Actual. ^c
Programmers Compared to U.S. Managers	-Security ^e -Social ^c -Esteem ^d -Autonomy ^c -Self-Actual. ^c	+Security ^e +Self-Actual.	-Social ^b -Esteem ^a -Autonomy ^d -Self-Actual. ^c
Programmers Compared to Their Managers	-Security ^e -Social ^c -Autonomy ^e	+Security ^e -Esteem ^e	-Autonomy ^c +Self-Actual. ^c

Note: The plus and minus sign indicate the direction of the attitude. Example: Programmers have greater Satisfaction with Security than their managers; programmers feel less Fulfilled with Autonomy needs.

^a p .10 (approaches significance).

^b p .01.

^c p .05.

^d p .025.

^e p .005.

Chapter 5

SOME ADDITIONAL FINDINGS

Since none of the references deals directly with the psychological aspects of need satisfaction among computer programmers, it is impossible to do any direct correlations with other studies. However, it may be interesting to make some comparisons of the results with some of the statements made in the Weinberg book and the Sheldrake study. In general, there are no blatant differences that stand out between either of these two references from the sample under study here.

The Psychology of Computer Programming

One of Weinberg's major contentions is that programming must become what he describes as "egoless programming."¹ While most programmers consider their work an individual activity, the emphasis should be on a social activity; one in which interaction of groups of programmers contributes to efficiency and productivity. When a programmer considers a program he has written as personal

¹Gerald M. Weinberg, The Psychology of Computer Programming (New York: Van Nostrand Reinhold, 1971), p. 56.

property, he becomes insulted and defensive when another programmer is assigned to debug or update it for a new application. In other words, his ego will not allow some other programmer to make his program more efficient for fear of being labeled inadequate. This action manifests itself in improper labeling of steps in a program to a belligerent attitude towards the individual assigned the revision.

This type of situation best falls into the Social category and, in particular, the item "the opportunity to give help to other people." In this question alone, the average raw score in fulfillment was 3.7, the average deficiency was 1.6, and the average importance score was 4.8 for programmers. On the other hand, managers' averages were 5.2, 0.7, and 4.6, respectively. Therefore, programmers actually experience relatively less fulfillment in helping others than do their managers. Whether this is a function of their work or their social environment is an open question. Weinberg's observations provided a basis for expectations of programmers' egos. The data support Weinberg's contention that programmers are less concerned with the social aspects of their work than are their managers.

Another interesting comment made by Weinberg concerns the subject of attitudes towards management. "In a small survey of working programmers, only 15 percent of the

first-line managers were thought to be as skillful as the programmers themselves, and none of the higher-level managers."² Several examples are cited of programmers winning the attention of managers by writing insignificant output that the manager thought he understood, or managers having terminals in their offices as status symbols.

It seems that a good measure of this kind of attitude can be derived from the Esteem category and the item "the prestige in my programming position inside the company." Specifically, the measure most indicative of prestige is the attitude of importance. The programmers' average response was 4.2 and the managers' was 6.2. Managers consistently value prestige higher than do programmers. To emphasize his point, Weinberg later points out that managers need a better appreciation of programming.³

On a more personal level, Weinberg lists some of the critical personality traits characteristic of programmers. In order of importance, he lists the ability to tolerate stressful situations, flexibility to accept rapid change, neatness (in a programming sense not necessarily a personal one), humility, assertiveness, and a sense of humor.⁴ Certainly, these are honorable qualities desirous

²Ibid., p. 109.

³Ibid., p. 125.

⁴Ibid., pp. 148-149.

for other occupational groups, even managers. Since the present research deals with primarily need satisfaction not personality factors, there is little to be inferred for comparative reasons. Yet, the rankings of the five need categories by programmers in the sample seem to say something besides which needs are satisfied and which are not. The fact that Self-Actualization is most important and highly fulfilled seems to suggest that programmers can indeed tolerate stressful situations and adopt to a changing programming environment.

As a personnel policy, Weinberg states that one of the major faults with most aptitude tests for programmers is the lack of understanding of programming.⁵ These tests inherently omit the factors that are important to the programming process. If Self-Actualization is more important than all the social interaction and prestige provided by such an occupation, perhaps personnel activities can be redirected to reflect these characteristics in their jobs.

Orientations Towards Work Among Computer Programmers

Sheldrake's main thesis is that programmers in his sample have an orientation of work ranging from a technical to an organizational perspective. He explains:

. . . A 'technical' perspective is one that is characterized by a focus on the details of work activities

⁵Ibid., p. 158.

themselves, an attention to practice, and an emphasis on the priorities of technique itself. . . . An 'organizational' perspective is one that takes account of the activities of a particular practice within its context and considers the application of the technique.⁶

The implications of these perspectives derived from experimental data suggested, among other things, ". . . that programmers with a technical orientation tend to follow technical priorities in programming . . . [and] are less likely to support the application of standards to their work."⁷

The research conducted for this paper was considerably more sophisticated in detail than the present one, having conducted long interviews and administering two questionnaires. While none of the data collected for the present study dealt with similar topics, it is a fact that this sample does contain elements that closely resemble the description of technical oriented programmers. These individuals are characteristically younger and more technically trained. Organizational types are those who technical programmers considered on the whole outdated and kept on the payroll for sentimental reasons. This dichotomy of orientations works both ways, as some of the older programmers take offense at the unconventional approaches to projects by the technical group.

⁶Peter F. Sheldrake, "Orientations Towards Work Among Computer Programmers," Sociology, 1971, 5, 211-212.

⁷Ibid., pp. 217-218.

Some of the conflict described by Sheldrake agrees with those in the Weinberg book, particularly the distastes associated with documentation procedures, and the independence of programming activity. The firms of Tymshare and the computer service bureau seem remarkably similar in organization and history. The product of several acquisitions and mergers, Tymshare's Technical Division's organization chart is functionally divided into the basic categories of development, quality control systems design, and software systems applications. It would be interesting to measure the bureau's programmers for their need deficiencies.

Chapter 6

PROGRAMMERS' NEEDS

Maslow's Theory in Perspective

The hierarchy of motives or needs is a useful system to gauge the psychological characteristics within any job as interpreted by the individual. Maslow's theory states in part that after a person satisfies basic or primary needs of minimal necessities; he then substitutes these motives with higher order needs of affiliation, nurturance, and esteem; and finally he expends the rest of his efforts on the highest order need of self-actualization. Naturally, the amount of self-fulfillment experienced by any individual is relative to what he thinks he is capable of persuing.

Need by Need Analysis

Starting with the lowest order need in the hierarchy, each need was examined in relation to the order which the programmers and managers chose. In order to test the third hypothesis, each need category was arranged in terms of its standard score for programmers and their managers. The data support the hypothesis that programmers

rank their needs within each attitude differently from their managers.

Security. There was only one question in the survey that dealt with Security, so consequently the responses are most direct. Programmers felt this was the least fulfilled and most dissatisfying need, but not nearly as important as Self-Actualization and Social motives. This may indicate that despite the reputation of high salary, the typical programmer would trade off this for a more secure position with his firm. Tymshare's managers, on the other hand, placed Security as the most fulfilled and highly satisfied need, but the least important. Security in their job seems to be of little importance for management as a group as the U.S. manager bears out.

Social. The Social motive was made up of two questions: the opportunity to give help to other persons and the opportunity to develop close friendships. Observations of informal gatherings of various social interests led to expectations of a relatively high social commitment among Tymshare programmers. Consequently, programmers indicated that this was the least deficient category although only moderately fulfilled. Their managers agreed with this expression in general, experiencing more fulfillment but less importance for the need. This was also the category that U.S. managers expressed as most fulfilled

and satisfied and relatively important. In the context of the two characteristics in this category, managers may perceive themselves as providing guidance and accommodation to their programmers on various projects. The programmer, as related earlier, may look upon helping others as a nuisance at times.

Esteem. The Esteem category also revealed some interesting phenomena. Some inferences can be based on Sheldrake's (1971) report about machines and their masters. The questionnaire devoted three characteristics to this category: the prestige derived from inside and outside the company and a measure of self-esteem inherent to the job. Programmers experience a relatively high degree of esteem but it is not appreciated. Managers, however, score this as their most intense need. It is their least fulfilled, least satisfied, and most important single need. The U.S. manager index treats this category less seriously than the sample managers. This deficiency of Esteem is interesting in light of the finding that Tymshare managers scored significantly more Esteem satisfaction than the U.S. manager index. Since prestige makes up most of this category, it is possible to infer that the managers in this sample are more concerned with job prestige than are programmers.

In other words, the typical programmer would say that there is quite a lot of prestige with his job but it

has no personal meaning. The manager would disagree stating that while there is quite a lot of prestige, there is not as much as there should be. This dichotomy of attitude assessment between programmers and their managers is the most interesting of the study. It is another indication of the effectiveness of the research instrument and an interesting comment on the manager-managed conflict.

Autonomy. The Autonomy category was relatively unimportant to programmers and equally unsatisfied. Managers experienced little fulfillment and satisfaction which, perhaps because of their titles, renders this an important aspect. This category consisted of two questions: authority and the opportunity for independent thought and action. Since these managers consist of middle to lower management positions, their participation in policy and strategy decisions are limited.

The second hypothesis tested for programmers' needs to be more satisfied than their own managers. Since Autonomy is a need that is mostly associated with managers, it follows that managers would experience more than their programmers. In fact, the data revealed two significant differences in this category with fulfillment and importance. Consequently, management still possesses and relishes more Autonomy than their programmers.

Self-Actualization. The final category, like Esteem, is another that has some interesting implications for programming as a unique profession. As previously mentioned, it was conceived that the very nature of programming computers requires the talents of a special type of individual who is qualified in logical processes of problem solving. It requires strategies to approach the problem illustrated in flow charting and patience in reiterating work to find errors. It would follow that fostering these talents would offer the individual an appreciable amount of self-actualization.

The category of Self-Actualization was made up of three characteristics: the opportunity for personal growth and development, the feeling of self-fulfillment, and the feeling of worthwhile accomplishment. The programmer interpreted these characteristics as highly fulfilled, moderately deficient, and most important. The typical programmer in this sample would, therefore, believe that there is a good deal of fulfillment in his job and it is very important that there be more. As a matter of fact, these responses more closely resemble the priorities expressed in the U.S. manager index. Programmers did indicate a significant amount of importance attached to this need when compared to their managers.

The Tymshare manager, on the other hand, feels little self-fulfillment, but does not believe it to be

important. This is a drastic deviation from the U.S. manager index and is particularly interesting in view of the fact that Self-Actualization is the highest order need. Tymshare managers do not consider it as such.

Summary

This chapter has analyzed the data in relation to the third hypothesis which stated that programmers and managers arrange their needs in different hierarchies. Each need was observed for its most unique characteristics. The most interesting categories were Esteem and Self-Actualization. The rankings of these needs within each attitude is summarized in Table 6.1.

Table 6.1 Rank by Fulfillment, Satisfaction, and Importance

Greatest Fulfillment		→				Least Fulfillment	
<u>Manager:</u>	Security	Autonomy	Social	Self-Actualization	Esteem		
<u>Programmer:</u>	Esteem	Self-Actualization	Social	Autonomy	Security		
Most Satisfied		→				Least Satisfied	
<u>Manager:</u>	Social	Security	Autonomy	Self-Actualization	Esteem		
<u>Programmer:</u>	Social	Esteem	Self-Actualization	Esteem	Security		
Most Important		→				Least Important	
<u>Manager:</u>	Esteem	Autonomy	Social	Self-Actualization	Security		
<u>Programmer:</u>	Self-Actualization	Social	Security	Autonomy	Esteem		

Chapter 7

GENERAL DISCUSSION AND CONCLUSIONS

This study has examined the psychological hierarchy of needs of computer programmers and their managers. The first hypothesis stated that programmers were more satisfied in their position than managers. The data were compared to a national study using the same measuring instrument and only partially supported this hypothesis with a significant difference in Security and a difference in Self-Actualization that approached statistical significance. This may possibly be explained by the minimal importance attached to this need by both sample and U.S. managers. It is more interesting that Self-Actualization approached significance when compared to the management profession since other studies have indicated that managers hold this to be their most prepotent need. Further research may be able to explore this matter more completely. The whole attitude of satisfaction in management may be a function of Autonomy rather than Self-Actualization of some other need.

The data only partially supported the second hypothesis that programmers are more satisfied than their own managers. Again, Security was the only significant

category. An interesting phenomenon was uncovered in this analysis concerning Tymshare's management prepotency for Esteem. While these sample managers had significantly more Esteem than their programmers and the U.S. manager index, this was still the need most deficient for them. This deviates from findings by Porter concerning a manager's striving for Self-Actualization. This may be a function of selection methods for managers at Tymshare or the nature of the software computer industry.

In terms of attitude fulfillment, the data did not support either corollary that programmers are more fulfilled than the typical U.S. manager or their own managers. Programmers were statistically less fulfilled in all need categories when compared to U.S. managers, and less fulfilled in Security, Social, and Autonomy needs when compared to their managers. However, in order to appreciate the nature of these differences, the third hypothesis focused on the individual ranking of the needs within each attitude.

One of the most interesting phenomena of the study was the inverse relationship between programmers and managers in the sample for the attitudes of fulfillment and importance. Managers find Esteem and Autonomy important and programmers list Self-Actualization and Social needs at the top. The ranking for fulfillment is exactly reciprocal between managers' and programmers' perceptions.

Additional analyses were performed on the sample managers compared to the national index. The Self-Actualization category was significantly less important while Security and Social approached significance in the same direction. As mentioned above Tymshare managers were less satisfied with Esteem than U.S. managers.

APPENDIX A
Questionnaire and Instructions

Tymshare, Incorporated
Technical Division
10231 Bubb Road
Cupertino, California

Dear Tech Division Employee:

The following survey has been prepared for the purpose of measuring the amount of satisfaction in your programming profession. The responses will be compared with similar data from other professions.

The questions are short and straightforward with no right or wrong answers. Your personal opinions of how you perceive your work is important for research purposes.

It would be most appreciated if you would take a few moments to complete the questionnaire which will remain anonymous. The findings will be the basis for a master's thesis for the Department of Management Sciences, California State University, Hayward.

Thank you for your time and cooperation.

Job Satisfaction Questionnaire

Instructions:

The following statements list several characteristics or qualities connected with your own position in your firm. For each characteristic, you are asked to give three ratings:

- a) How much of the characteristic is there now connected with your position in your firm?
- b) How much of the characteristic do you think should be connected with your position in your firm?
- c) How important is this position characteristic to you?

Each rating will be made on a seven-point scale, which will look like this:

(minimum) : : : : : : : : (maximum)
 1 2 3 4 5 6 7

Please put a mark (X) above the number on the scale that represents the amount of the characteristic being rated. Low numbers represent low or minimum amounts, and high numbers represent high or maximum amounts. If you think there is "very little" or "none" of the characteristics presently associated with your position, you would place an X above number 1. If you think there is "just a little," you would place an X above number 2, and so on. If you think there is a "great deal but not a maximum amount," you would place an X above number 6. For each scale, place an X-mark above only one number.

Please do not omit any scales.

1. The feeling of self-esteem a person gets from having my programming position:
- (min) (max)
- a) How much is there now? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- b) How much should there be? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- c) How important is this to me? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
2. The authority connected with my programming position:
- (min) (max)
- a) How much is there now? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- b) How much should there be? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- c) How important is this to me? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
3. The opportunity for personal growth and development in my programming position:
- (min) (max)
- a) How much is there now? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- b) How much should there be? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- c) How important is this to me? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
4. The prestige of my programming position inside the the company (that is, the regard received from others in the company):
- (min) (max)
- a) How much is there now? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- b) How much should there be? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- c) How important is this to me? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
5. The opportunity for independent thought and action in my programming position:
- (min) (max)
- a) How much is there now? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- b) How much should there be? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$
- c) How important is this to me? $:\frac{\quad}{1}:\frac{\quad}{2}:\frac{\quad}{3}:\frac{\quad}{4}:\frac{\quad}{5}:\frac{\quad}{6}:\frac{\quad}{7}:$

6. The feeling of security in my programming position:
 (min) (max)
- a) How much is there now? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- b) How much should there be? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- c) How important is this to me? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
7. The feeling of self-fulfillment a person gets from being in my programming position (that is, the feeling of being able to use one's own unique capabilities, realizing one's potentialities):
 (min) (max)
- a) How much is there now? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- b) How much should there be? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- c) How important is this to me? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
8. The prestige of my programming position outside the company (that is, the regard from others not in the company):
 (min) (max)
- a) How much is there now? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- b) How much should there be? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- c) How important is this to me? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
9. The feeling of worthwhile accomplishment in my programming position:
 (min) (max)
- a) How much is there now? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- b) How much should there be? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- c) How important is this to me? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
10. The opportunity, in my programming position, to give help to other people:
 (min) (max)
- a) How much is there now? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- b) How much should there be? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:
- c) How important is this to me? : $\frac{_}{1}$: $\frac{_}{2}$: $\frac{_}{3}$: $\frac{_}{4}$: $\frac{_}{5}$: $\frac{_}{6}$: $\frac{_}{7}$:

11. The opportunity to develop close friendships in my programming position:
- (min) (max)
- a) How much is there now? : : : : : : : :
 1 2 3 4 5 6 7
- b) How much should there be? : : : : : : : :
 1 2 3 4 5 6 7
- c) How important is this to me? : : : : : : : :
 1 2 3 4 5 6 7

To help with statistical analyses of the data, please answer the following information about yourself:

1. How many years have you been working as a programmer?

2. Your age: _____
3. Sex: Male _____ Female _____
4. How many total years of formal education did you complete, including high school, university, and technical school? (give the number)

5. If you attended a university or technical school, what was the specialty you studied? (check one)
 ___ Engineering
 ___ Business & Economics
 ___ Arts & Philosophy
 ___ Science & Mathematics
 ___ Other (please specify)
6. Your current position with your company may be classified as: (check at least one)
 ___ Manager
 ___ Systems Designer
 ___ Systems Programmer
 ___ Coder
 ___ Other (please specify)

APPENDIX B
Female Responses

Female Responses - Average Raw Scores (Standard Deviations)

	Fulfillment	Satisfaction	Importance
Security	4.20	1.00 (1.50)	4.80 (.75)
Social	4.80	1.40 (1.53)	3.70 (2.10)
Esteem	4.33	1.87 (1.28)	5.07 (1.65)
Autonomy	4.00	1.40 (1.08)	5.70 (1.62)
Self- Actualization	4.08	2.07 (1.34)	5.33 (1.08)

Standard Scores

	Fulfillment	Satisfaction	Importance
Security	-.03	.04	.01
Social	.09	-.49	-.41
Esteem	.15	.62	.16
Autonomy	-.21	.43	.33
Self- Actualization	-.16	.36	-.31

Female Sample (N = 5)

Average Years Experience	9.0
Average Age	29.8
Average Years of Formal Education	16.4
% Major in Science & Mathematics	100.0

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