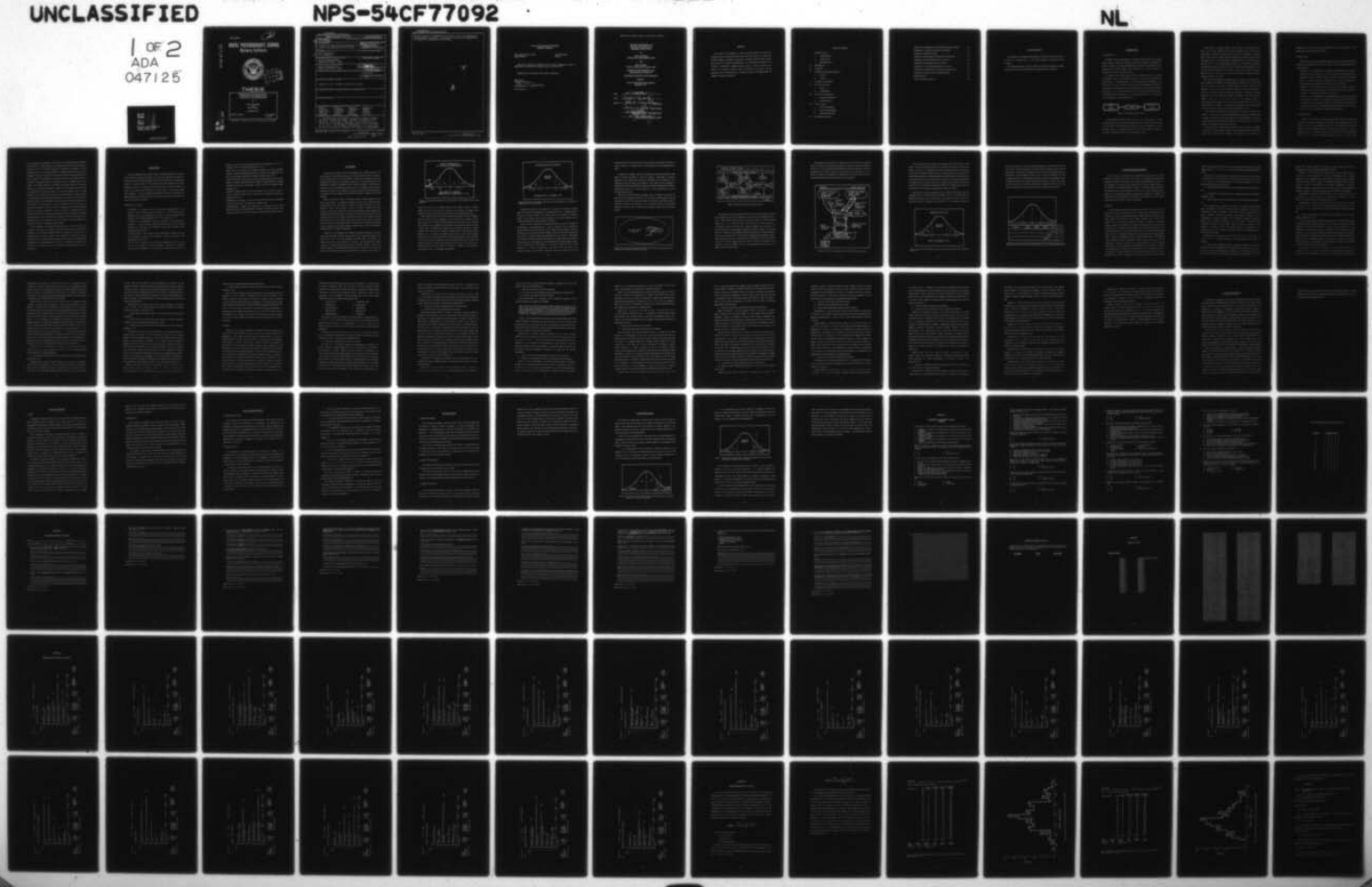
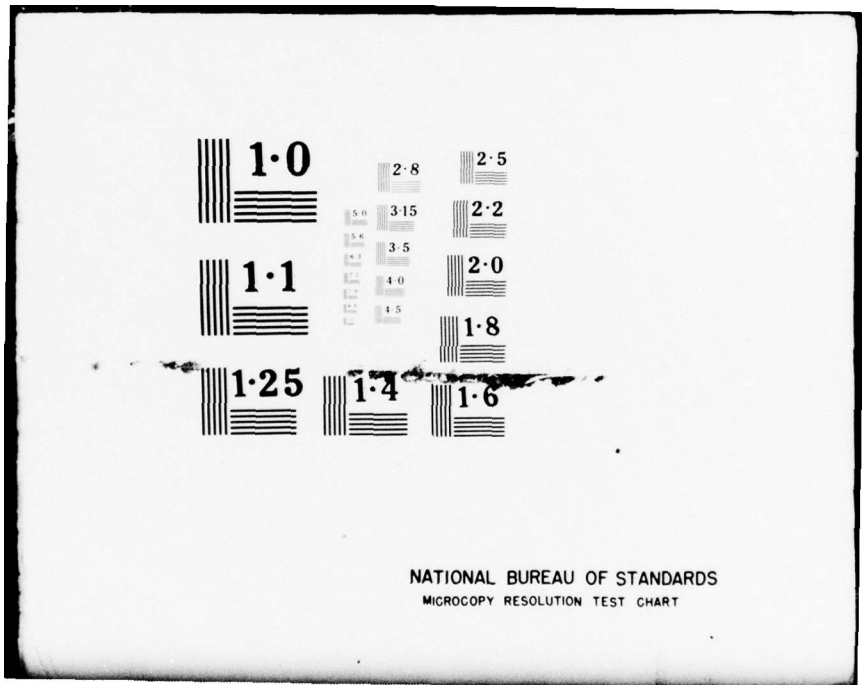
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THESIS

THE ROLES AND IDENTIFICATION OF INNOVATORS AND LINKERS IN THE TECHNOLOGY TRANSFER PROCESS

by

Lyle K. Hochberger
and
Bill G. Woolley

September 1977

Thesis Co-Advisors: J. W. Creighton
J. A. Jolly

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1. REPORT NUMBER: NPS-54Cf77092	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): The Roles and Identification of Innovators and Linkers in the Technology Transfer Process.	5. TYPE OF REPORT & PERIOD COVERED: Master's Thesis; September 1977
6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s): Lyle K. Hochberger; Bill G. Woolley	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	12. REPORT DATE: Sep[illegible]77
	13. NUMBER OF PAGES: 149
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Adoption	Diffusion	Invention	Methodology
Application	Dissemination	Investigation	Research
Communications	Information	Knowledge	Technology
Creativity	Innovation	Linker	Transfer
Development	Innovator	Measurement	Utilization

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The concept that the innovator is a unique and essential element in the process of technology transfer is advanced. Distinction is drawn between the innovator, the inventor, and the linker categories of individuals. An instrument is developed to identify both the innovator and the linker. The instrument is administered to a set of individuals and the ability of the instrument to differentiate is validated through the results of a series of interviews with a sample of the respondents.

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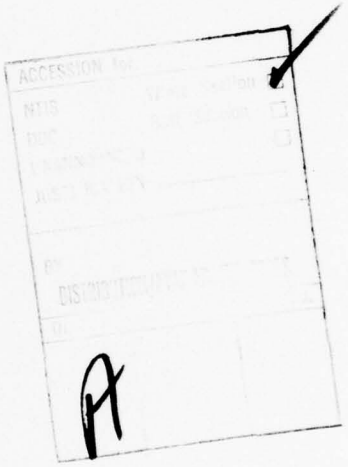
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Extensive analysis is performed on the results of both the questionnaire and the personal interviews. Conclusions are drawn, and recommendations for additional investigation are provided.



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The Roles and Identification of Innovators and Linkers in the Technology Transfer Process

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

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ABSTRACT

The concept that the innovator is a unique and essential element in the process of technology transfer is advanced. Distinction is drawn between the innovator, the inventor, and the linker categories of individuals. An instrument is developed to identify both the innovator and the linker. The instrument is administered to a set of individuals and the ability of the instrument to differentiate is validated through the results of a series of interviews with a sample of the respondents. Extensive analysis is performed on the results of both the questionnaire and the personal interviews. Conclusions are drawn, and recommendations for additional investigation are provided.

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ACKNOWLEDGEMENT

We would like to acknowledge the encouragement and assistance that have been given to us by Dr. J. W. Creighton and Dr. J. A. Jolly. Their suggestions and critiques have proven invaluable.

We would especially like to thank Dr. Creighton who initially encouraged us to undertake this research project and who freely shared with us the great wealth of his experience.

I. INTRODUCTION

A. BACKGROUND

Technology transfer has been defined as "a purposeful conscious effort to move technical devices, materials, methods, and information from the point of discovery or development to new users," (Gilmore, 1969). It has also been defined as "a purposive, conscious effort to move technical devices, materials, methods, and/or information from the point of discovery or development to new users," (Claassen, 1973, p. 8).

The process in its most macro concept consists of three elements; they are, (1) the source of knowledge or ideas (i.e., the invention or discovery), (2) the diffusion or dissemination of that knowledge (i.e., the linking function), and (3) the consequences of the knowledge (i.e., the user function). This macro concept of the total process has been graphically represented by various authors, and although the names of the individual roles may vary from author to author, the functions of each role remain essentially the same. The representation pictured in Figure 1, is not unlike that used by (Claassen, 1973, p. 9), (Nyenhuis & Welborn, 1976, p. 13), (Farr, 1969, p. 3), and (Creighton, Jolly, and Denning, 1972, p. 3).

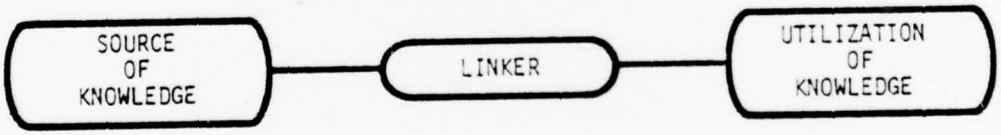


Figure 1. The Technology Transfer Process

In this simplified scenario the role of the "innovator" is that corresponding to the "source of knowledge" and relates to the function of generating new ideas, concepts, materials, etc. The role of the "linker" is that of transferring the product of the inventor, regardless of its form, to the potential users of that product. The role of the "user," corresponding to "utilization of knowledge," quite naturally is to put to use the knowledge so received.

Although Figure 1. adequately presents a macro concept of the technology transfer process, there are other essential roles that should be identified to insure a more accurate understanding of the process. Three such roles are those of the "gatekeeper," the "opinion leader," and the "innovator." Briefly explained, the gatekeepers are those individuals that hold the strategic positions in the user organization for controlling the flow of external innovations (Havelock, 1973, p. 7-11). The opinion leader is identified as that individual who is responsible for influencing the adoption of innovations by other members of his reference group. And, the "innovator" has been described as "the first person in a social system to take up a new idea" (Havelock, 1973, p. 7-13), also as "the first 2.5 percent of the individuals to adopt an innovation" (Rogers & Shoemaker, 1971, p. 181).

The roles of the gatekeeper and the opinion leader in the process of technology transfer have been adequately researched and documented (Rogers & Shoemaker, 1971, p. 347-385). The role of the innovator in the process, and indeed precisely what actually constitutes being identified as an innovator, has not been adequately defined. The concept that an innovator is merely the first individual to adopt an existing idea is considered to be inadequate. It has been suggested by some observers and noted by Rogers & Shoemaker that one of the two possible additional steps that can be said to occur in the sequential process of invention-diffusion-consequences is that of innovations development. This step occurs after invention and prior to a diffusion. "It is the process of putting the new idea in a form that meets the needs of an intended audience of receivers" (Rogers & Shoemaker, 1971, p. 7).

It is this concept of an innovator that forms the genesis of this research. The idea that the "innovator" is characterised by an individual possessing the inherent ability to recognize a need or a problem and through a novel and original application of existing knowledge is able to effect a surprisingly good solution. Taken in this context, the fact that the innovator is an essential element in the technology transfer process is self evident.

That the innovator is a category separate and distinct from that of the linker was suggested by Creighton as a result of research in the area of linker concept methodology in the technology transfer process (Creighton, Jolly & Denning, 1972). Identification of the innovator, and

differentiation between the innovator and the linker then is seen as a vital step in the overall understanding of the technology transfer process.

B. OBJECTIVES

The objective of this research is threefold in nature and directly corresponds with the three hypotheses that underlie the total effort. Each objective and its associated hypothesis will be covered separately.

Hypothesis (1): It is hypothesized that an instrument can be developed which is capable of isolating two classes of individuals (i.e., linkers and innovators), when administered to a representative body of personnel. Objective (1): The primary objective of this research effort is to develop and validate a questionnaire that is capable of identifying and differentiating between the linker and the innovator categories of individuals.

Hypothesis (2): It is hypothesized that there will be a positive correlation between the innovator and the linker traits. Objective (2): The secondary objective of this research is to determine if a relationship does exist relative to the two traits.

Hypothesis (3): It is hypothesized that the relationship between the innovator trait and the linker trait will not be unity, that is to suggest that all innovators are not also linkers and that all linkers are not also innovators. Objective (3): The third objective of this research is to define the exact nature of the relationship between the linker and the innovator traits, given of course that the findings of the second objective are affirmative.

C. METHODOLOGY

To initiate the research effort, an intensive literature search in the fields of creation and innovation was conducted. This literature search produced a set of generalizations which were then used as the basis for the generation of questions that would constitute the proposed test instrument. Following completion, the initial test instrument was administered to a section of students enrolled in the Technology Transfer Seminar (MN-3801) at the Naval Postgraduate School. As a result of constructive comments by members of the class and a further literature

search, the instrument was modified to its present form, the Expanded Professional Preference Census (EXPPC). A detailed description of the rationale used in the instrument development is provided in Section IV. The EXPPC (Appendix A) was mailed to 720 students at the Naval Postgraduate School. From this total population, 254 students responded. From this group of respondents 40 students were selected to be interviewed using the Validation Schedule for the EXPCC (Appendix B). The purpose of conducting the interviews was to validate the ability of the EXPPC to distinguish innovators, non-innovators, linkers, and stabilizers from the vast majority. The Validation Schedule for the EXPPC was developed based upon the interview schedule used to validate the original PPC of Creighton, Jolly, and Denning (1972, p. 68-71), and from generalizations that had been obtained as a result of the literature search. A detailed description of the rationale used in the interview schedule development is provided in Section V. The relationships between the questionnaire data and the interview data were analyzed to establish the ability of the questionnaire to differentiate between the classes identified by the first hypothesis. Discriminate analysis was used to establish the ability of the instrument to predict group membership from question scores. To investigate the hypothesized relationship between the individual traits defined as linker and innovator, a regression analysis was performed using the linker trait scores and the innovator trait scores as variables. To investigate the third hypothesis, that is, that linkers are not necessarily innovators, and innovators are not necessarily linkers, several respondents whose scores tended to validate the hypothesis were selected to be included in the interview group for validation.

Twelve respondents were excluded from the data analysis as they were known by the researchers to have had prior knowledge of this research project and/or had extensive prior knowledge of the Professional Preference Census as an instrument to isolate the class of individuals defined as linkers. In addition, four respondents were excluded from the data analysis because it was found during the interview process that they did not fully understand the questionnaire due to language differences. In each of the 16 instances, the exclusion of the respondent was an attempt on the part of the researchers to remove external bias from the research effort.

II. DEFINITIONS

It has been suggested that man need not assume a universal meaning for each and every term. "Since human beings assign meaning to a term, they may well choose not to agree; it is not necessary that they should always agree, but only that they should know to what extent they disagree" (T. B.Sprecher, 1963, P.77). This statement is particularly significant to the field of technology transfer due to the apparent arbitrary usage of many key terms. In this thesis, the authors have retained the same perogatives as the other authors in the field and assigned specific meanings to various terms. While the meanings have their genesis in the literature, it is deemed appropriate to define those terms which may produce confusion if not taken in the same context as that intended by the authors.

DEFINITIONS OF TERMS:

INVENTION: (1) An invention is an act of mental creation or organization. (2) It is the process by which new ideas are created or developed. (3) It is the first discovery or new knowledge. (The basis for this definition is derived from (1) Webster's Third International Dictionary, 1961. (2) Rogers & Shoemaker, 1971, p. 7. (3) Goldhar, 1974, p. 36)

INVENTOR: One who originates or creates, as a product of his own contrivance or imagination, a totally new product and/or concept and thereby increases the existing knowledge base. (The basis for this definition is derived from the Webster's Third International Dictionary, 1961.)

INVENTIVENESS: A relative measure of one's capacity/ability to conceive new ideas and relationships. (The basis for this definition is derived from Webster's Third International Dictionary, 1961.)

INNOVATION: (1) An innovation is an invention that is applied for the first time. (2) The first use of an invention, or unique combination of inventions in a particular innovator-client/use combination. (3) An idea, practice, or object perceived as new by an

individual. (The basis for this definition is derived from (1) Mansfield, et. al., 1971, p. 11. (2) Goldhar, 1974, p. 36. (3) Rogers & Shoemaker, 1971, p. 19.)

INNOVATOR: That individual which through the application of existing knowledge, originates a unique and surprisingly good solution to a known and defined problem. (The basis for this definition is derived from the American College Dictionary, 1970.)

INNOVATIVENESS: A measure of one's ability to recognize problems or needs and be capable of effecting a good solution thereto through the original application of existing knowledge. (The basis for this definition is derived from the The American College Dictionary, 1970.)

ADOPTION: Adoption refers to the use and continued use of a new item or idea; it involves commitment rather than trial. (The basis for this definition is derived from Robertson, 1971, p. 32.)

ADOPTER: One who adopts, or accepts a new item or idea. (The basis for this definition was derived from Webster's Third International Dictionary, 1961.)

ADOPTIVENESS: A general scalar categorization for identifying the rate at which different individuals are willing and capable of accepting a new idea or innovation. (The basis for this definition was derived from Webster's Third International Dictionary, 1961.)

III. CONCEPTS

The present state-of-the-art in this new and emerging field of technology transfer is such that the models which have been presented to-date have all included in one form or another a linker or linkage concept. The role of the linker is to interact with the consumer or user of the technology and the source of the technology. Claassen (1973, p. 8) describes the linker as "an individual who through his own initiation seeks out scientific knowledge, is an early knower of innovation, and acts as an intermediary between the source of knowledge and the individuals or organizations who put it to use." The linker is in essence the catalyst who can translate needs of the consumer into stated problems which are potential candidates for application of the new technology.

Rogers and Shoemaker (1969), p. 174 developed a model of adopter categorization on the basis of innovativeness (i.e., adoptiveness as defined by this paper). They hypothesized that a large population would, when ranked by the measure of average time to adopt a new idea, concept, or method, (relative earliness or lateness of adoption in comparison with other members of a given social system) form a continuum which would be normally distributed. They classified the group falling more than two standard deviations below the mean as innovators, the group between one and two standard deviations below the mean as early adopters, the group between the mean and one standard deviation below the mean as early majority, the group between the mean and one standard deviation above the mean as late majority, and the group above one standard deviation above the mean as laggards. Figure 2, Rogers and Shoemaker Adoption Model p. 182, depicts this relationship.

Creighton, Jolly, and Denning in 1972 developed and applied an instrument to isolate and identify those individuals which they classed as linkers. They structured the topology of the linking roles to that of "the leader (gatekeeper and opinion leader), early adopter of an innovation (innovator), and early knower of an innovation". Their self-assessment instrument consisted of 18 multiple-choice questions, each with five possible responses. A value of one through five points was assigned to each possible response. The value of five was given to the answer which identified the strongest positive linker attribute as indicated by prior research. A

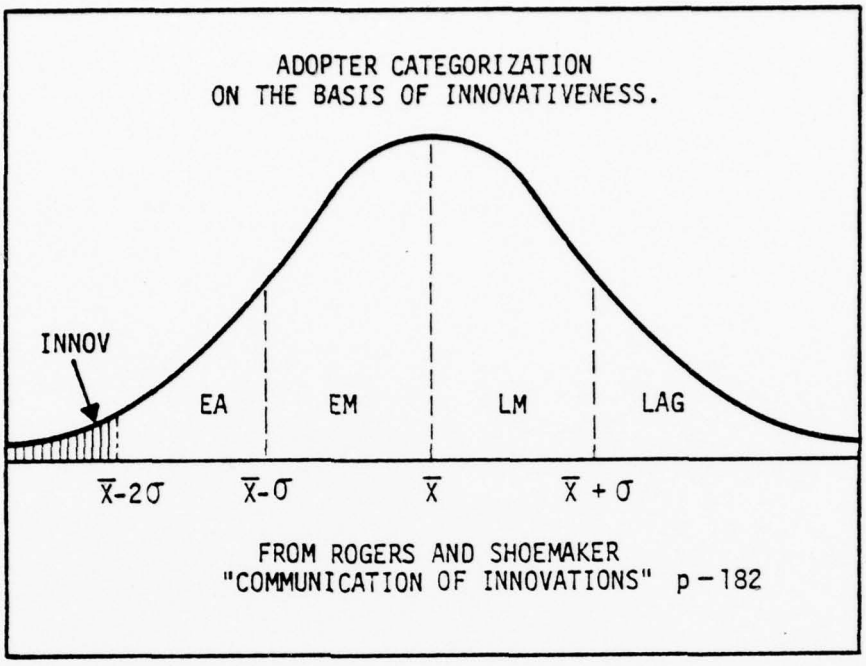


Figure 2. The expected distributions of individuals based on the time required by each to adopt new ideas.

value of one was given to the response indicative of the strongest non-linker or stabilizer attribute. The sum of the scores for all questions of the instrument was calculated. This composite score served as the means of classifying individuals in the appropriate category.

Using a method similar to that utilized by Rogers and Shoemaker, the team of Creighton, Jolly, and Denning divided the respondents to the instrument into five categories using the mean, plus and minus one and two standard deviations as the break-points. Those individuals whose composite score was greater than two standard deviations above the mean were classified as linkers. Those individuals whose composite score was between one and two standard deviations above the mean were classified as potential linkers. Those individuals whose composite score was between one standard deviation above the mean and one standard deviation below the mean were classified as non-discriminating majority. Those individuals whose composite score was between one and two standard deviations below the mean were classified as potential stabilizers. Those individuals whose composite score fell beyond two standard deviations below the mean were classified as stabilizers. This relationship is demonstrated by Figure 3, Linker-Stabilizer Categorization.

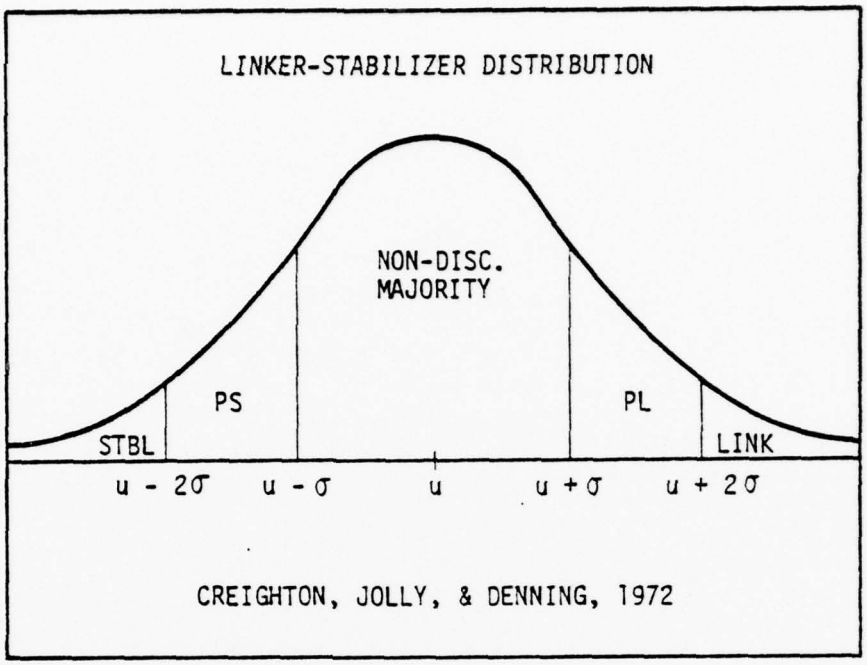


Figure 3. The expected distribution of individuals based on their propensity to link sources of knowledge with users of knowledge

Following the application of the instrument and an analysis of the responses, the break points for classification were changed from two standard deviations to 1.83 standard deviations and from one standard deviation to 0.93 standard deviations. This method of classification "tended to create groups which were more indicative of the sample distribution than the arbitrary method did based upon the assumption of normality."

While the "linker" is identified as the intermediary between the source of knowledge and the individuals or organizations who put it to use, the "innovator" is seen to represent an essentially different type of individual. This is not to suggest that the characteristics associated with the linker and the innovator are entirely different, in actuality they are quite similar and are only distinct in the degree to which each characteristic exists. The innovator is differentiated from the linker as being that individual which possesses the inherent capability to recognize a problem and/or need, and through a new and unique application of existing knowledge is able to effect an unusually good solution thereto. It is this ability to define and effect an initial application that is unique to the innovator. It may matter little to the innovator if the information relating to the innovation is transferred to society, and therein lies one of the

essential differences between the innovator and the linker. The hypothesized relationship of these two categories of individuals relative to the total population is shown diagrammatically by Figure 4.

As apparent from Figure 4, there will be a grouping of individuals which possess a high degree of linking characteristics, a group that possesses a high degree of innovative characteristics, and a group which will possess a high degree of both characteristics, all as differentiated from the majority of the population. This concept of the two categories of individuals who though closely related were distinct unto themselves suggested that a method of differentiating between the two would contribute to a better understanding of the total technology transfer process.

The intent of the PPC developed by Creighton, Jolly, and Denning was to identify the linker from the total population. The PPC was very successful in identifying persons who had strong linker traits each time it was used. The intent of this research was to develop a method of identifying the innovator and incorporate it with an appropriate segment of the instrument developed by Creighton, Jolly, and Denning, thereby producing a single vehicle with extended capability.

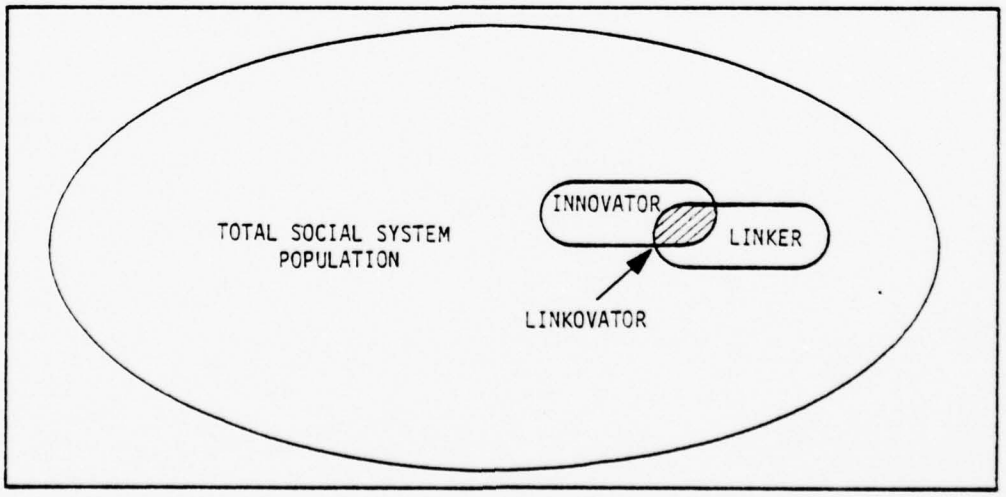


Figure 4. The hypothesized relationship of the innovators, the linkers, the linkovators, and the remainder of the population in a given social system.

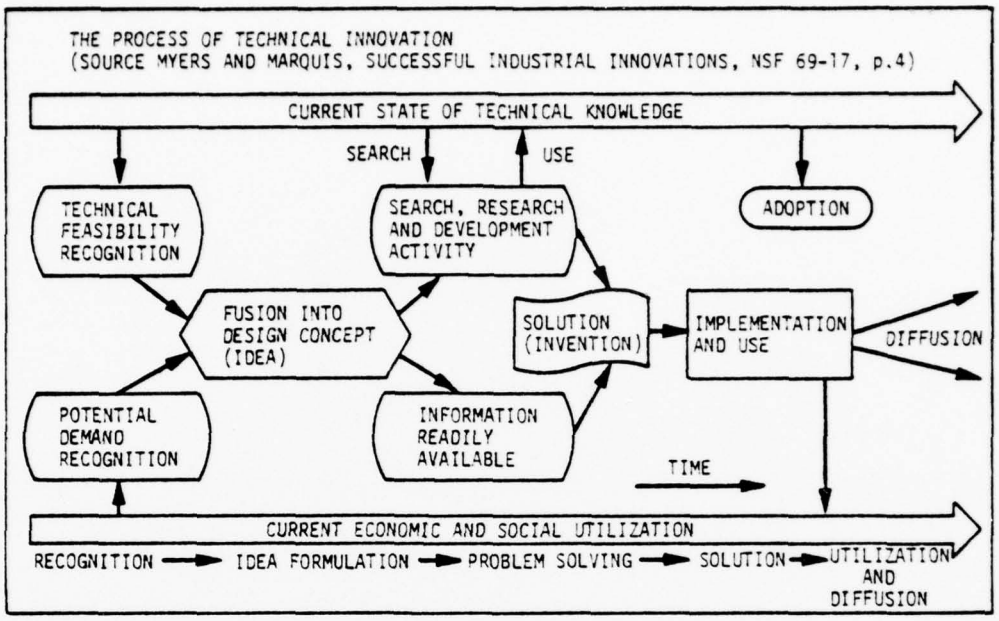


Figure 5. The Sequential process of technical innovation

The determination of how best to identify the innovator was initiated through a literature search utilizing the facilities of the Dudley Knox Library at the Naval Postgraduate School. A review of the available literature indicated that innovators operate in a rather pre-defined manner, that is to say, the innovator has a specific process that he either consciously or sub-consciously follows which leads him eventually to/through a given innovation. This innovation process has been thoroughly documented and consists essentially of five distinct phases (i.e., recognition, idea formulation, problem solving, solution, and utilization/diffusion) (Ref. Myers and Marquis, 1969, p. 4). This process is diagrammatically represented by Figure 5. Another unique characteristic of the innovator that was identified as a result of the literature search was the specific thought process that occurs in the mind of the innovator as the innovation is taking form. Goldhar, (1974, p. 61), has identified the process in the form of a diagram; this is provided as Figure 6.

The segregation of the innovator as a category distinct from the linker was accomplished using a set of questions that were developed specifically to address the strong characteristics of the innovator. Eleven new questions were developed that were used in conjunction with eight of the questions from the PPC to identify the total population of the innovators. The 11 new questions in addition to contributing to the identification of the innovator were also used to assist in differentiating between the linker and the innovator categories.

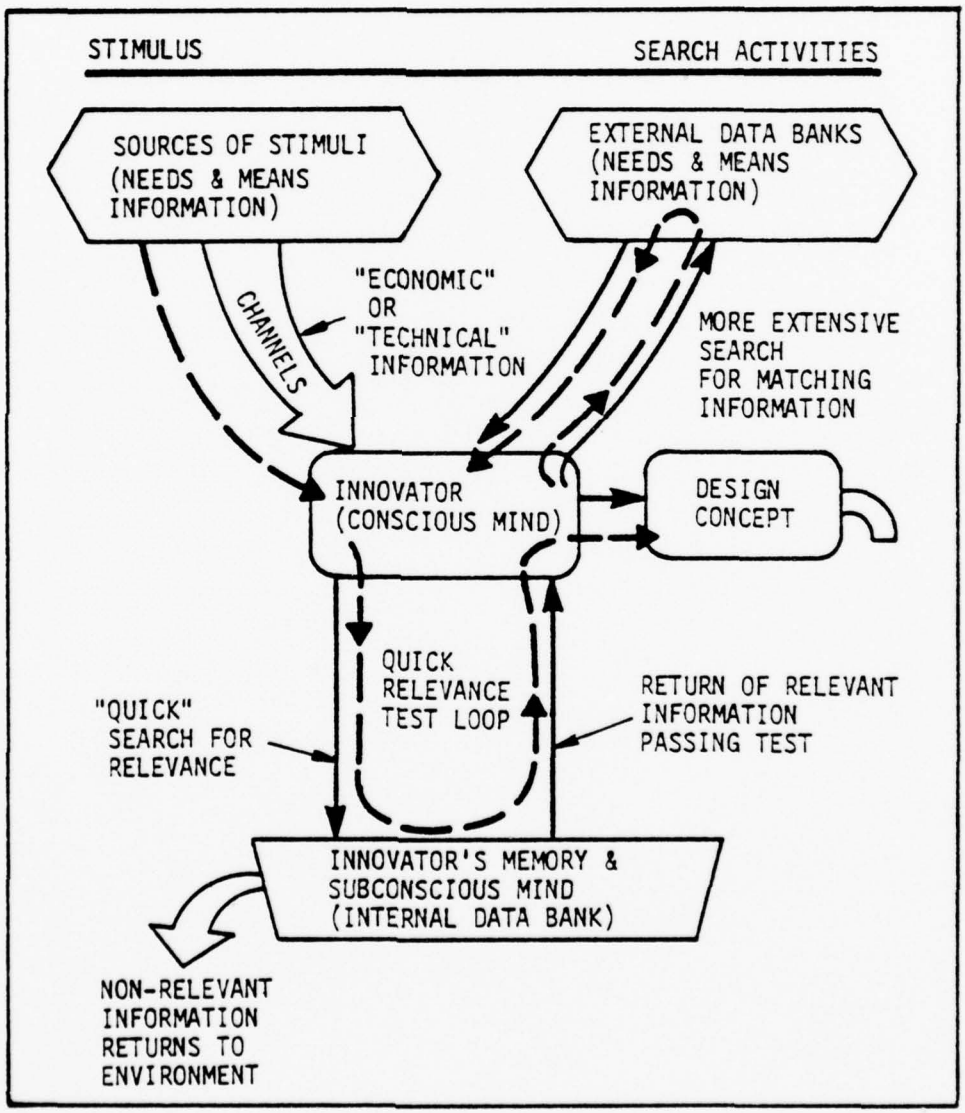


Figure 6. The innovators thought processes during design concept formulation

It was anticipated that the distribution of the innovator, like that of the linker, would possess a normal distribution characteristic. The anticipated break point for the innovator category was taken at two standard deviations above the mean and greater. Near innovators were tentatively identified at between one and two standard deviations above the mean. The non-discriminating majority was the group between one standard deviation above the mean and one standard deviation below the mean. The near non-innovator was that group falling between one standard deviation below the mean and two standard deviations below the mean. The non-innovators were identified as all respondents falling at two standard deviations below the mean and below. This relationship is diagrammatically represented by Figure 7.

Three models have thus far been presented, each is concerned with the general subject of technology transfer. The model of Rogers and Shoemaker (1971, p. 182) was concerned with categorizing individuals based on the amount of time required by each to adopt a new innovation. The model of Creighton, Jolly, and Denning (1972, p. 30) categorized individuals in

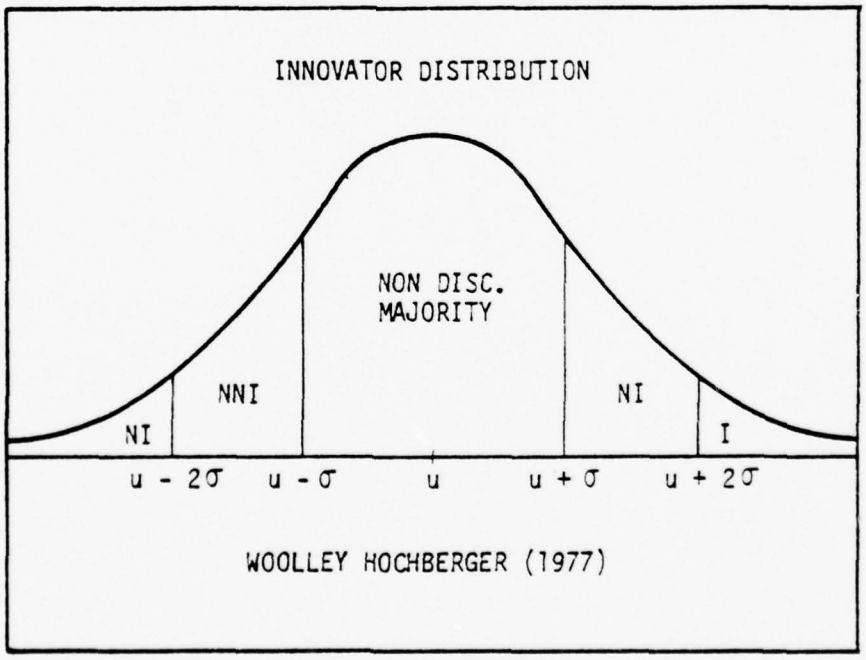


Figure 7. The hypothesized distribution of innovators based on their relative ability to generate innovations

terms of their propensity to provide an information linking function. The model advanced in this thesis seeks to categorize individuals in terms of their capacity to produce innovations. While all three models are concerned with technology transfer, and each model, although addressing a different facet, strongly resembles the other two, there is in reality no duplication, nor is there any significant conflict. The relationship of these models and indeed their complementary nature is perhaps best represented by a diagram that depicts the population in terms of "time to adopt," with the "innovator," and the "linker" sub-populations superimposed. (Figure 8.) This, then, reflects the relationship of the basic concepts that form an integral portion of this thesis.

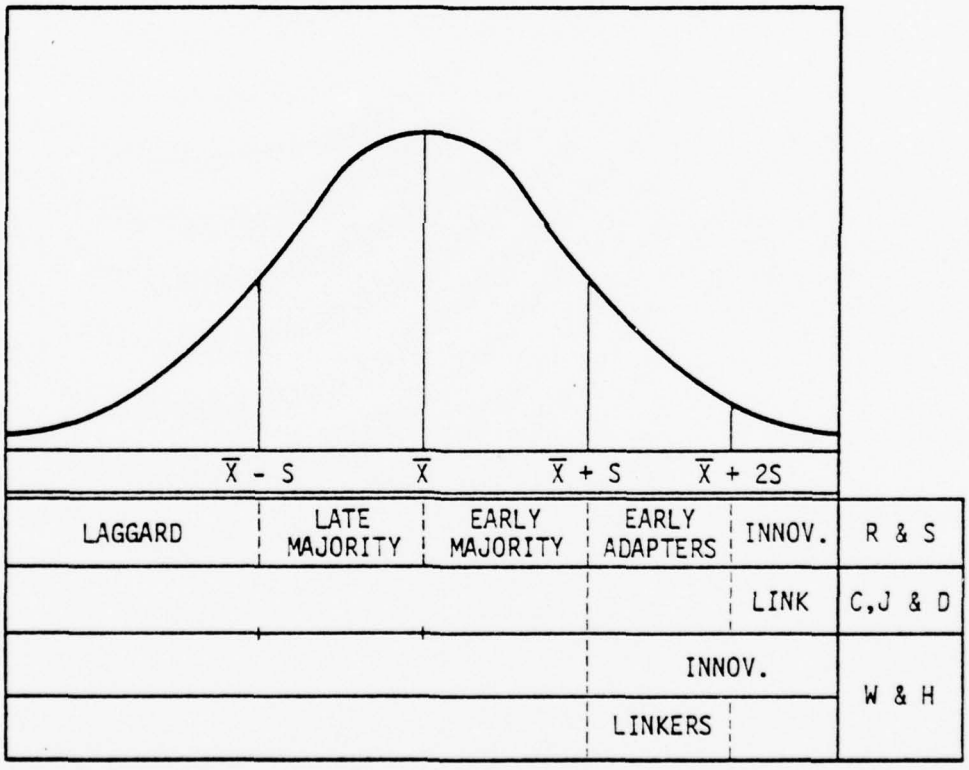


Figure 8. The comparative relationship of innovators and linkers as identified by Rogers and Shoemaker (R&S), Creighton, Jolly, and Denning (CJ&D), and Woolley and Hochberger (W&H)

IV. QUESTIONNAIRE DEVELOPMENT

The very nature of this research effort necessitated the identification of two distinct categories of individuals, the "innovator", and the "linker". To accomplish this requirement, the questionnaire development was divided into two separate but interdependent phases. Phase 1 of the development was concerned with the identification of the "linker" category while Phase 2 was concerned with identifying the "innovator" category. It was essential in the development of the questionnaire that any new question selected not only be capable of identifying a given category, but also be capable of assisting in the differentiation between the two categories. The procedures and rationale associated with the selection of all the questions used in this research will be presented in either Phase 1 or Phase 2 as appropriate.

A. PHASE 1

This phase being concerned with the identification of the "linker" proved to be one of the easier tasks in the research project. Initial work by Creighton, Jolly, and Denning in 1972 had developed and validated a questionnaire consisting of nineteen questions which demonstrated a good capability for identifying the "linker" category. Additional work by Claassen, 1973, modified some of the questions to increase their relevance to a specific, i.e., government employee, audience. For the purpose of this research, selected questions from the Professional Preference Census of Creighton, Jolly, and Denning, were used. The questions selected, ten in all, were determined based on the chi-square goodness-of-fit tests and the multiple discriminate analysis of each of the original 19 questions. These criteria were measures of each question's ability to classify a total population in terms of linkers, potential linkers, nondiscriminating majority, potential stabilizers, and stabilizers. The ten questions selected were those that demonstrated the greatest consistency in the classification process. Since the rationale supporting each of the ten questions remains unchanged from the original work by Creighton, Jolly, and Denning, their development rationale is provided exactly as documented in Ref. 12 of the bibliography. Although the definitions of innovator and innovativeness used in this thesis are different from those used by Creighton, Jolly, and Denning, the rationale used in their question

selection remains essentially valid for this thesis. The questions supporting this phase included questions number 2, 4, 6, 8, 9, 11, 13, 15, 16, and 21. Each question is addressed individually as follows:

Question Two: "*Indicate the number of technical and/or scientific society meetings and/or conventions which you attended last year which involved personnel other than your immediate circle of colleagues.*" The following propositions from Rogers & Shoemaker were a major source from which the question was derived:

(1) Earlier adopters are more cosmopolite than later adopters (Rogers & Shoemaker, p. 189).

(2) Earlier knowers of an innovation are more cosmopolite than later knowers (Rogers & Shoemaker, p. 108).

(3) Opinion leaders are more cosmopolite than their followers (Rogers & Shoemaker, p. 218).

The first generalization is supported by 76 percent of the 174 empirical studies performed (Rogers & Shoemaker, p. 369-71). The second proposition is supported by five of the five studies performed (Rogers & Shoemaker, p. 349-50); while the final conclusion is based on 13 studies, 77 percent of which favor the general statement (Rogers & Shoemaker, p. 378). Cosmopoliteness is defined as "the degree to which an individual's orientation is external to a particular system" (Rogers & Shoemaker, p. 89). The dichotomy is between local and cosmopolitan individuals. The local largely confines his interests and activities to the organization or community of which he is an integral member. The cosmopolitan is more oriented toward that which is common to all the world or that which is something greater than the limited local environment.

Question Four: "*Indicate the level within the social strata to which you would aspire to be 10 years from now.*" was partially based upon the following proposition from Rogers & Shoemaker:

(1) Earlier adopters have higher aspirations (for education, occupations, and so on) than later adopters (Rogers & Shoemaker, p. 188). The generalization is supported by 29 of the 39 studies that have been performed (Rogers & Shoemaker, p. 367-8). Rogers also found in an earlier study that innovators and early adopters earn a higher gross income (Rogers, 1, p. 72). In

addition, Bell's findings indicated that with respect to consumer durable goods innovators differed significantly income-wise from non-innovators (Bell, p. 90).

Question Six: "*Indicate the number of technical, scientific, and/or professional societies to which you hold current membership.*" was based on cosmopoliteness. Since a dominant characteristic of the gatekeeper, opinion leader, innovator, and early knower is his general orientation to things outside his own group, it was agreed that membership in external societies, groups, etc., would be a viable indicator of the respondent's cosmopoliteness. As previously mentioned, research has shown that a linker is more likely to belong to special organizations because of his tendency to expand his interests and activities beyond the local environment.

Question Eight: "*During the last month, indicate the relative frequency with which you recommended a specific item of interest, e.g., journal article, research report, or a lead to either, to a colleague which dealt with a work-related topic.*" and

Question Eleven: "*Indicate the frequency with which your subordinates, peers, and/or superiors came to you in the past month for work-related information and/or advice which was not a function of your formal position.*" was based upon the Rogers & Shoemaker conclusion that:

(1) Earlier adopters have a higher degree of opinion leadership than later adopters (Rogers and Shoemaker, p. 189).

Sixty-one of the 80 empirical studies relating innovativeness to opinion leadership support the above generalization (Rogers & Shoemaker, p. 375-76). Inherent in the definition of opinion leadership is the concept that information flows both to and from the opinion leader. Reynolds and Dardin have identified several findings in the literature which tend to support the concept that there is a two-way transfer of information with respect to opinion leaders and non-leaders. They have found that opinion leaders are more active as receivers of product information from personal sources than non-leaders (Reynolds, p. 449). Bales (p. 2-7) review of opinion leader-non-leader interaction studies revealed that those individuals who transmitted most frequently also received the largest number of communications.

Question Nine: "*In the past year, how many nonroutine, work-related projects have been completed for which you supplied the original idea?*", was based upon the definition of an innovator as the earliest adopter of an idea or system of thought which the individual, or

organizational entity to which he is a member, perceives to be new. Even though the innovator is usually not a "creator" in the inventive sense of the work, it was hypothesized that the number of nonroutine, work-related projects for which an individual supplied the original idea would be a measure of the respondent's innovativeness. Hence, the innovator, being eager to try new ideas, would instigate and complete a greater number of projects for which he supplied the original idea than would the later adopter of an innovation.

Question Thirteen: "*Indicate the type of information upon which you would place highest credibility.*" was based upon the assumption that a "linker" would be classified as a "better performer" as contrasted with a "poorer performer" in terms of desired output. As such, Massey has found that better performing scientific and technical personnel tend to place most reliance upon information which they have stored in their own minds, and second most on that stored in the minds of others. Formal or written communication was given lowest relative valuation (Massey, p. 57-58). Additionally, the Conference on the Human Factor in the Transfer of Technology agreed that scientific and technological information experiences its earliest transfer in terms of people-to-people interactions rather than through formal publication (Reiss, p. 109). Further research has indicated that opinion leaders are primarily affected not by the communication media but by still other people (Katz, 1, p. 77). Also nearly 60 percent of the innovators studied by Blackwell reported word-of-mouth communication to be the single most effective source in their decision to adopt an innovation (Blackwell, p. 19). The assumption was made that the source of information which the "linker" perceived to be the most credible was that source which the above research findings have indicated to be the most effective.

Question Fifteen: "*In the past month how many times have you sought further information about a new idea or ideas which you thought to be useful to your work?*", was derived from the following conclusion from Rogers & Shoemaker:

(1) Earlier adopters seek information about innovations more than later adopters (Rogers & Shoemaker, p. 189)

The generalization is based on 14 empirical studies; only two of which do not support the conclusion (Rogers & Shoemaker, p. 374). Additional research indicated that the gatekeeper actively seeks out information and then makes it available to the rest of the audience (Farr, p. 10). Also, since the opinion leader, gatekeeper, innovator, and early knower of an innovation

use mass media and other sources of external information more extensively than their counterparts, Thorelli (p. 427-28) has found that consumer groups who have greater exposure to the mass media tend to consult each of several product information sources more extensively for product information in general than those who are not exposed to a considerable amount of mass media. The research findings were consistent with the belief by the researchers that a "linker" would tend to actively seek information to a greater extent than would other individuals within the user organization.

Question Sixteen was: "*Indicate the total number of journals, magazines, and newspapers which you regularly read.*" A primary reason for its inclusion in the PPC is the following propositions from Rogers & Shoemaker (p. 189):

(1) Earlier adopters have greater exposure to mass media communication channels than later adopters.

(2) Earlier knowers of an innovation have more exposure to mass media channels of communication than later knowers (Rogers & Shoemaker, p. 108).

(3) Opinion leaders have greater exposure to mass media than their followers (Rogers & Shoemaker, p. 218).

The first generalization is based on 116 empirical studies of which 69 percent support the statement (Rogers & Shoemaker, p. 372-73); the second on 29 studies of which 62 percent support the conclusion (Rogers & Shoemaker, p. 348); and the final on ten studies of which 90 percent are supporting (Rogers & Shoemaker, p. 378). In addition, research concerning the gatekeepers has shown that "they use mass media and other sources of information external to their own group more frequently" (Farr, p. 10) than do the group/s of receivers for whom they act as a gate. Further research by Lazarsfeld and others (p. 50-51) concluded that "compared with the rest of the population, opinion leaders were found to be considerably more exposed to the radio, to the newspaper, and to magazines, that is to the formal media of communication." More recent research substantiates the findings that opinion leaders tend to be more exposed to mass communications than non-leaders, particularly to topic-relevant media (Thorelli, p. 452).

Question Twenty-One: "*Indicate which combination of words, when placed in the following sentence would most accurately describe you: I feel that I hear about new work-related developments in my professional area* _____ *most of my colleagues.*" is

based upon the following generalization from Rogers & Shoemaker:

(1) Earlier adopters have greater knowledge of innovations than later adopters (Rogers & Shoemaker, p. 189).

Forty-two of the 55 empirical studies performed support the above proposition (Rogers & Shoemaker, p. 374-75). Naturally the identification of the group "early knowers of an innovation" inherently supports question 21 because such a group has been the dependent variable in over 100 empirical studies (Rogers & Shoemaker, p. 347-50) concerned with relating certain attributes and characteristics to this group. Similarly, gatekeepers by definition act in "such a way that the passing or not passing of a unit through the whole channel depends to a high degree upon what happens in the gate region" (Lewin, p. 199). It follows from the functions of a gatekeeper that he would hear of new things prior to the group/s of receivers for whom he acts as a gate. The above findings and conclusions are the basis for question 21 and its inclusion in the census.

B. PHASE 2

This phase of the instrument development was concerned with both the identification of the innovator and the differentiation between the innovator and the linker. Criteria for the determination of both aspects were derived from the available literature in the fields of technology transfer, and scientific creativity. Utilizing a list of characteristics which conceivably would separate the innovator from the linker, a group of questions was generated and administered to a controlled sample of personnel. The results of this test suggested that while the original questions may separate the linker and the innovator categories, they did not separate either category from the non-discriminating majority. Utilizing a somewhat different approach, a set of 19 questions were identified that would define a population in terms of innovator and non-innovator. The 19 questions were comprised of eight questions taken from Phase 1, and 11 new questions which had been developed from the same group of characteristics identified earlier. The selection criterion for the eight questions obtained from Phase 1 was that they be able to support the identification of innovators as a discrete set of the total population. The 11 new questions that were generated were intended to both identify the innovator and to assist in

differentiating between the innovator and the linker. To accomplish this , it was essential that the question development utilize those characteristics that would conceivably support differentiation. The original list of possible characteristics for identification and differentiation consisted of 161 separate terms. Through the selection of single terms to identify a given characteristic, and the elimination of those characteristics that would not easily support differentiation, the list was reduced to the following ten terms:

1. DELEGATIVE
2. DIPLOMATIC
3. ADVENTUROUS
4. EMPATHETIC
5. PERSERVERING
6. COMMUNICATIVE
7. CREDITABLE
8. DISCERNING
9. METICULOUS
10. ASSERTIVE

The rationale utilized in the development of each new question (i.e., question number 1, 3, 5, 7, 10, 12, 14, 17, 18, 19, and 20) will be provided in detail, and will be addressed first. The questions selected from Phase 1 (i.e., question number 2, 4, 6, 9, 13, 15, 16, and 21) will be addressed secondly and will reflect only the relevance of each question to support innovator identification.

Question One, "*The tasks I worked on this past year that were most enjoyable, were those that ...*" was developed to identify the level of attention to technical detail associated with each respondent. The basis for this question was the generalization that:

(1) Innovators have greater attention to detail than do linkers.

The innovator, as the individual responsible for the generation of an innovation, by necessity requires an in depth knowledge of the area in which he operates. "Knowledge is a basic requirement for creativity. Nothing can be made of nothing" (P. R. Whitfield, p. 34). "There is much analytical and convergent thinking in creative problem-solving" (P. R. Whitfield, p. 39). "Being an innovator has several prerequisites. These include control of substantial financial resources to absorb the possible loss due to an unprofitable innovation and the ability to understand and apply complex technical knowledge" (Rogers & Shoemaker, p. 183). Although it is essential that the linker possess a broad range of knowledge to be successful, the fact that "he is not the initial source of knowledge, nor is he a member of the client community who

applies the knowledge to the ongoing educational process" (R. S. Farr, p. 4), suggests that the depth of knowledge and associated attention to technical detail, are not as pronounced in the linker as in the innovator.

Question Three, "*Your office has just been assigned an important study project: would you:*", was specificially developed to allow the respondent to select answers that would indicate his attention to detail, his acceptance of perceived risk, and his attitude regarding the delegation of tasks. The basis for the question was the following two generalizations:

(1) Innovators have a more favorable attitude toward risk than do linkers.

(2) Innovators are less likely to delegate tasks than are linkers.

The first generalization reflects an extension of the precept advanced by Rogers & Shoemaker, "Earlier adopters have a more favorable attitude toward risk than later adopters" (p. 188). There are 37 separate studies that have been catalogued on this subject, 73 percent of the studies support the generalization, ten of the studies do not support (p. 366). Analysis of available data has lead Rogers & Shoemaker to profile the innovator in the following manner: "The salient value of the innovator is venturesomeness. He desires the hazardous, the rash, the daring, and the risky. The innovator also must be willing to accept an occasional setback when one of the new ideas he adopts proves unsuccessful" (p. 183). Extension of the Rogers & Shoemaker's generalization is evidenced by the division of the early adopter category into the units of innovators and linkers; this is in consonance with the connotation assigned to those terms by this thesis. The second genralization is in part based on the concept that the innovator relies basically on the output of his own efforts while the linker serves to bridge the efforts of the innovator and the user. "There is a large slice of self sufficiency in the makeup of the successful creator. He relies on his own energy as well as his own ability; he does his own thing and is willing to work hard at it" (P. R. Whitfield, p. 41).

This question was constructed in such a manner as to allow the measurement of both risk and delegation through the implied increased risk associated with each increase in the quantity of the task delegated.

Question Five, "*I have just thought of a novel and outstanding solution to a problem that most people consider to be minor, I will:*", is a situation question that asks the respondent to

select the answer that most closely reflects his approach to implementing a new idea. The question is based on the generalization that:

(1) Innovators tend to be more assertive than do linkers.

(2) Innovators tend not to be diplomatic in terms of the things that they have created.

(3) Innovators tend to persevere more than do linkers.

These generalizations are in consonance with the charateristics associated with the innovative individual as described by P. R. Whitfield:

> "The innovator must not only be confident in himself to develop his idea but must also force it onto others. This will not be achieved by forbearance and humility but by a decidely single-minded assertiveness, a desire to explain the idea to anyone who will listen and a determination to gain support for it. To know success then, he must know how to influence other people and how to use them. He may be sensitive to their needs, not necessarily out of sympathy for them, but to gain commitment to his cause" (p. 42).

The basis for differentiating between the innovator and the linker through the use of this question originates from the precept that while the innovator will tend to be assertive and persevering, the successful linker will not press for the acceptance of any given innovation to the extent that alienation could occur, and that perseverance beyond the point of idea rejection by the client community would provide little satisfaction.

Question Seven, "*After having completed an original piece of work of which I am VERY PROUD, I find that two people whom I respect have questioned both my reputation and what I have created, I would be ...*", seeks first to determine if the respondent attaches the most significance to, (a) his reputation, or (b) the product of his efforts. Secondly, the question allows the respondent to attach a value judgement to the perceived degree of importance that the selected characteristic represents. This question was based upon the following generalizations:

(1) Linkers will tend to have a higher degree of creditability than will innovators.

(2) Innovators tend to regard their creations as more important than their reputations.

Support for the first generalization is provided through the Rogers & Shoemaker genralization that "change agent success is positively related to his creditability in the eyes of his clients" (p. 245). Only one study has been catalogued on this concept, yielding 100 percent support for the position (p. 382). The change agent, as identified by Rogers & Shoemaker,

"functions as a communication link between two or more social systems" (p. 228). In this context, the change agent is not unlike the linker as identified in this thesis.

Support for the second generalization was in-part developed from a portion of a profile for an innovator as defined by P. R. Whitfield (p. 43). "Though a creative person is quick to foster and defend his work, he is less likely to be concerned over opinions about himself. He has a certain personal detachment which insulates him. This is not to say that he is unfeeling or bottles up his emotions. On the contrary, he is likely to react strongly, particularly when his work is under attack, and give vent to his feelings forcibly."

Question Ten, "*In the past year, how many new ideas or new methods were you, by yourself, responsible for putting into practice?*", was developed to ascertain the degree to which each respondent tends toward job autonomy, an indication of the respondents creativity, and a measure of each respondents propensity toward job completion. This question was based on the following generalizations:

(1) Innovators tend to be more creative than linkers.

(2) Creative individuals are highly motivated toward job completion.

Myers and Marquis, 1969, described technical innovation as a complex activity which proceeds from conceptualization of a new idea to a solution of the problem and then to the actual utilization of a new item of economic or social value. "The idea for an innovation consists of the fusion of a recognized demand and a recognized technical feasibility into a design concept. This is a truly creative act in which the association of both elements is essential" (Myers & Marquis, p. 5). Taken in this context, an innovator is by necessity a creative individual. The first generalization is supported by studies that have been catalogued by Rogers & Shoemaker. Of these five, or 63 percent, supported the generalization that "Earlier adopters have a greater ability to deal with abstractions than do later adopters" (p. 364). The second generalization reflects a characteristic associated with the innovator that has been documented by P. R. Whitfield, p. 43, "Creative people have this drive to complete tasks and feel a special tension when there is a lack of completeness of 'closure' in what they see. A sense of dissonance caused by the problem itself makes them uncomfortable until they have solved it."

Question Twelve," *Which of the following best describes your feelings a majority of the*

time?", is a situational question that was intended to identify the degree of empathy that was felt by each respondent. Although it is considered essential for both the linker and the innovator to possess the characteristic of empathy in order to be successful (i.e., linkers must be empathetic in order to understand the requirements and desires of clients and users, while innovators need to be empathetic in order to define user problems which require innovation), the degree to which each will display the characteristic will differ. From this precept the following generalization has been developed:

(1) Linkers will tend to have a more empathetic attitude than will innovators.

Rogers & Shoemaker, p. 364, have catalogued 14 studies of which nine or 64 percent support the generalization that "Earlier adopters have greater empathy than later adopters." Additionally, although not supported by empirical evidence, Rogers & Shoemaker have identified an additional relevant generalization, "Change agent success is positively related to his empathy with clients" (p. 239). Once again, the context utilized for the change agent was that of the "link" between two or more social systems; in this context their use of the term is in agreement with "linker" as identified in this thesis.

Question Fourteen, "*When faced with a problem that requires an immediate answer to maximize the benefit to both myself and my organization, and knowing that a wrong decision could jeopardize my job, I would...*", was developed with a set of answers that would allow the respondent to select the degree of risk that he would be willing to accept under the conditions as stated in the problem. The foundation of the question lies in the concept that the very nature of the innovator is that of accepting high risk and that the nature of the non-innovator is that of risk adversion. This relationship suggests that both the innovator and the earlier adopter (or linker) will accept a greater amount of risk than will the remainder of the population. The degree to which the innovator is willing to accept risk will, however, be greater than that of the linker. The basis for this question is the same generalization as that used in question three, phase (1).

(1) Innovators have a more favorable attitude toward risk than do linkers.

The empirical evidence supporting this generalization is the same as that provided by question three.

Question Seventeen, "*Once I have initiated a worthwhile project, I normally:*" was

developed in a manner to allow the respondent to select the degree to which he is inclined toward assertiveness, perseverance, and drive for project completion. These characteristics, although present in both the linker and the innovator, are normally associated with a creative or innovative individual. It is not normal to associate the assertiveness characteristic with the linker. The basis for the question lies in the following three generalizations:

(1) Innovators tend to be more assertive than do linkers.

(2) Innovators tend to persevere more than do linkers.

(3) Creative individuals are highly motivated toward job completion.

Generalizations (1) and (2) are the same as those provided in question five; genralization (3) is the same as that provided by question ten. The same rationale and the supporting data are applicable to generalizations (1), (2) and (3) above, as were provided previously by questions five and ten.

Question Eighteen, "*I feel that I could have delegated ----- percent of the tasks that I was assigned the responsibility for last year.*" was used to measure the respondents propensity for delegating work to others. It is the nature of the linking process to ultimately eliminate the requirements for the linking service by enabling the clients and the source to interact directly with each other (R. G. Havelock, p. 19). It has additionally been suggested that the linker activities, which are normally grouped into three kinds of processes (i.e., input, throughput, and output), can result in "too much to do," that is to say, there may be too much information to handle, too many people to get it from, too many steps to put it through, and too many people to give it to (R. G. Havelock, p. 7-34). The implication of the above statements is that delegation is both a function of the linking process and an essential element in its accomplishment. This question finds its origin quite naturally in the generalization that:

(1) Innovators are less likely to delegate tasks than are linkers.

This generalization is the same as that provided in part (2) of question three. The quotation from P. R. Whitfield associated with this generalization as provided in question three is equally applicable to this question.

Question Nineteen, "*The preferred way to insure a good but controversial project is accomplished is to:*", was used to first identify if the approach taken for project accomplishment

was normally assertive, or diplomatic. Since assertiveness and diplomacy represent opposite ends of possible approaches to project completion, the answers provided by the questionnaire were developed to reflect a scalar measure. This scalar characteristic of the answers, although highly subjective, allowed the respondent to accomplish the second intent of the question; that is, to attach a relative strength to the approach selected. The generalizations upon which this question was based were:

(1) Innovators tend to be more assertive than do linkers.

(2) Innovators tend not to be diplomatic in terms of things they have created.

Although the characteristics associated with the linker individual have never been explicitly defined (possibly due to the fact that he can assume any one of a variety of roles such as the opinion leader, the gatekeeper, the early knower, the change agent, the early adopter, etc.), it is reasonable to assume that he will possess certain characteristics if he is to be successful in the linking process. Accordingly, it is suggested that the linker will be diplomatic, empathetic, cosmopolite, communicative, and have creditability. Diplomacy is seen as an essential element to the accomplishment of each of the other characteristics, all of which have empirical support that has been catalogued by Rogers & Shoemaker. The innovator however tends toward exhibiting the characteristic of assertiveness, this being most pronounced when he is attempting to gain acceptance for something he has created or innovated (P. R. Whitfield, p. 42). The resultant difference in the perceived characteristics of the linker and the innovator as applied to the answers provided by this question form a basis for linker-innovator differentiation.

Question Twenty, *"Once I have studied and evaluated a given problem, I:"*, was a situational question that was intended to identify if the respondent was open minded toward alternate approaches for problem accomplishment. This question was based on the generalization that:

(1) The ability to reevaluate a problem from alternate points of view is a characteristic that is shared by both the linker and the innovator.

This generalization is supported by three separate Rogers & Shoemaker generalizations: (1) "Earlier adopters have greater empathy than later adopters"; 14 studies have been catalogued,

nine studies, or 64 percent, support the position (p. 364). (2) "Earlier adopters are less dogmatic than later adopters"; 36 studies have been catalogued, 17 studies, or 64 percent, support the position (p. 364). (3) "Earlier adopters have a more favorable attitude toward change than later adopters"; 58 studies have been catalogued, 43 studies, or 75 percent, support the position (p. 365).

Question Two, "*Indicate the number of technical and/or scientific society meetings and/or conventions which you attended last year which involved personnel other than your immediate circle of colleagues.*" and Question Six, "*Indicate the number of technical, scientific and/or professional societies to which you hold current membership*" were used to identify the cosmopolite nature of the respondent. Since cosmopoliteness is considered to be a characteristic of early adopters, early knowers of innovation, and opinion leaders, the question is appropriate for use in the identification of innovators.

Question Four, "*Indicate the level within the social strata to which you would aspire to be ten years from now.*" was used to identify the relative level of aspiration of the respondent. Since earlier adopters and innovators tend to have higher aspirations and gross income than later adopters, the question is deemed appropriate.

Question Nine, "*In the past year, how many nonroutine, work-related projects have been completed for which you supplied the original idea?*", was used to identify the creative characteristic of each respondent. This question is directly applicable to the identification of the innovator as defined in this thesis.

Question Thirteen, "*Indicate the type of information upon which you would place highest credibility.*" was based on the concept that internalized knowledge and interpersonal communications were the two sources of information relied on most by the opinion leader and the innovator. For obvious reasons, this question was considered applicable.

Question Fifteen,"*In the past month how many times have you sought further information about a new idea or ideas which you thought to be useful to your work?*", was based on the concept that earlier adopters seek information about innovations more than later adopters. In context with the concept that the earliest (i.e., initial) adopter is what this thesis identifies as an innovator, this question is considered to be very appropriate.

Question Sixteen, "*Indicate the total number of journals, magazines, and newspapers which you regularly read,*" was based on the precept that earlier adopters, earlier knowers of innovation, and opinion leaders all have greater exposure to mass media than do the remainder of the population. Innovators, as used in this thesis, are considered to exhibit like characteristics, therefore the question is included.

Question Twenty-One, "*Indicate which combination of words, when placed in the following sentence would most accurately describe you: I feel that I hear about new work-related developments in my professional area ---------- most of my colleagues.*" was intended to identify the relative time frame in which new ideas are received by each respondent. The basis of the question was that early adopters have greater knowledge of innovations than later adopters. This particular aspect is deemed to be equally applicable to the innovator as compared to the non-discriminating majority, therefore the question has been considered appropriate for inclusion.

V. VALIDITY INSTRUMENT

The design of a questionnaire is not unlike that of developing a new parachute, all details are carefully checked, the optimum approach is selected, and nothing is left to chance. Still the worth of the item will only be demonstrated once it is put to the test. The development of the EXPPC had as an objective, the responsibility for identifying two distinct categories of individuals from a total population (i.e., linkers and innovators). The instrument, (Appendix A) being a combination of selected questions from the PPC of Creighton, Jolly, and Denning, plus a set of totally new and untested questions generated specifically to apply to the innovator, could be said to constitute an item of unknown capability. This unknown characteristic of the instrument dictated the requirement to validate its ability to accomplish the intended purpose, therefore the validation schedule for the EXPPC was developed.

The fact that many of the characteristics that are associated with the linker are also associated with the innovator, served to lessen the amount of questions that were required to identify the members of these groups. Using as a reference base the Linker/Stabilizer Validity Census (LVC) of Creighton, Jolly, and Denning, seven of the 11 available questions were selected as being appropriate for identifying both the linkers and the innovators. Of the seven questions taken from the LVC, four were used without any modification (i.e., questions number 3, 5, 6, and 9). Three questions (i.e., questions number 1, 2, and 4) were changed to eliminate all reference to barrier problems associated with the linking process. Two totally new questions were developed to address areas that would appeal strongly to the innovative individual. The entire schedule (Appendix B) consisted of these nine open-ended questions, each of which should be applicable to both the innovator and the linker, but to a varing degree. Each question on the schedule was subjectively scored by both authors using a point system that ranged from 1 to 10 relative to both the linker, and the innovator categories. The aggregate scores of each individual interviewed were computed and averaged using the totals from both authors. Based partially on the averages, the authors subjectively reached agreement identifying the relative

position of each person interviewed in both the innovator and the linker categories. The results obtained using the schedule and the methodology associated with the application and analysis of the data are covered in Sections VI and VII.

VI. DATA COLLECTION

A. EXPPC

The Expanded Professional Preference Census was administered to the student body at the Naval Postgraduate School in residence for the summer quarter 1977. A total of 720 questionnaires with instructive cover letters (Appendix A) were placed in the individual boxes at the student mail center of the school. The respondents were requested to use the facility guard mail service to return the instrument.

Prior to mailing the test instrument, a three-digit identification number was assigned to each student and placed on the back of his questionnaire. The respondents were given an opportunity to remain anonymous by removing the cover letter which had their name and student mail center number on it. The anonymity was strictly maintained except for those respondents who were selected to be interviewed. During each interview, a release was obtained giving the researchers permission to compare and analyze the results of the respondents respective scores and responses on the questionnaire and the interview. A facsimile of the release without names (to further protect anonymity) is included in Appendix B.

The number of responses to the EXPCC was in the range to be expected. Prior surveys at the Naval Postgraduate School have resulted in response rates of from 30 to 40 percent. Of the 720 questionnaires mailed, 254 were returned. Of those returned, nine were unusable because of incompleteness. This resulted in a response of 245 from 711 or a 34.5 percent response rate. During the interview process, it was discovered that some of the respondents had acquired prior knowledge of the original Professional Preference Census during seminars in Technology Transfer (MN-3108). This may have biased their responses. Therefore, the class rosters from the three preceding quarters were matched against the present list of students and the data cards for respondents who had previously taken MN-3108 were removed from the data base and destroyed. There were 12 such matches. Additionally, during the interviews, four Allied Officers indicated that they did not fully understand the questionnaire due to language

differences. Their data cards were subsequently removed from the data base and also destroyed. Thus, a remainder of 229 responses were in the data base. The data base and its coding scheme are included in Appendix C.

B. INTERVIEWS

Forty candidates were selected from the 245 usable responses for interview, using the Validation Schedule for the EXPCC. Of the forty selected, 30 were chosen because of either very high or very low composite scores on either the linker trait or the innovator trait. The other ten selected were within one standard deviation of the mean score on both traits. They were chosen by selecting the first ten matches obtained between a random number table and the identification numbers in a listing of respondents within the one standard deviation range for both traits. All 40 selected were contacted by telephone and agreed to be interviewed. One was unable to be interviewed due to a conflict in schedules. The remaining 39 interviews were scheduled and conducted to provide data for the analysis.

It was during the interview process that the possible bias due to prior knowledge of the Professional Preference Census was discovered. After removal of the three respondents with prior knowledge, 36 remained. Also at this time, the four Allied Officers who had some difficulty in understanding the questionnaire were removed from the interview data base and from the questionnaire data base. Thus a data base of 32 respondents from the interviews remained for the data analysis.

VII. ANALYSIS AND RESULTS

A. INTERVIEW RESULTS

In this research project the interview was intended primarily to either confirm or deny the classification assigned to the individuals by the questionnaire. The classification of the respondents was confirmed for both traits in all but two instances. In these two instances, the respondent scored lower on the questionnaire than he was rated in the interview. In one of the cases, the respondent remembered being in an extreme hurry when filling out the questionnaire and did indeed give contradicting answers in the interview to the answers on the questionnaire. Discounting that respondent, an agreement in classification was achieved in 30 of 31 respondents or 96.8 percent.

B. EXPPC RESULTS

Each questionnaire was evaluated according to the scoring sheet in Appendix A. The individual score from each question along with the identification number of the respondent was keypunched on a standard 80-column computer card. The aggregate of the data cards (229) formed the data base used in the EXPPC analysis. A histogram of the reponses to each question in the questionnaire is found in Appendix E.

To evaluate the effectiveness and ability of the instrument developed in this project it was necessary to determine if the instrument produced a normal distribution as predicted. From the Trait Distributional Analysis, Appendix E, it was found that both the linker composite scores and the innovator composite scores were distributed in a bell-shaped manner very closely approximating a normal distribution. In addition to defining the form of the distribution, it was also necessary to determine if the instrument was able to actually discriminate between the classifications in each of the two traits. It was found that the instrument did discriminate in the following manner:

1. The expected value of the mean was very narrow for both trait distributions. It was noted that the scores falling outside of these narrow bands did not occur by chance, but that they did indeed indicate an actual difference in response (Appendix E).

2. It was found that each of the questions used to compute the linker trait composite score was independently able to discriminate between the linker classifications at a confidence level of 99 percent (Appendix F).

3. It was additionally found that each of the questions used to compute the innovator trait composite score was independently able to discriminate between the innovator classifications at a confidence level of 90 percent except for questions 3, 12, 13, and 20 (Appendix F).

4. The ability of each question to discriminate when considered as part of the total instrument was found to be statistically significant (Appendix G). However, questions 3, 5, 6, 9, 12, 14, and 20 were low in significance.

5. Linear discriminating equations were derived which predicted trait classifications which were in agreement with the instrument classification in 92.58 percent of the cases for the linker trait and 90.83 percent of the cases for the innovator trait. (Appendix G).

6. The "best fit" between interview data and composite score data occured when questions 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 were used to compute the composite innovator score, accordingly all of these questions were used to discriminate between the classifications in the innovator trait (Appendix H).

The results indicate that the EXPPC is capable of discriminating between the classifications of the innovator trait and linker trait. Some of the questions, however are low in either individual or collective discriminating ability.

The relationship between the innovator trait score and the linker trait score was investigated to determine if there was a dependency. It was found that a dependency does exist at least at the 99.9 percent level of confidence. It was also found that there was a positive correlation of 0.75254 between the two trait scores. Being close to unity, this was considered to represent a good correlation. (Appendix I).

VIII. CONCLUSIONS

A. FIRST HYPOTHESIS

The first hypothesis presented in this thesis was that a vehicle could be developed which was capable of isolating two classes of individuals, i.e., linkers and innovators, when administered to a representative body of personnel. The application of the EXPPC to the student body of the Naval Postgraduate School produced distributions of composite scores for the linker trait and the innovator trait which were nearly normal as predicted. In Section VII, it was shown that the questions in the EXPPC and the EXPPC itself did differentaite between the classifications of both the linker and innovator traits.

In view of the overwhelming evidence, interview and statistical, it was concluded that the instrument developed in this research project could and did isolate two classes of individuals, i.e., linkers and innovators, when administered to a representative body. Therefore the first hypothesis of this thesis was concluded to be valid.

B. SECOND HYPOTHESIS

The second hypothesis presented in this thesis was that there will be a positive correlation between the innovator and the linker traits in individuals.

The statistical evidence cited in Section VII clearly showed a dependence between the linker trait scores and the innovator trait scores, and that a positive correlation did indeed exist. Therefore it was concluded that the second hypothesis presented in this thesis was valid.

C. THIRD HYPOTHESIS

The third hypothesis presented in this thesis was that the relationship between the innovator trait and the linker trait will not be unity, i.e., all innovators are not also linkers and all linkers are not also innovators. The simple fact that the Pearson product-moment correlation

coefficient was not unity. (Appendix I) alludes to the truth of the third hypothesis. However, to be certain, a detailed accounting of all linkers and innovators identified was performed. The crosstabulation of linker vs. innovator classifications was the source of the data. It was noted that of the 11 linkers identified, only two were innovators (18 percent). Seven linkers were potential innovators (64 percent). Two linkers were in the majority (18 percent). Of the six innovators identified, only two were linkers (33 percent). Three of the innovators were potential linkers (50 percent). One of the innovators was from the indiscriminate majority (17 percent). It was therefore concluded that a perfect correlation between linkers and innovators did not exist and the third hypothesis was concluded to be valid.

IX. RECOMMENDATIONS

One of the more exciting aspects of a research project is that new vistas are exposed as a research process takes place. This project was no exception in that regard. Two new areas that appear to merit additional study have been identified and continued refinement of the instrument developed by this thesis is indicated. Each area of suggested additional study is briefly summarized in the following paragraphs.

Analysis of the data obtained from the questionnaire indicated a unique grouping of two sub-populations, the innovator and the linker. The specific relationship of these two populations relative to both each other and to the adopter categories suggested two new hypotheses. Each hypothesis is provided as follows:

1. It is hypothesized that the "linker" population, as defined by Creighton, Jolly, and Denning (1972, p. 30) will display a bell shaped distribution about a mean that is located in the approximate center of the "early adopter" category as identifed by Rogers & Shoemaker (1971, p. 182). This hypothesis can be shown graphically in the following manner:

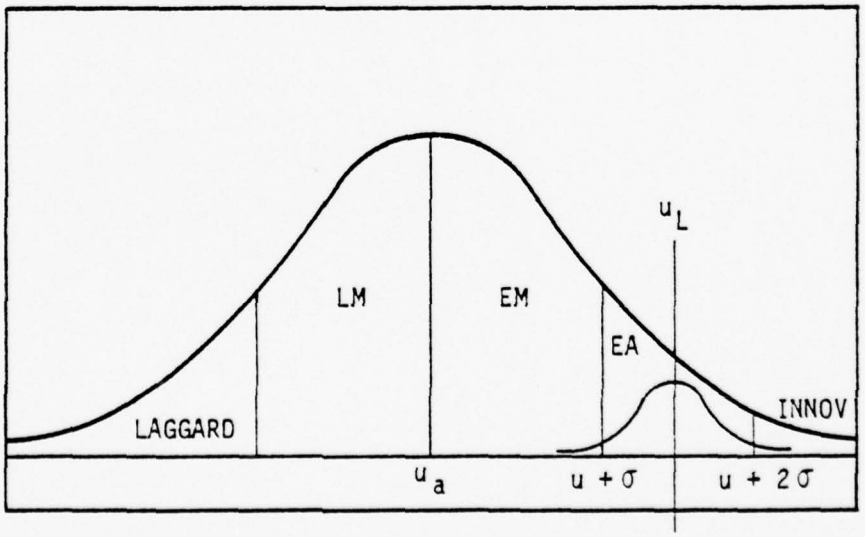


Figure 9. The hypothesized relationship of the linker distribution relative to the adopter distributions of Rogers and Shoemaker

2. It is hypothesized that the "innovator" population, as identified by this thesis will display a bell shaped distribution about a mean that is located in the approximate center of the "potential linker" category as identified by Creighton, Jolly, and Denning (1962, p. 30). This hypothesis can be shown graphically in the following manner:

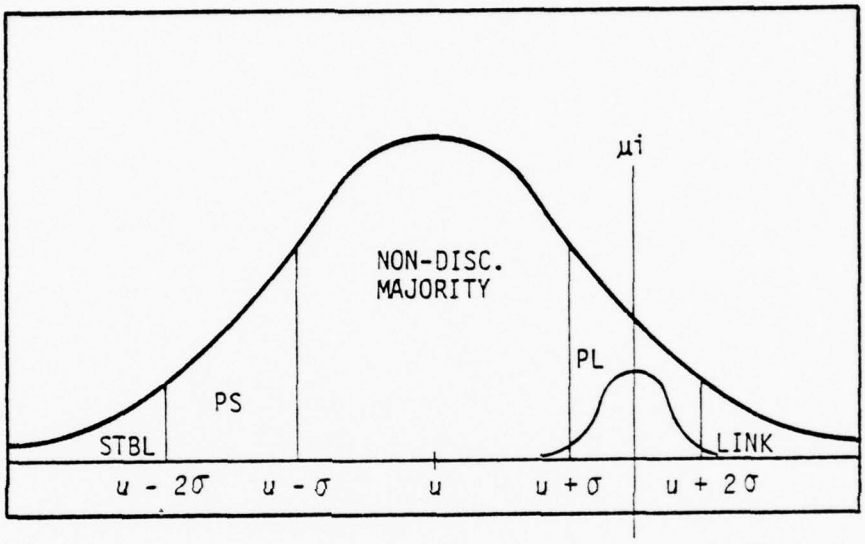


Figure 10. The hypothesized relationship of the innovator distribution relative to the linker distribution of Creighton, Jolly, and Denning

Since the EXPPC has demonstrated that there are indeed two distinct categories of individuals which display quite similar characteristics, it is considered appropriate that additional study be conducted to define the exact nature of that relationship. Accordingly, it is recommended that each of the noted hypotheses be considered as candidates for future research. It is additionally recommended that any further research utilize a population other than the military community that was used to support this project.

One of the problems that each researcher must at some time address is how satisfactory are the tools that have been applied in his research effort. In the case of this research project, the primary tool employed was a questionnaire, the EXPPC. The question then in this case is, "how good is the EXPPC in its ability to accurately identify a population in terms of innovators,

linkers, and linkovators?" The answer is, that although the questionnaire has demonstrated a good capacity for classifying individuals in those specific terms, the instrument cannot be considered to be totally developed. An analysis of the responses to the questions and an associated critical review of the structure of each question suggest that there are six questions that may warrant additional study. Three of these questions, number 5, 17, and 19, may require additional development relative to clarifying the scalar relationship of the various answers. The remaining three questions, number 3, 12, and 20, may require additional study relative to concept validity and individual question clarity. Accordingly, it is recommended that additional study be conducted toward improving the EXPPC.

APPENDIX A.

PROFESSIONAL PREFERENCE CENSUS
(expanded)

1. The tasks that I worked on this past year that were most enjoyable, were those that...

   a) I suggested an approach to the problem and let someone else do all the technical refinement.
   b) I suggested an approach to the problem and was involved in a small portion of the technical refinement.
   c) I suggested an approach to the problem and was involved in about half of the technical refinement.
   d) I suggested an approach to the problem and was deeply involved in the technical refinement.
   e) I defined the approach and accomplished the technical refinement.

2. Indicate the number of technical and/or scientific society meetings and/or conventions which you attended last year which involved personnel other than your immediate circle of colleagues.

   a) 0
   b) 1-2
   c) 3-4
   d) 5-6
   e) More than the above

3. Your office has just been assigned an important study project; would you:

   a) Give the task to a competent subordinate and allow that person to complete the study for you.
   b) Complete the study yourself except for routine portions such as tabulating data and illustrations.
   c) Make up an outline of how the task is to be conducted and then have a subordinate complete the study following your outline.
   d) Make up an outline of how the task is to be conducted and then have a subordinate complete the study under your direct supervision.
   e) Complete the study yourself except for typing.

4. Indicate the level within the social strata to which you would aspire to be 10 years from now.

   a) Upper
   b) Lower-Upper
   c) Upper-Middle
   d) Middle
   e) Lower-Middle

5. I have just thought of a novel and outstanding solution to a problem that most people consider to be minor. I will:

   a) Explain it to my supervisor and only pursue it if my supervisor shows an interest in the solution.
   b) Come back to my supervisor a second time if he shows no interest the first time because he may have had other problems on his mind.
   c) If he doesn't show interest during the second explanation, I will write a report on the problem/solution and submit it to my supervisor.
   d) If he doesn't respond favorably to the report, I'll send a copy of the report with an explanatory letter to his supervisor.
   e) If I don't get a favorable response, I will send a copy of the report with a letter of explanation to the chief executive officer of the organization.

6. *Indicate the number of technical, scientific, and/or professional societies to which you hold current membership.*

   a) 0
   b) 1
   c) 2
   d) 3
   e) More than the above

7. After having completed an original piece of work of which I am very proud, I find that two people whom I respect have questioned both my reputation and what I have created, I would be

   a) much more offended by the attack on what I have created.
   b) slightly more offended by the attack on what I have created.
   c) about equally offended by each attack.
   d) slightly more offended by the attack on my competence.
   e) much more offended by the attack on my competence.

8. During the last month, indicate the relative frequency with which you recommended a specific item of interest, e. g., journal article, research report, or a lead to either, to a colleague which dealt with a work-related topic.

   a) 0
   b) 1-2
   c) 3-4
   d) 5-6
   e) More than the above

9. In the past year, how many nonroutine, work-related projects have been completed for which you supplied the original idea?

   a) 0-2
   b) 3-4
   c) 5-6
   d) 7-8
   e) More than the above

10. In the past year, how many new ideas or new methods were you, by yourself, responsible for putting into practice?

    a) 0
    b) 1-2
    c) 3-4
    d) 5-6
    e) More than the above

11. Indicate the frequency with which your subordinates, peers, and/or superiors came to you in the past month for work-related information and/or advice which was not a function of your formal position.

a) 0-2
b) 3-6
c) 7-10
d) 11-15
e) More than the above

12. Which of the following best describes your feeling a majority of the time?

a) When someone wants to tell me about a problem they have I am always ready to listen and normally appreciate their concern.
b) If someone tells me about a problem of theirs, I will listen out of courtesy, but will not get involved.
c) If someone tells me about a problem of theirs I will listen and sometimes develop a feeling of concern.
d) I do not enjoy hearing of anyone else's problem and will usually avoid it.
e) I am very uncomfortable hearing someone else's problem and will avoid it whenever possible.

13. Indicate the type of information upon which you would place highest credibility.

a) Personal knowledge
b) Associated staff
c) Vendors and/or trade councils
d) Literature--journals, books, etc.
e) Analysis and experimentation

14. When faced with a problem that requires an immediate answer to maximize the benefit to both myself and my organization, and knowing that a wrong decision could jeopardize my job, I would

a) not make a decision unless I were at least 60% sure.
b) not make a decision unless I were at least 70% sure.
c) not make a decision unless I were at least 80% sure.
d) not make a decision unless I were at least 90% sure.
e) not made the decision until later when the risk is less and I have better problem insight.

15. In the past month how many times have you sought further information about a new idea or ideas which you thought to be useful to your work?

a) 0-2
b) 3-4
c) 5-6
d) 7-8
e) More than the above

16. Indicate the total number of journals, magazines, and newspapers which you regularly read:

a) 0-3
b) 4-5
c) 6-7
d) 8-9
e) More than the above

17. Once I have initiated a worthwhile project I normally:

a) Attempt to see it through regardless of what obstacles may be present.
b) Attempt to see it through only if there is minimal political implications.
c) Attempt to see it through if the obstacles are not too great.
d) Will support it only as long as it is accepted by the other personnel knowledgeable of the project.
e) Attempt to see it through if it can be accomplished in a reasonable amount of time.

18. I feel that I could have delegated ----% of the tasks that I was assigned the responsibility for last year.

a) 0 to 20%
b) 20 to 40%
c) 40 to 60%
d) 60 to 80%
e) 80 to 100%

19. The preferred way to insure a good but controversial project is accomplished is to:

a) Not jeopardize the project by alienating any possible proponent.
b) Drive the project through to completion using every means necessary.
c) Allow project changes to appease the would-be opponents.
d) Refuse to take no for an answer on any issue that may adversely affect the project.
e) Seek out ways to convince the projects opponents of its worthwhile nature.

20. Once I have studied and evaluated a given problem, I:

a) Reject alternate viewpoints unless they are clearly superior.
b) Seldom look for alternate viewpoints.
c) Can view the problem from another standpoint if it is necessary.
d) Find it comfortable to review the problem from an alternate viewpoint.
e) Find it very easy to re-evaluate the problem from other points of view.

21. Indicate which combination of words, when placed in the following sentence would most accurately describe you: I feel that I hear about new work-related developments in my professional area _____ most of by colleagues.

a) Considerably before
b) Sooner than
c) At about he same time as
d) Later than
e) Sometime after

Scoring for Expanded Professional Preference Census:

QUESTION	NUMBER OF POINTS				
	a	b	c	d	e
1	1	2	3	4	5
2	1	2	3	4	5
3	1	4	2	3	5
4	5	4	3	2	1
5	1	2	3	4	5
6	1	2	3	4	5
7	5	4	3	2	1
8	1	2	3	4	5
9	1	2	3	4	5
10	1	2	3	4	5
11	1	2	3	4	5
12	1	3	2	4	5
13	5	4	2	2	1
14	5	4	3	2	1
15	1	2	3	4	5
16	1	2	3	4	5
17	5	3	4	1	2
18	5	4	3	2	1
19	2	5	1	4	3
20	5	4	3	2	1
21	5	4	3	2	1

APPENDIX B

VALIDATION SCHEDULE FOR EXPPC

Name: _____ Ident. Code: _____

Last Duty Assignment: _____ Rank/Rate: _____

1. Can you recall learning about a NEW work-related idea which you considered implementing while at your last duty station? YES ___ NO___

   If YES, what was the idea? _____
   _____

   Where did you get the idea? _____
   _____

   Have any attempts been made to bring this idea to fruition? YES___ NO___

   If YES, describe the action taken: _____
   _____
   _____
   _____

   Can you recall the MOST important information source AFTER idea generation? YES___ NO___

   If YES, identify and describe its role: _____
   _____
   _____
   _____
   _____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

2. Can you recall the MOST recent instance in which you thought of a new work-related idea? YES ___ NO___

If YES, what was the idea? _____

_____

_____

Where did you get the idea? _____

_____

_____

Was the idea implemented? YES___ NO___ WHY?

_____

_____

_____

How frequent do instances similar to the above occur?

_____

_____

_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

3. Can you recall the MOST RECENT work-related PROJECT which you have COMPLETED while at your prior duty station? YES__ NO__

If YES, what was the project? _____

_____

Who supplied the INITIAL idea for the project? _____

_____

Who recognized the NEED for such a project? _____

_____

Was the project SPECIFICALLY assigned to you? YES__NO__
If NO, Explain: _____

_____

_____

Were there any changes between the initial idea and the idea which was actually implemented? YES__ NO__

If YES, who supplied the majority of the changes? _____

_____

Please identify your most important sources of information with respect to this project:

_____

_____

_____

Did these information sources change as the project progressed? YES__ NO__

Identify and explain: _____

_____

_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

4. Aside from the above project, can you recall a work-related project which you have COMPLETED while at that duty station for which YOU supplied the ORIGINAL idea? YES___ NO___

If YES, what was the project?_____

_____

Where did you get the idea?_____

_____

_____

Where did you get the majority of information after idea inception?_____

_____

_____

Did the information sources change as the project moved from initial idea to completed project? YES___ NO___

Identify and explain: _____

_____

_____

Is it normal for you to originate unique and useful ideas? YES___ NO___

How many new ideas that you generated in the past year can you recall?_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

5. Can you recall the MOST RECENT instance in which a subordinate, superior, or peer came to you with a new work-related idea? YES__ NO__

If YES, what was the idea? _____

_____

If YES, was the person's coming to you required by his FORMAL relationship to you? YES__ NO__

If YES, explain the formal relationship which exists:

_____

_____

If NO, explain why you feel this person came to you with this idea: _____

_____

_____

Explain what action followed this person coming to you with respect to his new idea:

_____

_____

_____

How frequent do instances similar to the above occur? _____

Explain: _____

_____

_____

_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

6. In the past year, approximately how many times have you recognized a problem as a result of observing some operation, practice, equipment, or process?

Can you recall and describe some of the instances?_____

If YES, were you able to define a unique and good solution to the problem? YES___ NO___

Can you recall and describe some of the solutions?_____

Were you able to implement the solutions?_____

Were the solutions actually as good as you imagined them to be?_____

Is it normal for you to notice problems when observing the operation of equipments and processes?_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

7. In the context of your prior duty station, please think of the MOST RECENT instance in which an item of INFORMATION which you RECEIVED from a source, other than someone in your IMMEDIATE circle of colleagues proved to be useful in your work.

What was the SOURCE of the information? _____
_____

Before receiving this information had you recognized a need for such information? YES__ NO__

If YES, what was the length of time between recognition of the need and receipt of the information? _____

If the time duration was excesssive, explain: _____
_____
_____

If YES, explain how you recognized the need for the information: _____
_____
_____
_____
_____

Please indicate the three major sources of information which you find most helpful in your work: _____
_____
_____

Of the above, which do you use most frequently? _____
Why? _____
_____
_____
_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

8. Can you recall an idea of yours from the past year that you felt could or should have been patented?
YES __ NO __

Was the idea generated as a result of a:
__ Known existing problem or need
__ Problem/need of your own discovery
__ Necessary improvement
__ Other

Did you develop/prove the concept? YES __ NO __

Did you apply for a patent? YES __ NO __

Describe the idea: _____
_____
_____
_____
_____
_____

How many patents do you hold?_____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

9. Can you recall the MOST recent NEW work-related DEVELOPMENT or INNOVATION in your professional area that you have heard or read about? YES___ NO___

If YES, what is the development? _____

How long has it been since you first heard or read about this development? _____

Where did you first hear or read about this development? _____

Do you feel that the majority of your colleagues are aware of this development? YES___ NO___

Explain: _____

What are other sources from which you frequently hear or read about new work-related developments in your professional area? _____

On the average, when do you feel that you hear and/or read about new work-related developments in your professional area with respect to your colleagues? _____

What leads you to this conclusion? _____

Linker Score: 1 2 3 4 5 6 7 8 9 10

Innovator Score: 1 2 3 4 5 6 7 8 9 10

10. General Comments: _____

INTERVIEW SCHEDULE/RELEASE

I agree to allow the interview team to cross-reference the interview results with my questionnaire results for the purpose of measuring the ability of the questionnaire to identify linking and innovative characteristics.

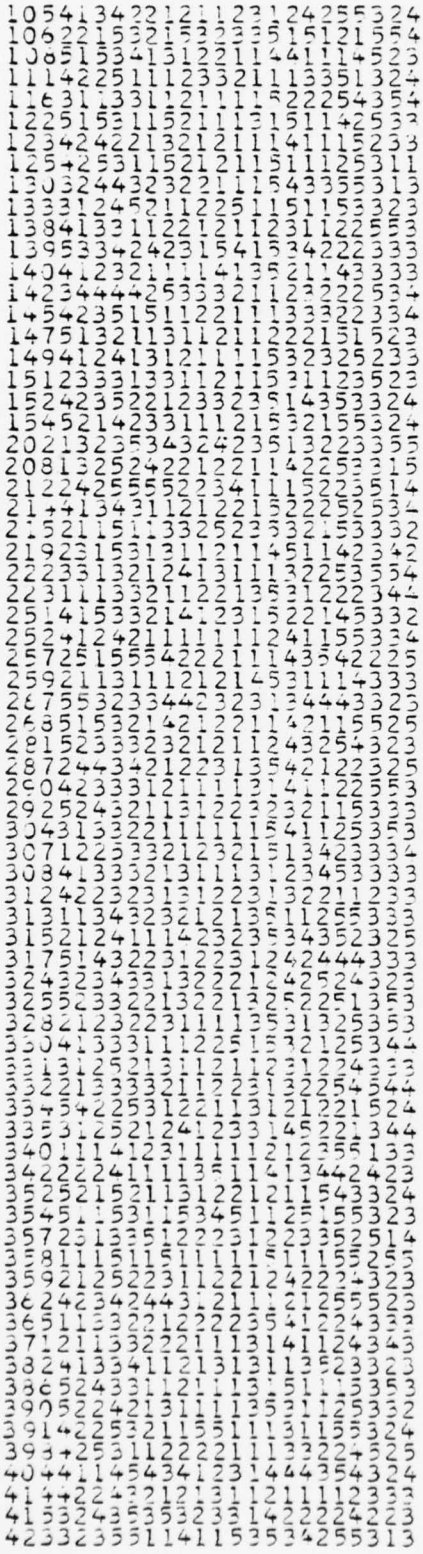
DAY/TIME	NAME	SIGNATURE

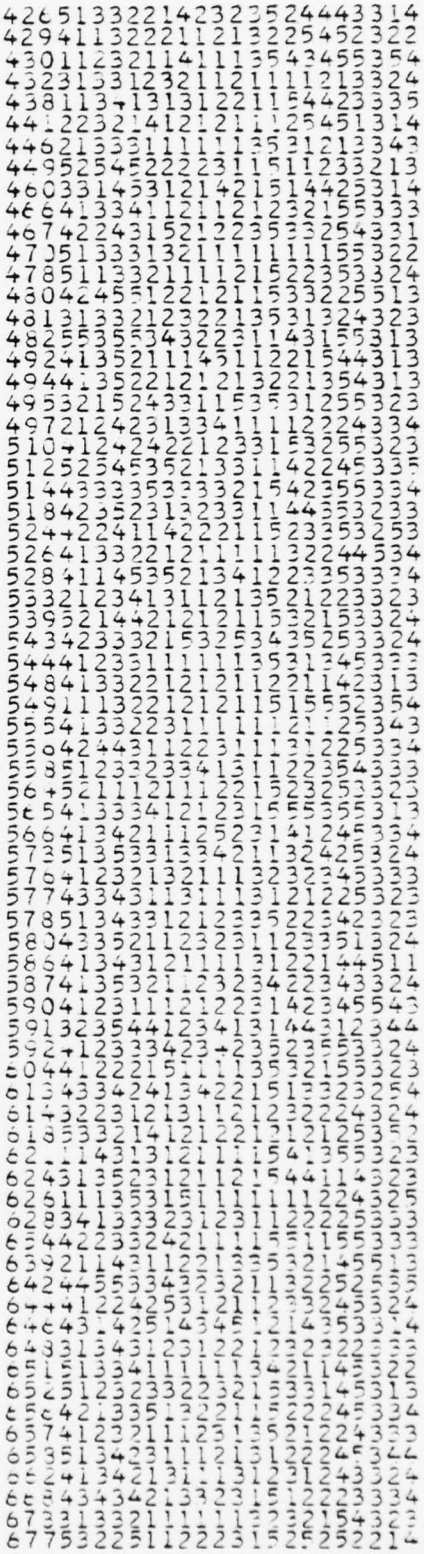
APPENDIX C

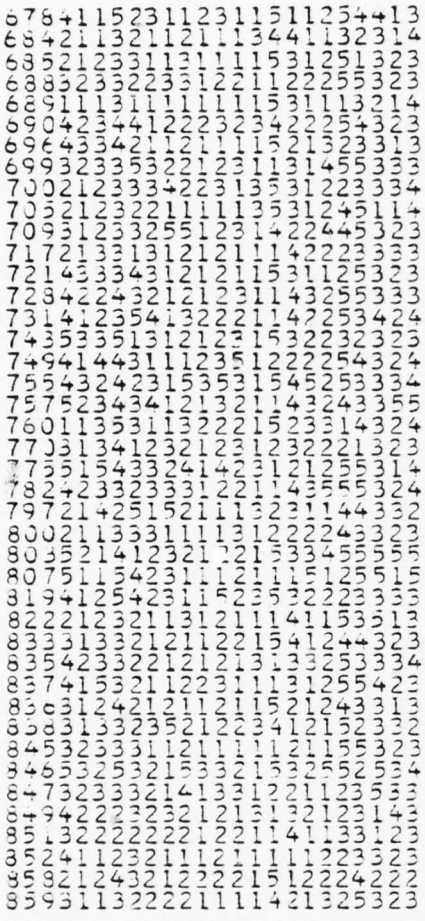
EXPPC DATA BASE

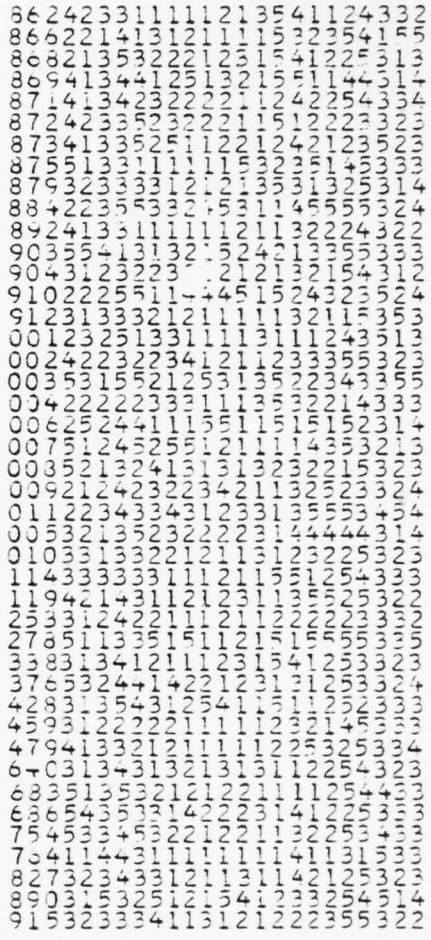
CODING SCHEME

Column 1-3	Respondent identification number
Column 4	Question 1
Column 5	Question 2
Column 6	Question 3
Column 7	Question 4
Column 8	Question 5
Column 9	Question 6
Column 10	Question 7
Column 11	Question 8
Column 12	Question 9
Column 13	Question 10
Column 14	Question 11
Column 15	Question 12
Column 16	Question 13
Column 17	Question 14
Column 18	Question 15
Column 19	Question 16
Column 20	Question 17
Column 21	Question 18
Column 22	Question 19
Column 23	Question 20
Column 24	Question 21



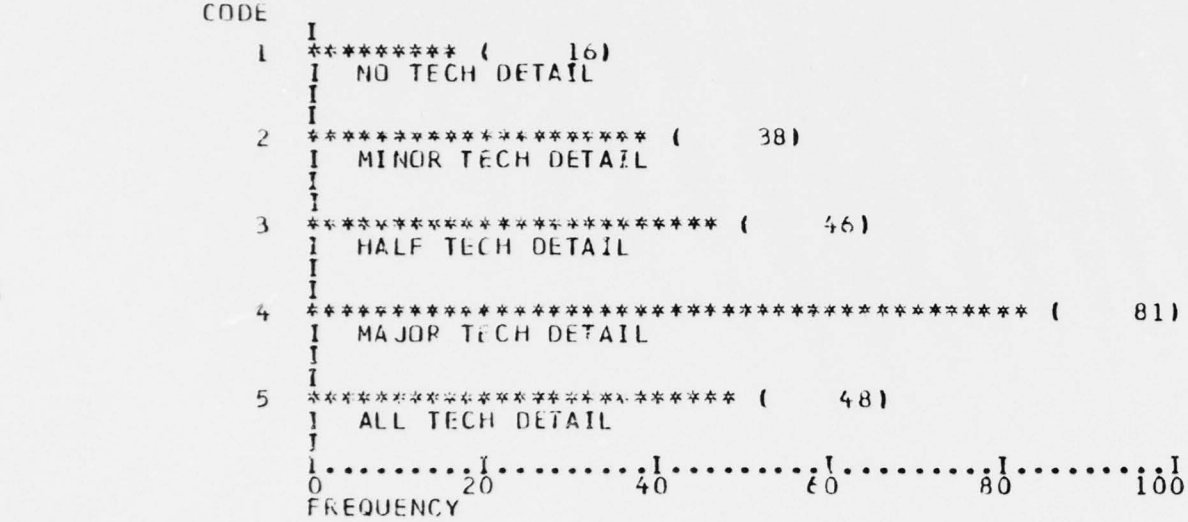






08/24/77 FILE - EXPPC - CREATED 08/24/77

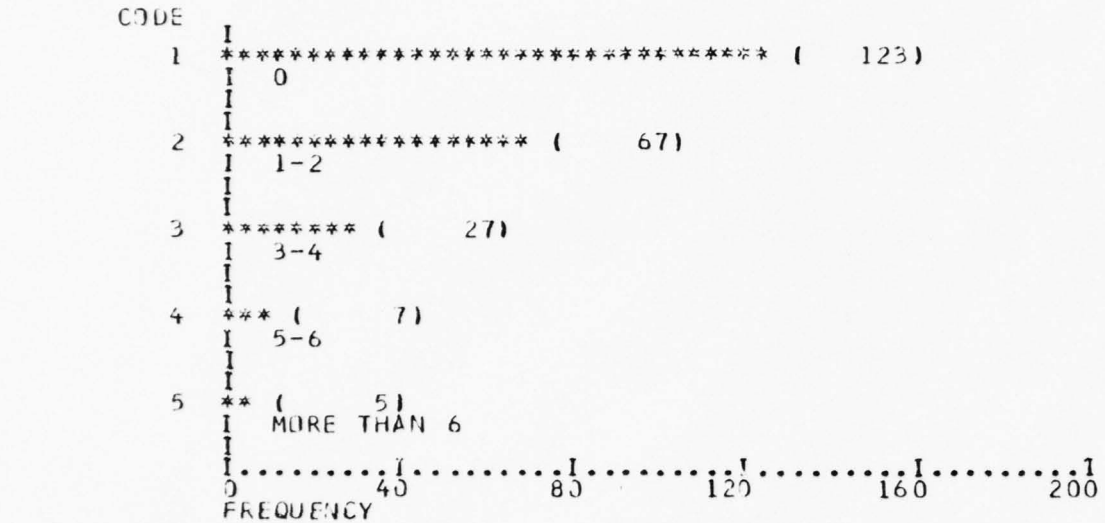
01 TASKS MOST ENJOYABLE



MEAN	3.467	STD ERR	0.079	MEDIAN	3.679
MODE	4.000	STD DEV	1.194	VARIANCE	1.425
KURTOSIS	-0.729	SKEWNESS	-0.468	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

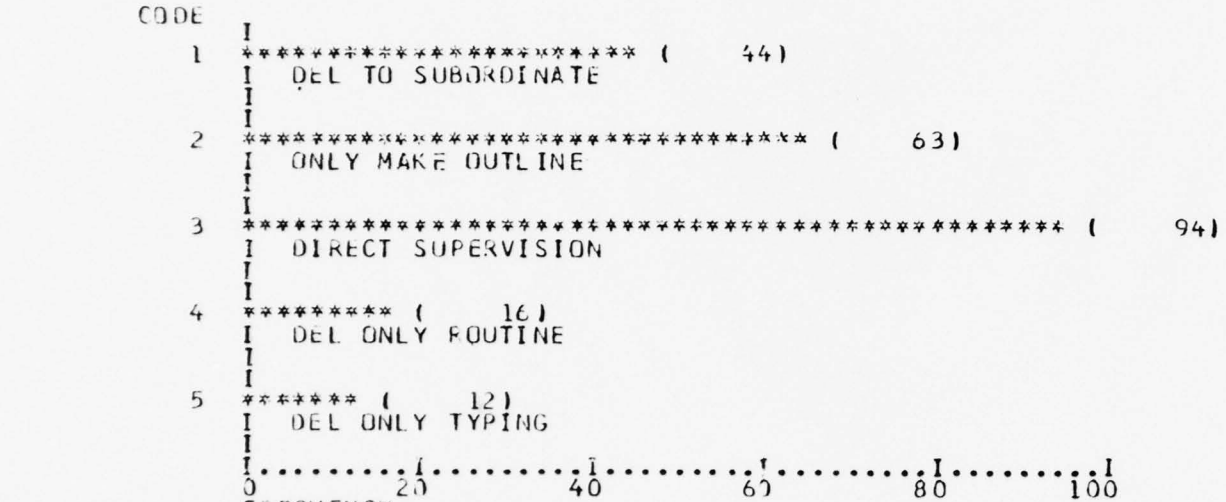
02 MEETINGS ATTENDED



MEAN	1.707	STD ERR	0.062	MEDIAN	1.431
MODE	1.000	STD DEV	0.945	VARIANCE	0.892
KURTOSIS	1.983	SKEWNESS	1.466	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

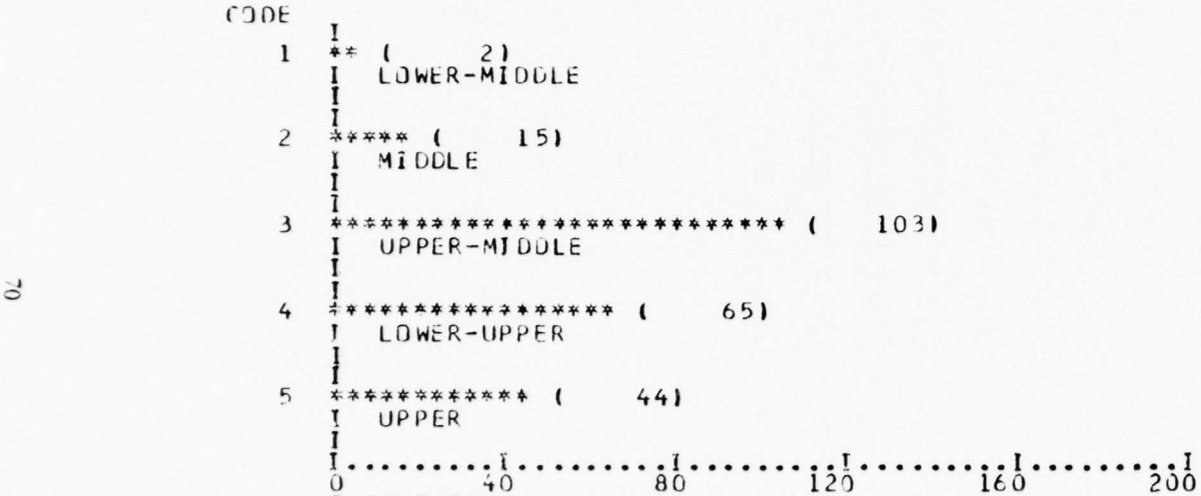
03 TASK DELEGATION BY WORK TYPE



MEAN	2.515	STD ERR	0.069	MEDIAN	2.580
MODE	3.000	STD DEV	1.045	VARIANCE	1.093
KURTOSIS	-0.112	SKEWNESS	0.331	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

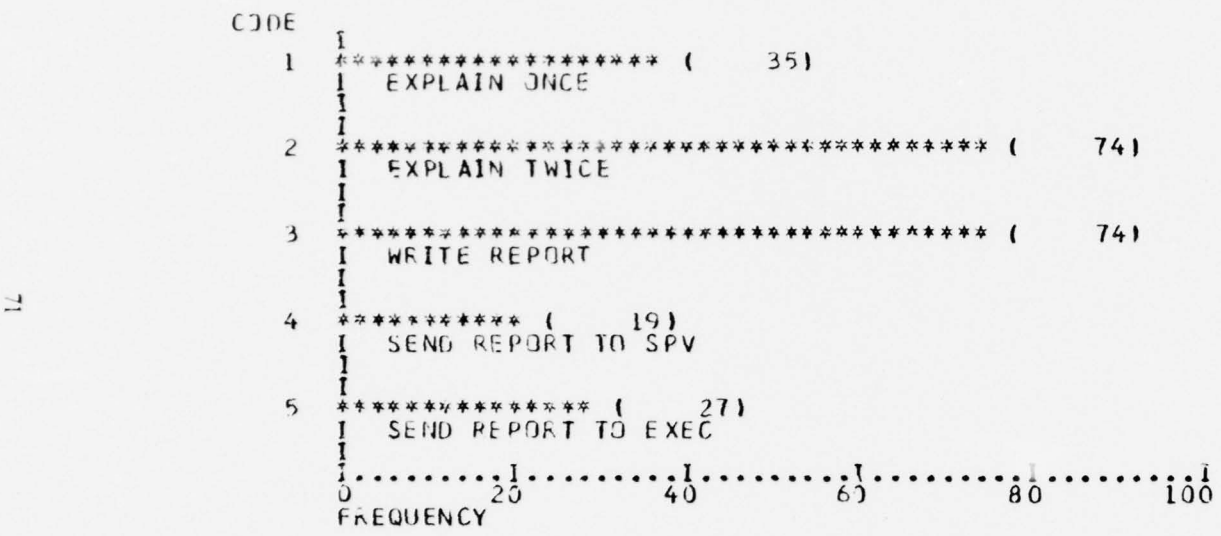
04 SOCIAL STRATA ASPIRATIONS



MEAN	3.585	STD ERR	0.060	MEDIAN	3.447
MODE	3.000	STD DEV	0.902	VARIANCE	0.814
KURTOSIS	-0.496	SKEWNESS	0.086	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

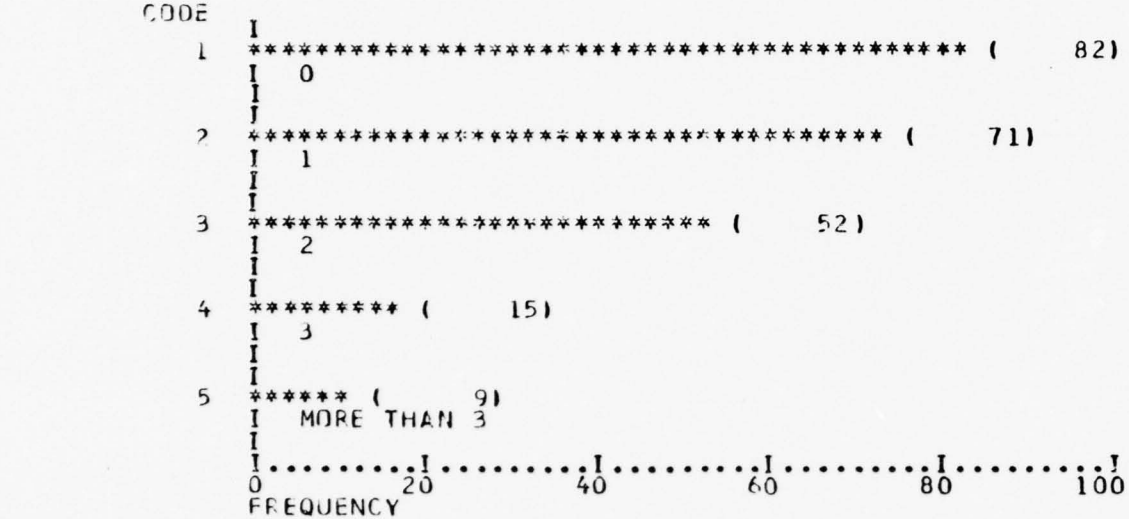
Q5 INNOVATION PERSEVERENCE



MEAN	2.690	STD ERR	0.078	MEDIAN	2.574
MODE	2.000	STD DEV	1.183	VARIANCE	1.399
KURTOSIS	-0.446	SKEWNESS	0.493	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

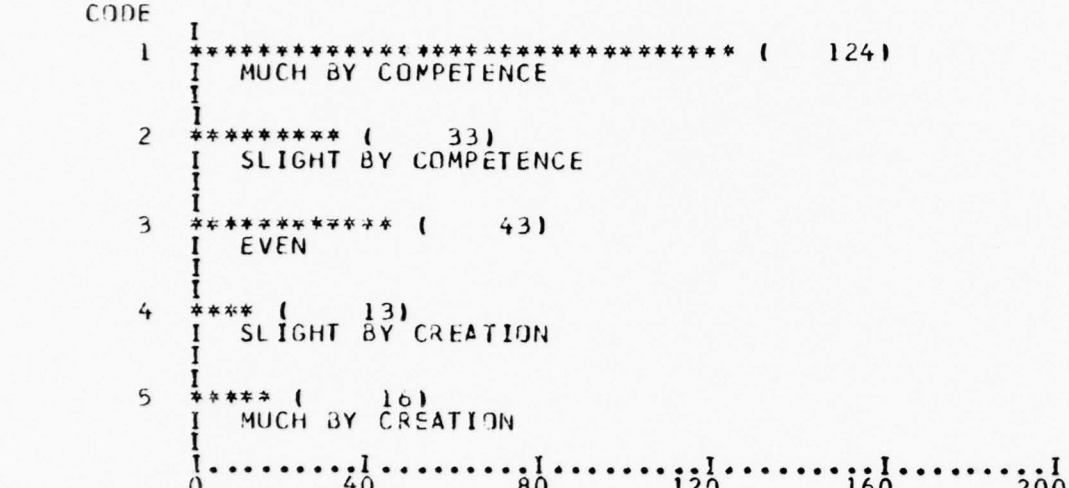
06 SOCIETY MEMBERSHIP



MEAN	2.118	STD ERR	0.072	MEDIAN	1.958
MODE	1.000	STD DEV	1.092	VARIANCE	1.192
KURTOSIS	0.029	SKEWNESS	0.804	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

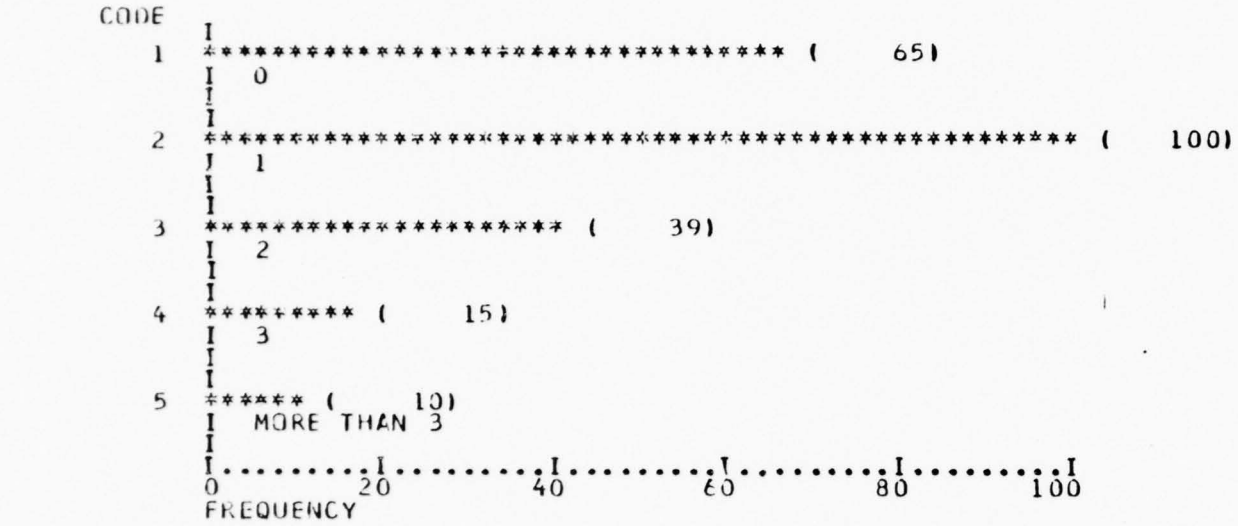
Q7 PERCIEVED OFFENSE



MEAN	1.969	STD ERR	0.083	MEDIAN	1.423
MODE	1.000	STD DEV	1.261	VARIANCE	1.591
KURTOSIS	0.035	SKEWNESS	1.076	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

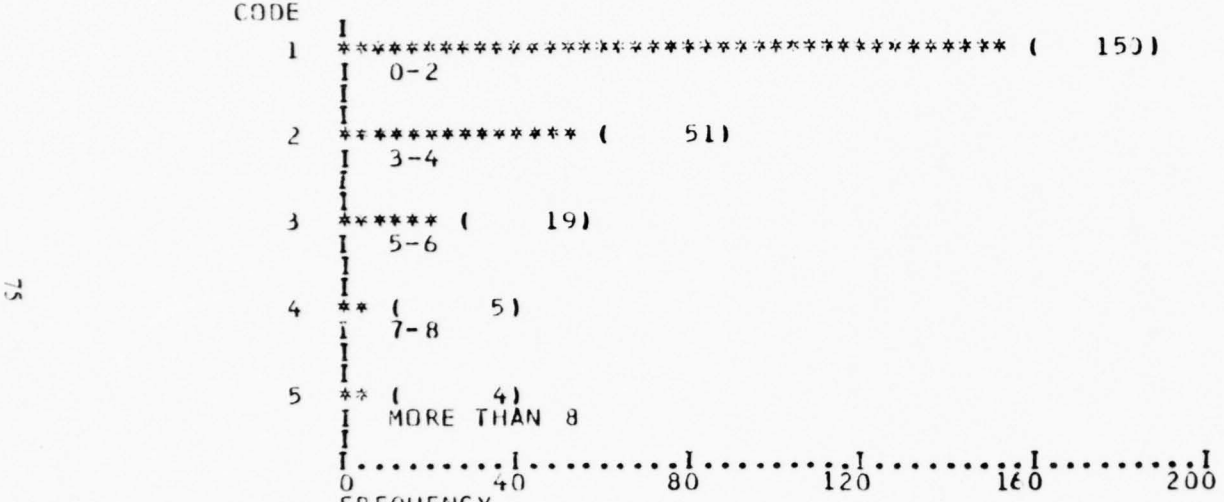
08 LEADS RECOMMENDED TO COLLEAGUES



MEAN	2.148	STD ERR	0.069	MEDIAN	1.995
MODE	2.000	STD DEV	1.045	VARIANCE	1.092
KURTOSIS	0.628	SKEWNESS	0.979	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		

VALID CASES 229 MISSING CASES 0

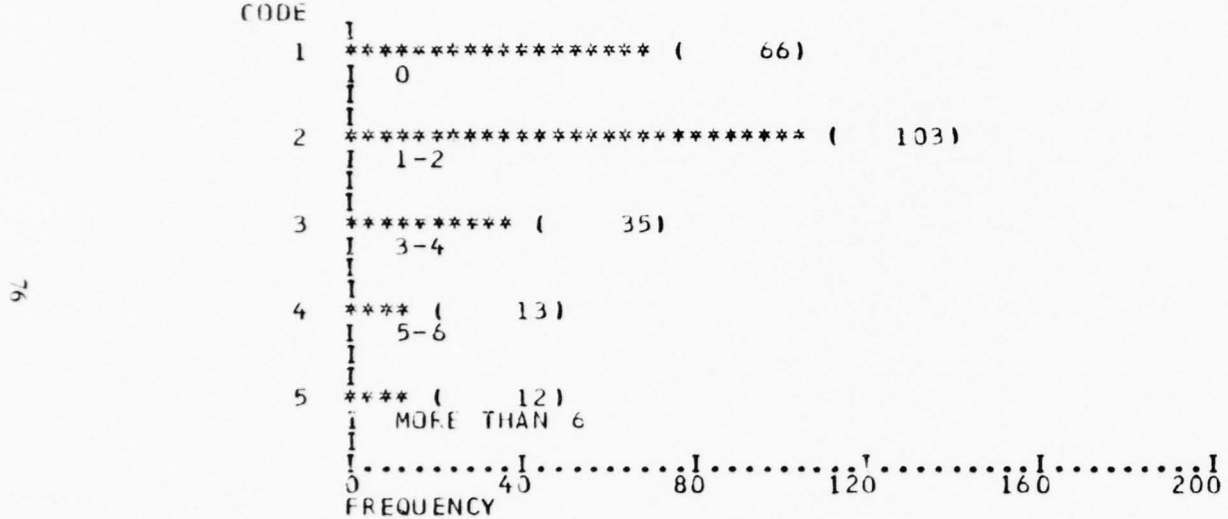
Q9 IDEAS PROVIDED BY RESPONDENT



MEAN	1.524	STD ERR	0.058	MEDIAN	1.263
MODE	1.000	STD DEV	0.871	VARIANCE	0.759
KURTOSIS	3.802	SKEWNESS	1.932	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

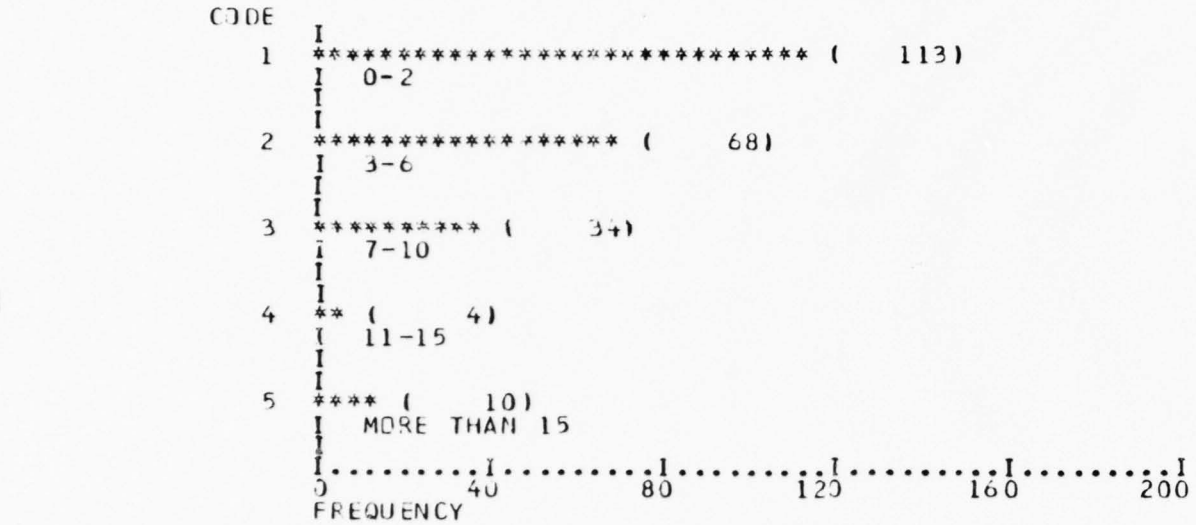
Q13 PROJECTS COMPLETE FROM OWN ORIG IDEA



MEAN	2.135	STD ERR	0.070	MEDIAN	1.971
MODE	2.000	STD DEV	1.061	VARIANCE	1.126
KURTOSIS	0.845	SKEWNESS	1.081	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

Q11 TIMES ADVICE SOUGHT FROM RESPONDENT

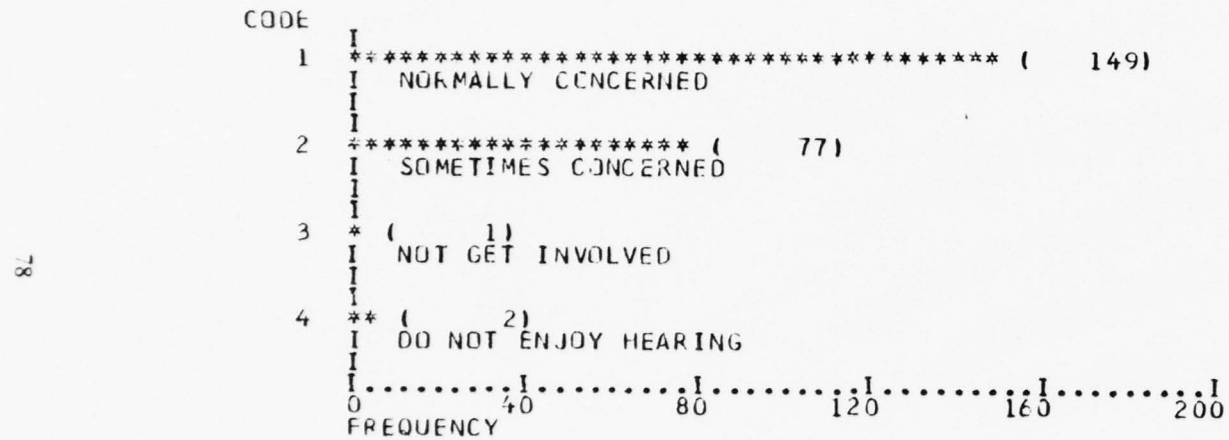


MEAN	1.821	STD ERR	0.069	MEDIAN	1.522
MODE	1.000	STD DEV	1.038	VARIANCE	1.077
KURTOSIS	1.726	SKEWNESS	1.409	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		

VALID CASES 229 MISSING CASES 0

08/24/77 FILE - EXPPC - CREATED 08/24/77

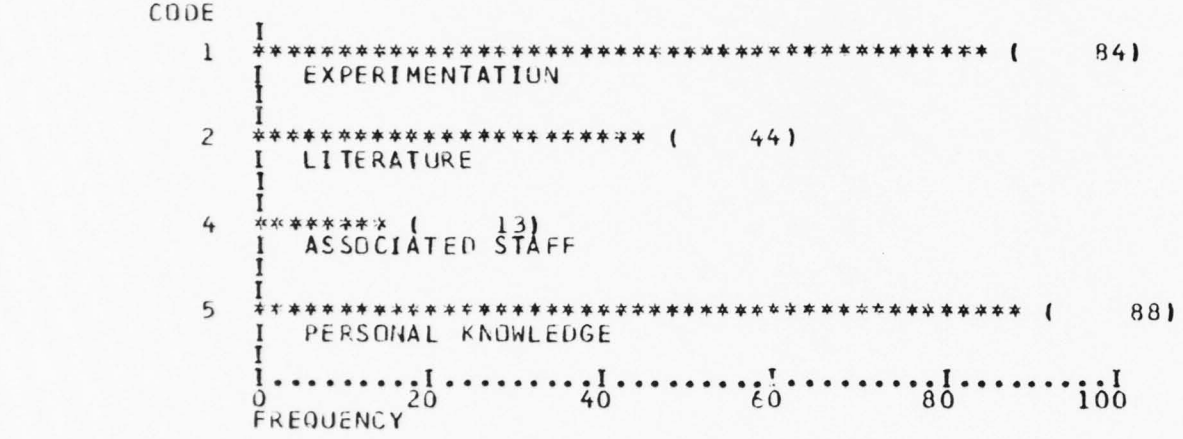
Q12 EMPATHY



MEAN	1.371	STD ERR	0.036	MEDIAN	1.268
MODE	1.000	STD DEV	0.544	VARIANCE	0.296
KURTOSIS	3.002	SKEWNESS	1.435	RANGE	3.000
MINIMUM	1.000	MAXIMUM	4.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

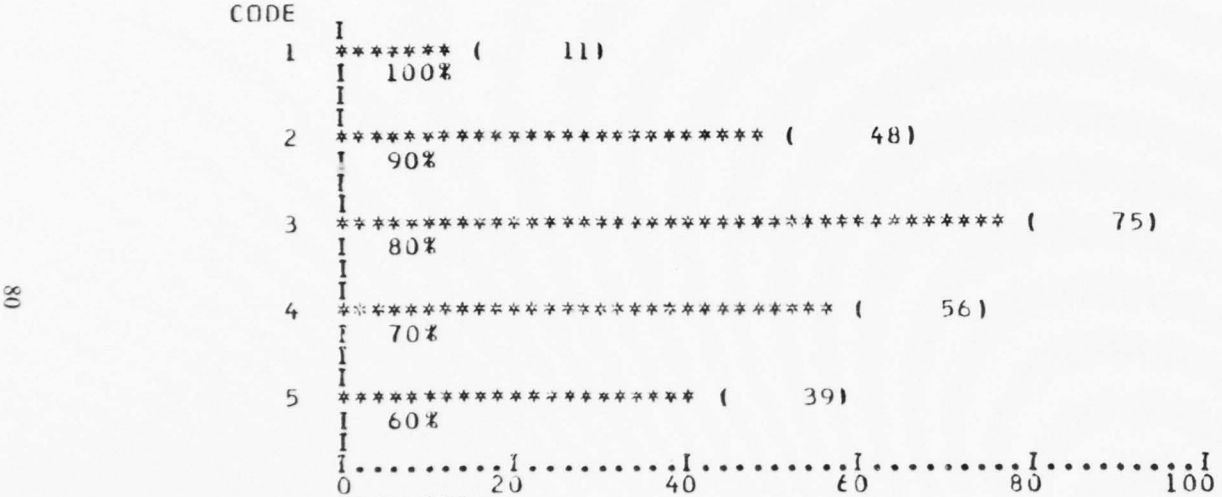
Q13 INFORMATION CREDIBILITY



MEAN	2.900	STD ERR	0.119	MEDIAN	2.193
MODE	5.000	STD DEV	1.805	VARIANCE	3.257
KURTOSIS	-1.829	SKEWNESS	0.169	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		

VALID CASES 229 MISSING CASES 0

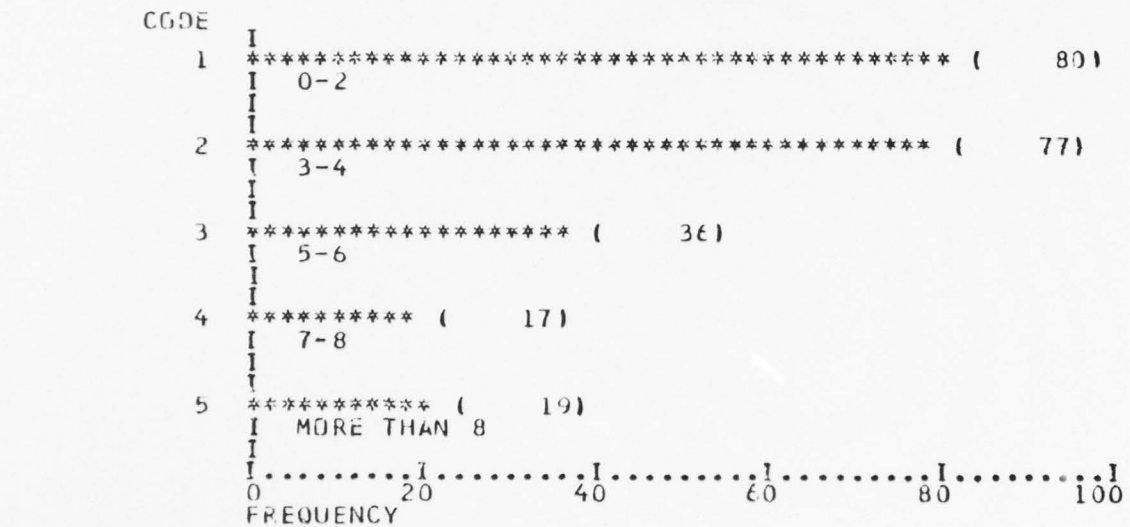
Q14 CERTAINTY REQUIRED FOR DECISION



MEAN	3.279	STD ERR	0.074	MEDIAN	3.240
MODE	3.000	STD DEV	1.120	VARIANCE	1.255
KURTOSIS	-0.801	SKEWNESS	-0.041	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

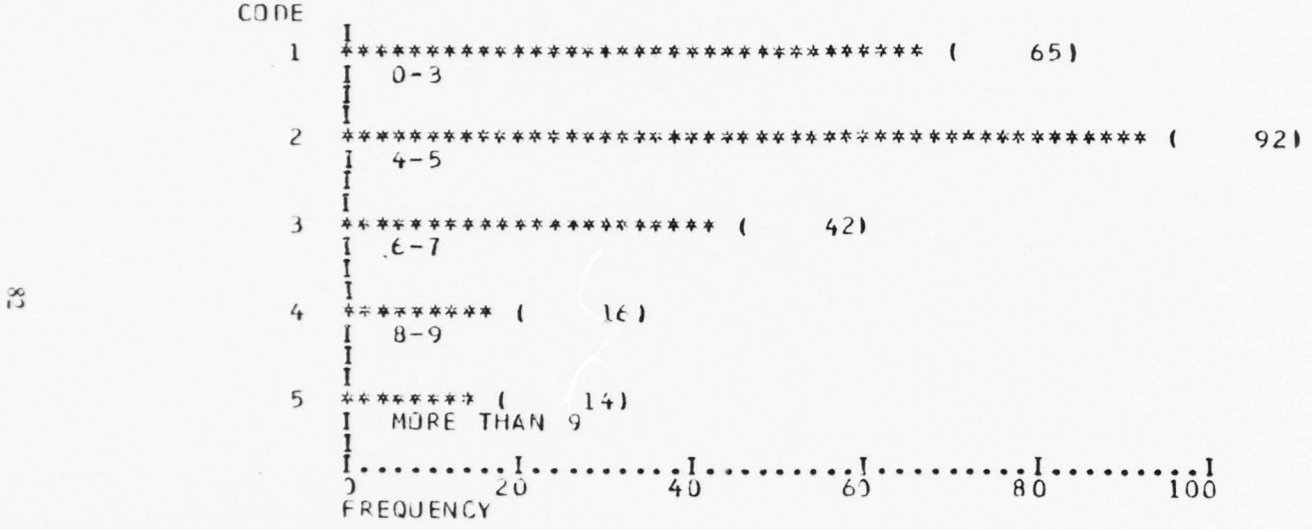
Q15 TIMES INFO SOUGHT BY RESPONDENT



MEAN	2.205	STD ERR	0.081	MEDIAN	1.948
MODE	1.000	STD DEV	1.231	VARIANCE	1.515
KURTOSIS	-0.059	SKEWNESS	0.927	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

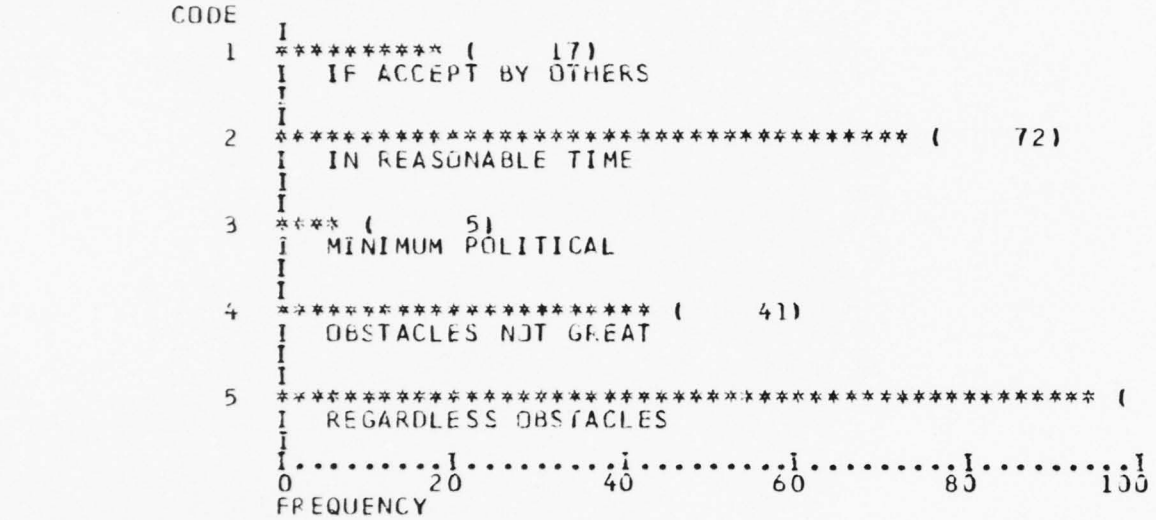
Q16 JOURNALS READ



MEAN	2.223	STD ERR	0.074	MEDIAN	2.038
MODE	2.000	STD DEV	1.119	VARIANCE	1.253
KURTOSIS	0.269	SKEWNESS	0.914	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

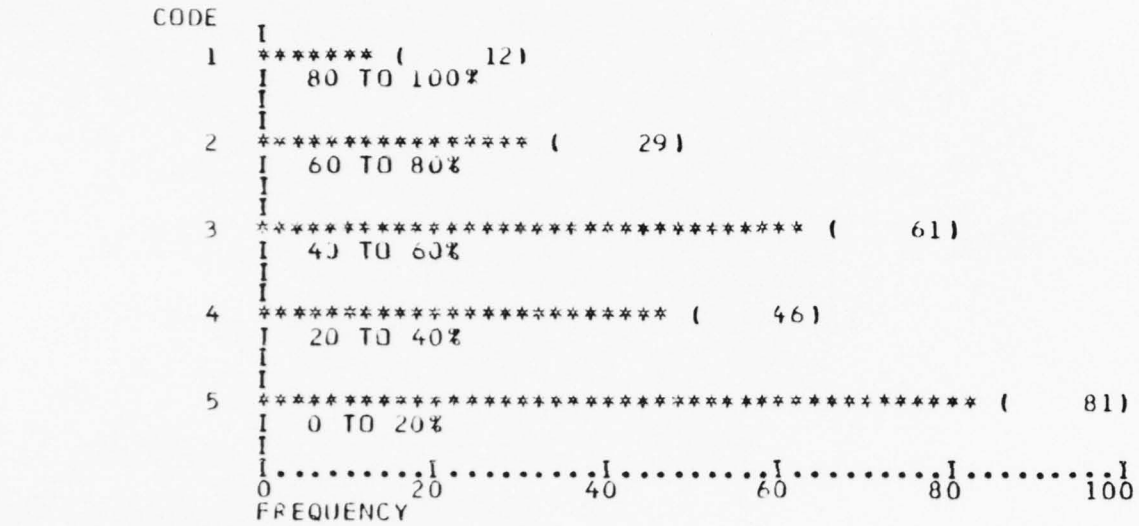
Q17 PROJECT PERSEVERENCE



MEAN	3.537	STD ERR	0.097	MEDIAN	4.000
MODE	5.000	STD DEV	1.467	VARIANCE	2.153
KURTOSIS	-1.545	SKEWNESS	-0.338	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

Q18 PERCENT TASKS DELEGATED

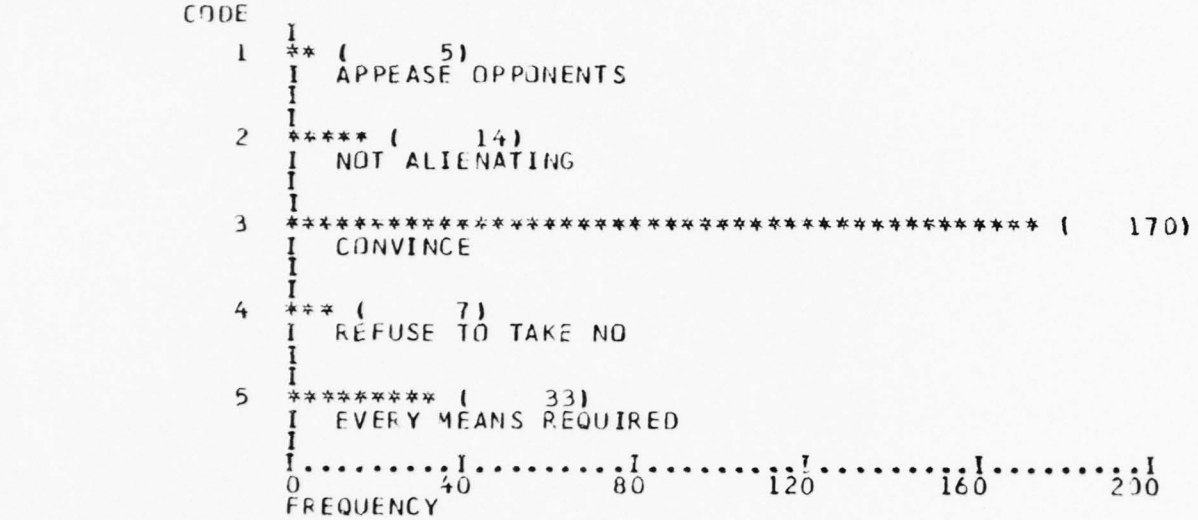


MEAN	3.677	STD ERR	0.081	MEDIAN	3.772
MODE	5.000	STD DEV	1.225	VARIANCE	1.500
KURTOSIS	-0.826	SKEWNESS	-0.473	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		

VALID CASES 229 MISSING CASES 0

08/24/77 FILE - EXPPC - CREATED 08/24/77

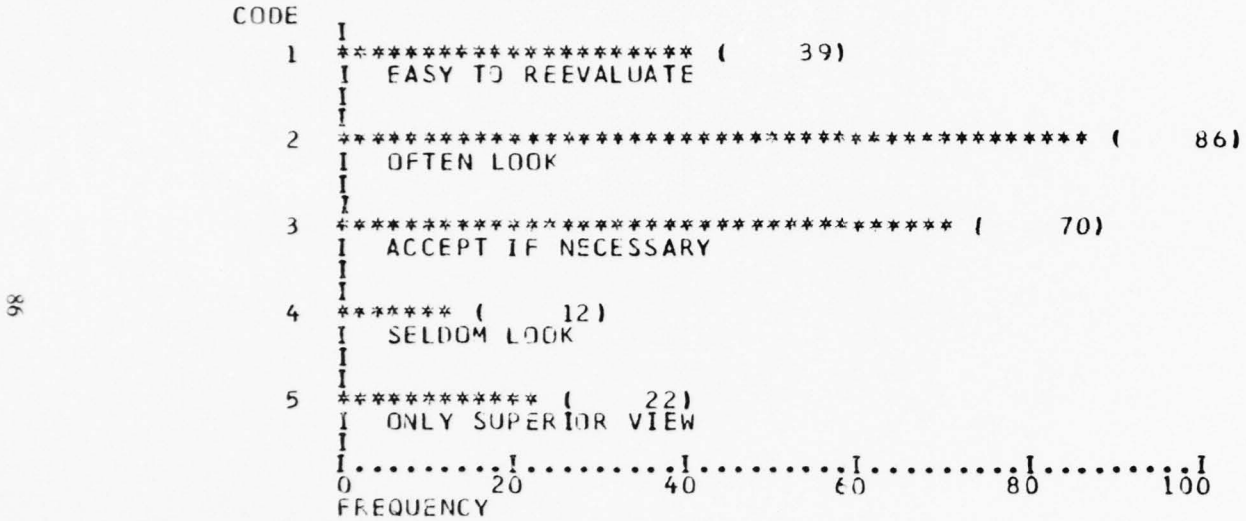
Q19 PROJECT ACCOMPLISHMENT



MEAN	3.214	STD ERR	0.056	MEDIAN	3.062
MODE	3.000	STD DEV	0.844	VARIANCE	0.713
KURTOSIS	1.297	SKEWNESS	0.812	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

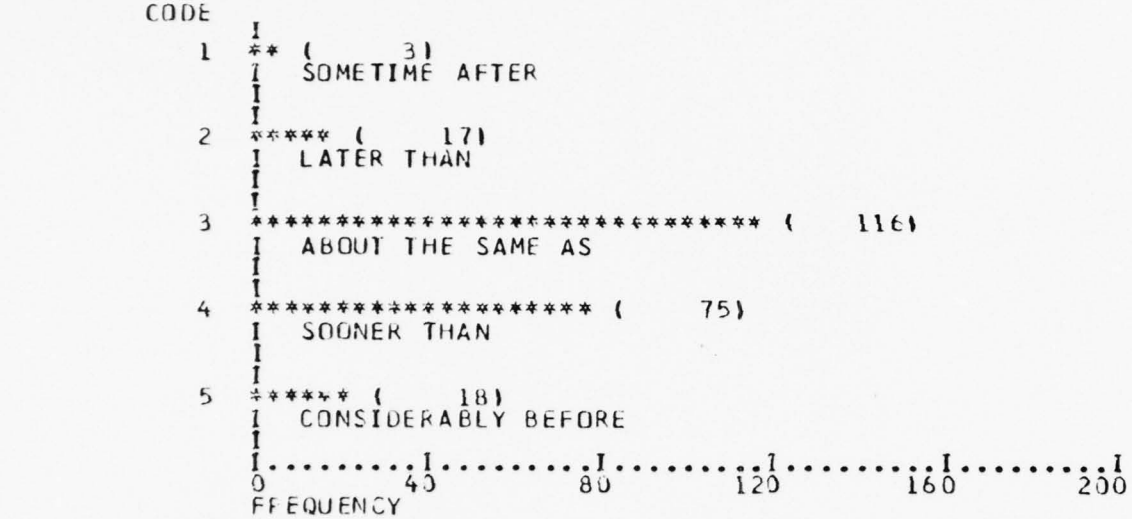
Q20 REEVALUATION POTENTIAL



MEAN	2.528	STD ERR	0.075	MEDIAN	2.378
MODE	2.000	STD DEV	1.130	VARIANCE	1.277
KURTOSIS	0.000	SKEWNESS	0.693	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

08/24/77 FILE - EXPPC - CREATED 08/24/77

Q21 KNOWLEDGE ACQUISITION TIMING



MEAN	3.384	STD ERR	0.052	MEDIAN	3.315
MODE	3.000	STD DEV	0.790	VARIANCE	0.624
KURTOSIS	0.380	SKEWNESS	0.010	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	229	MISSING CASES	0		

APPENDIX E

TRAIT DISTRIBUTIONAL ANALYSIS

It was initially decided, based on prior results of the questions in the Professional Preference Census, that the linker composite score would be the summation of questions 2, 4, 6, 8, 9, 11, 13, 15, 16, and 21. Using this as the basis, the composite scores were computed. The results are presented in tabular form in Table I. A histogram of the results appears in Figure 11. The mean of this distribution of scores was 23.616 while the standard deviation was 5.174 and the standard error of the sample mean was 0.342. The histogram of the linker scores was bell shaped similar to a normal distribution, however, the skewness was calculated to be 0.456 and the kurtosis to be -0.163. The skewness, often referred to as the "third moment," measures deviations from symmetry. It is defined by the formula:

$$\text{SKEWNESS} = \frac{\sum_{i=1}^{N} [\,(X_i - \overline{X})/s\,]^3}{N}.$$

where N is the number of intervals,

X_i is the i^{th} interval,

X is the mean, and

S is the standard deviation.

A positive value indicates that the cases are clustered more to the left of the mean with most of the extreme values to the right of the mean. The kurtosis, often referred to as the "fourth moment," is a measure of the peakedness or flatness of the curve in relation to a normal curve. It is defined by the formula:

$$\text{KURTOSIS} = \frac{\sum_{i=1}^{N} [(X_i - \bar{X})/s]^4}{N} - 3 .$$

If the kurtosis is positive, then the distribution is more peaked (narrow) than would be true for a normal distribution, while a negative value means that it is flatter.

It was initially decided based upon the rationale developed in the Concepts and EXPPC Development Sections, that the innovator composite score would be the summation of the scores of all of the questions with the exception of questions 8 and 11. Using this as a basis, the composite scores were computed. The results are presented in tabular form in Table II. A histogram of the results appears in Figure 12. The mean of this distribution of scores was 50.031 while the standard deviation was 6.058 and the standard error was 0.400. The histogram of the innovator scores was also bell shaped similar to a normal distribution. The skewness was calculated to be 0.163 and the kurtosis to be -0.072. This again indicates that the cases are clustered more to the left of the mean with most of the extreme values to the right of the mean and that the distribution is slightly flatter than a normal distribution. The innovator scores were distributed more closely to a normal distribution than were the linker scores. This conceivably was due to the larger number of questions used in the innovator composite score, tending to normalize the distribution.

LINKOVATOR 1 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

INNOVATE INNOVATOR TRAIT SCORE-QUESTIONAIRE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	33	1	0.4	0.4	0.4
	36	2	0.9	0.9	1.3
	38	3	1.3	1.3	2.6
	39	2	0.9	0.9	3.5
	40	2	0.9	0.9	4.4
	41	7	3.1	3.1	7.4
	42	2	0.9	0.9	8.3
	43	12	5.2	5.2	13.5
	44	13	5.7	5.7	19.2
	45	10	4.4	4.4	23.6
	46	11	4.8	4.8	28.4
	47	14	6.1	6.1	34.5
	48	11	4.8	4.8	39.3
	49	18	7.9	7.9	47.2
	50	23	10.0	10.0	57.2
	51	11	4.8	4.8	62.0
	52	14	6.1	6.1	68.1
	53	10	4.4	4.4	72.5
	54	10	4.4	4.4	76.9
	55	12	5.2	5.2	82.1
	56	13	5.7	5.7	87.8
	57	2	0.9	0.9	88.6
	58	3	1.3	1.3	90.0
	59	6	2.6	2.6	92.6
	60	2	0.9	0.9	93.4
	61	4	1.7	1.7	95.2
	62	5	2.2	2.2	97.4
	63	3	1.3	1.3	98.7
	64	1	0.4	0.4	99.1
	65	1	0.4	0.4	99.6
	66	1	0.4	0.4	100.0
	TOTAL	229	100.0	100.0	

MEAN	50.031	STD ERR	0.400	MEDIAN	49.783
MODE	50.000	STD DEV	6.053	VARIANCE	36.705
KURTOSIS	-0.372	SKEWNESS	0.163	RANGE	33.000
MINIMUM	33.000	MAXIMUM	66.000		
VALID CASES	229	MISSING CASES	0		

Table I. Tabular Presentation of Resultant Composite Linker Trait Scores from EXPPC, along with Population Statistics.

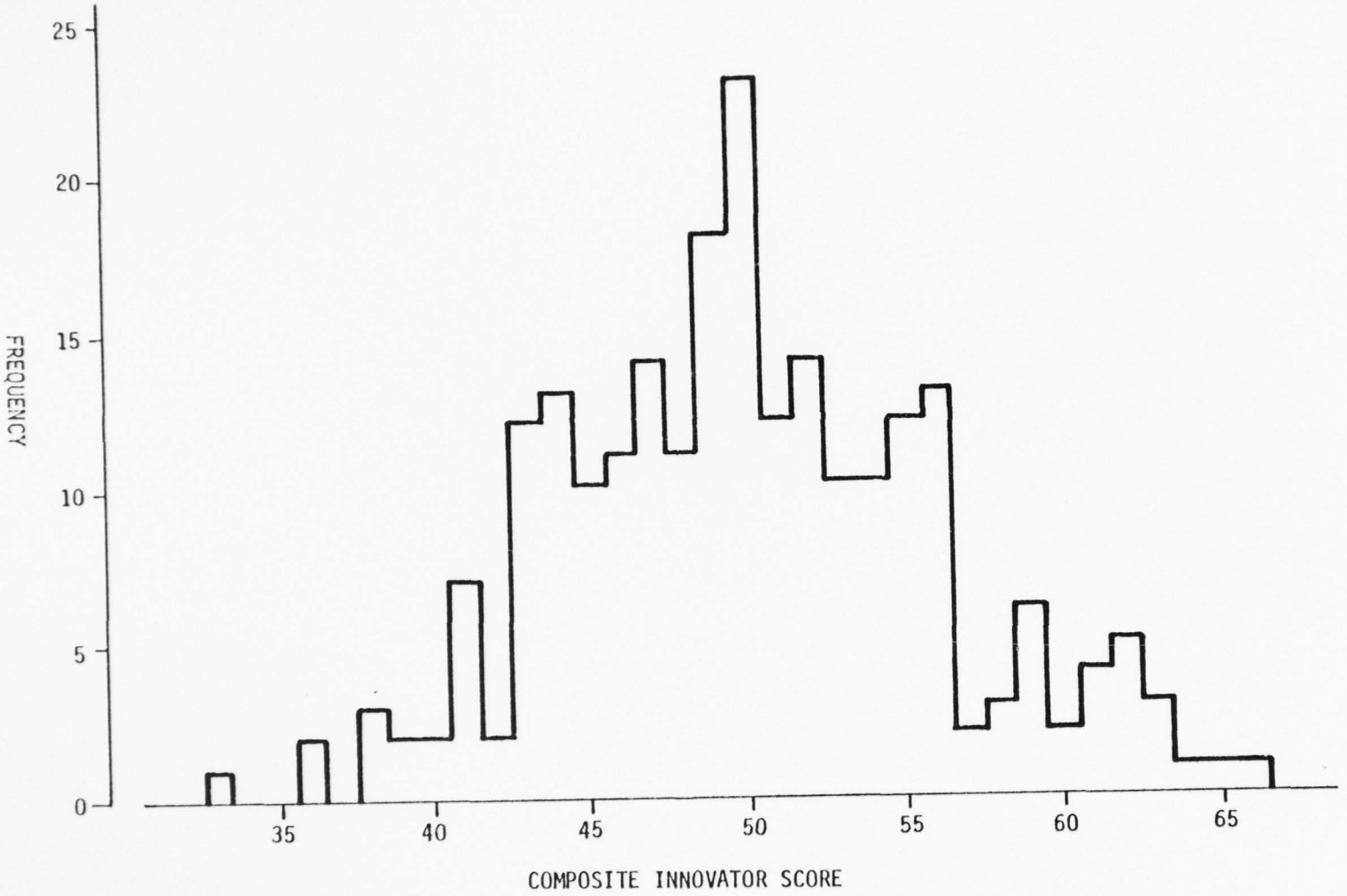


Figure 11. Histogram of Resultant Composite Linker Trait Scores from EXPPC.

LINKOVATOR 1 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

LINK LINKER TRAIT SCORE-QUESTIONAIRE

CATEGORY LABEL	CODE	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (PERCENT)	ADJUSTED FREQUENCY (PERCENT)	CUMULATIVE ADJ FREQ (PERCENT)
	14	3	1.3	1.3	1.3
	15	7	3.1	3.1	4.4
	16	10	4.4	4.4	8.7
	17	6	2.6	2.6	11.4
	18	10	4.4	4.4	15.7
	19	15	6.6	6.6	22.3
	20	13	5.7	5.7	27.9
	21	18	7.9	7.9	35.8
	22	20	8.7	8.7	44.5
	23	20	8.7	8.7	53.3
	24	23	10.0	10.0	63.3
	25	12	5.2	5.2	68.6
	26	9	3.9	3.9	72.5
	27	14	6.1	6.1	78.6
	28	8	3.5	3.5	82.1
	29	9	3.9	3.9	86.0
	30	6	2.6	2.6	88.6
	31	7	3.1	3.1	91.7
	32	5	2.2	2.2	93.9
	33	3	1.3	1.3	95.2
	34	3	1.3	1.3	96.5
	35	3	1.3	1.3	97.8
	36	1	0.4	0.4	98.3
	37	4	1.7	1.7	100.0
	TOTAL	229	100.0	100.0	

MEAN	23.616	STD ERR	0.342	MEDIAN	23.125
MODE	24.000	STD DEV	5.174	VARIANCE	26.773
KURTOSIS	-0.163	SKEWNESS	0.456	RANGE	23.000
MINIMUM	14.000	MAXIMUM	37.000		
VALID CASES	229	MISSING CASES	0		

Table II. Tabular Presentation of Resultant Composite Innovator Trait Scores from EXPPC, along with Population Statistics.

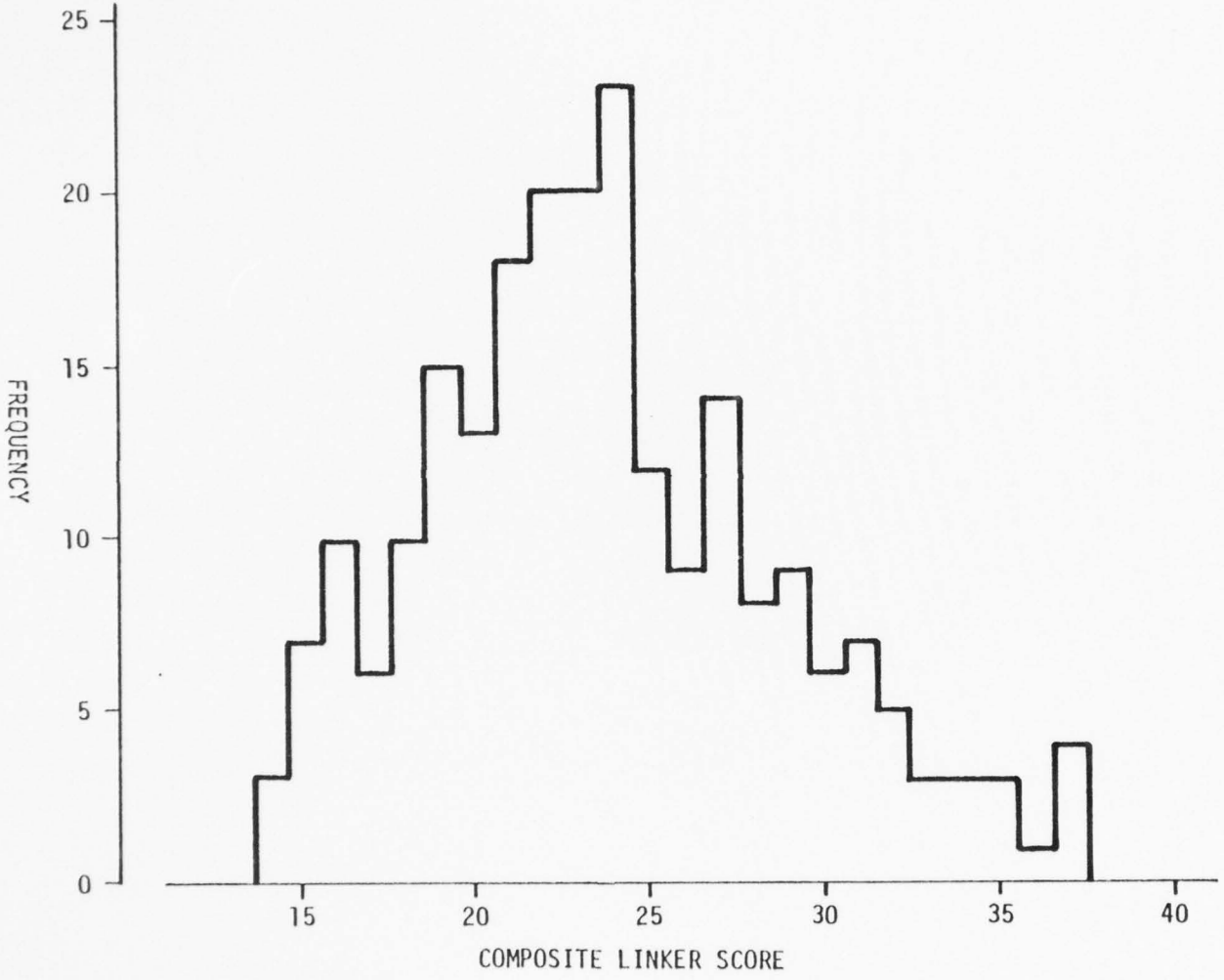


Figure 12. Histogram of Resultant Composite Innovator Trait Scores from EXPPC.

For any near normal distribution, the magnitude of possible random error at a given confidence level is computed using the formula:

$$E = z_{CL}\, S_{\overline{X}},$$

where E = the magnitude of possible random error (measured in either direction from the sample mean),

z_{CL} = the Z - statistic for the confidence level desired, and

$S_{\overline{X}}$ = the standard error of the sample mean.

For a 99 percent confidence level, z_{CL} equals 2.58.

For the linker mean:

$$E = (2.58)\ (0.342) = 0.882.$$

Since the sample mean, $\overline{X}$, is 23.616, the probability is 0.99 that the mean score of a respondent, μ, will be in the following range:

$$22.734 < \mu < 24.498.$$

Thus any sample falling outside of the band is significantly different from the mean at a confidence level of 99 percent indicating that the instrument is differentiating.

For the innovator mean :

$$E = (2.58)\ \ (0.400) = 1.032.$$

Since the sample mean, $\overline{X}$, is 50.031, the probability is 0.99 that the mean score of a respondent, μ, will be in the following range:

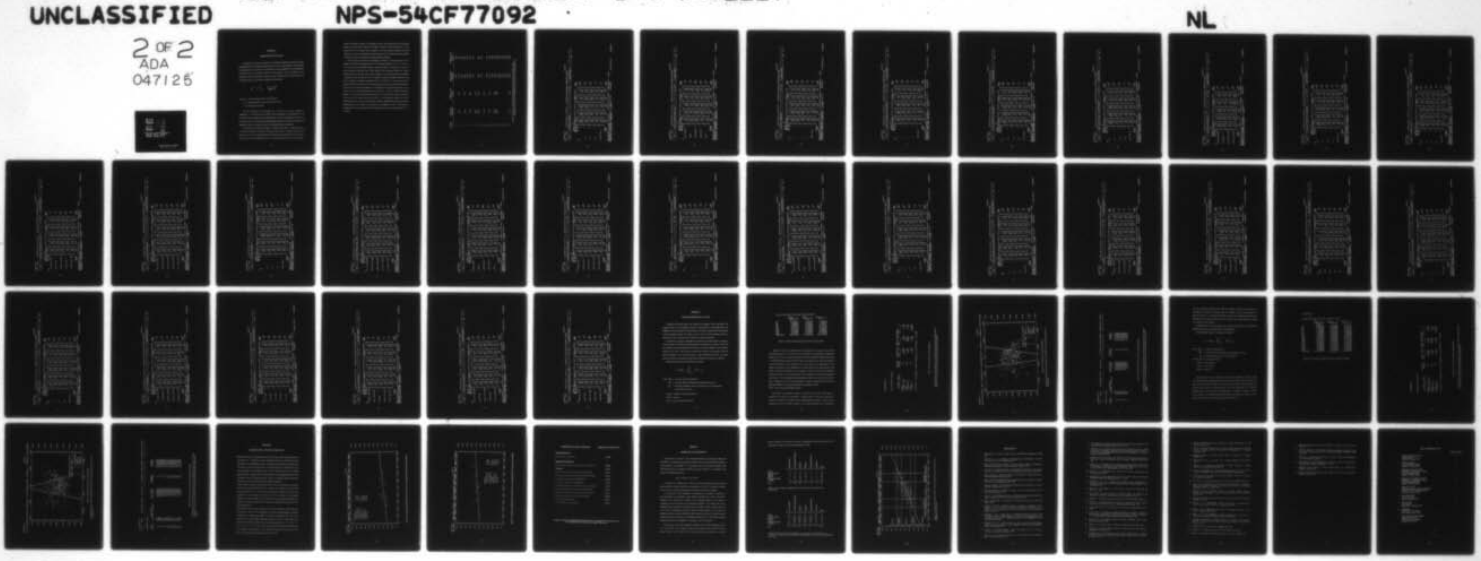
$$48.999 < \mu < 51.063.$$

Thus any score falling outside of this band is significantly different from the mean at a confidence level of 99 percent, indicating that the instrument is differentiating.

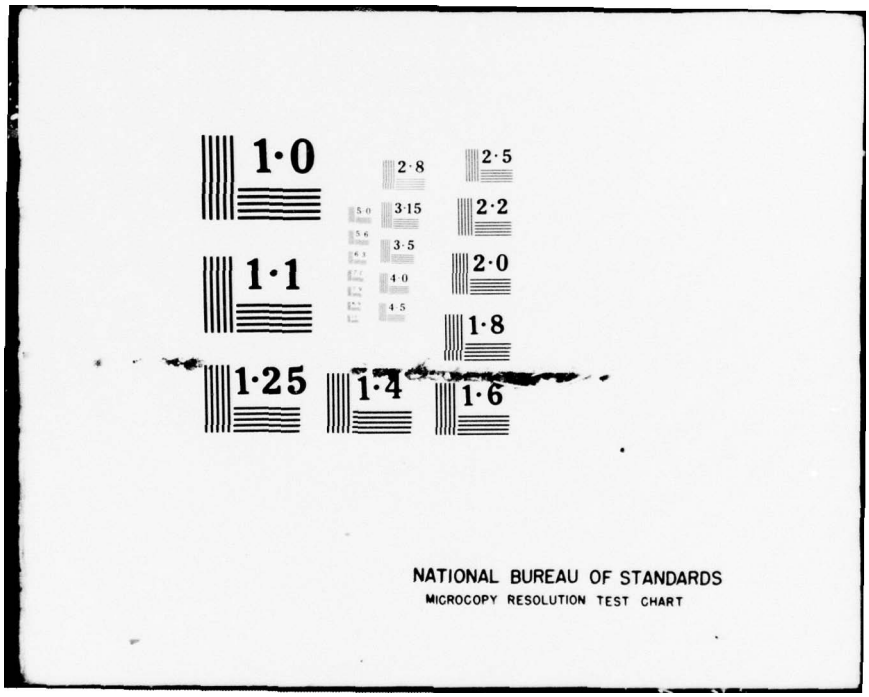
AD-A047 125 NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF F/G 5/1
THE ROLES AND IDENTIFICATION OF INNOVATORS AND LINKERS IN THE T--ETC(U)
SEP 77 L K HOCHBERGER, B G WOOLLEY

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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

APPENDIX F

CROSSTABULATION ANALYSIS

To determine the ability of each question to individually differentiate between the various classifications in both the linker and innovator traits, a series of crossbreaks or crosstabulations was genrated and a chi-square test was performed on each crosstabulation. The crosstabulations for each question are presented at the end of this Appendix. Table III. Summary of the Chi-Square Values for Questions in EXPPC, presents in tabular form the values derived. The Chi-square values in each case were calculated from the formula:

$$\chi^2 = \sum_{i=1}^{K} \frac{(O_i - E_i)^2}{E_i} .$$

where O_i = observed number of cases in the i^{th} interval,

E_i = expected number of cases in the i^{th} interval, and

K = the number of intervals.

The null hypothesis for the chi-square test in each case is that the variables are independent, i.e., responses will be uniformly spread throughout the crosstabulation. If the calculated values are greater than a chi-square statistic for a given confidence level, then we can say with that level of confidence that the independence hypothesis is false, that the variables are dependent, and that the questions are able to discriminate between classifications.

For the linker trait, there are 16 degrees of freedom (the number of classifications minus one, times the number of answers to the question minus one). It should be noted that the authors are aware of the theoretical limitations associated with the presence of near vacant cells (less than 5) in the crosstabulation matrix. It was, however assumed that the values calculated

would be reasonable indicators of discriminatory ability even though they did lack theoretical perfection. The chi-square statistic for 16 degrees of freedom at the 99 percent level is 32.00. Because all of the chi-square values calculated for the linker questions are greater than 32.00 (Table III), we can be at least 99 percent certain that each of the ten questions will discriminate between the various classifications in the linker-stabilizer continuum.

For the innovator trait, there are 20 degrees of freedom. The chi-square statistic for 20 degrees of freedom at the 99 percent level is 37.57. Because questions 2, 4, 5, 6, 7, 9, 10, 15, 16, 17, 19, and 21 all have calculated chi-square values greater than 37.57 (Table III), we can be at least 99 percent certain that each of these questions will discriminate between the various classifications in the innovator, non-innovator continuum. The chi-square statistic for 20 degrees of freedom at the 95 percent level is 31.4. In addition to the above questions, questions 14 and 18 have calculated chi-square values greater than 31.4 (Table III), so we can be at least 95 percent certain that questions 14 and 18 will discriminate between the various classifications in the innovator, non-innovator continuum. In a similar manner, using chi-square statistics, we can say that we are at least 90 percent certain that question 1, at least 75 percent certain that question 12, at least 50 percent certain that question 13, at least 25 percent certain that question 20, and at least 10 percent certain that question 3 will discriminate between the various classifications on the innovator, non-innovator continuum. Dependence between the innovator classifications and the answers to the questions was established at least at the 90 percent confidence level for all questions used in the composite innovator score except questions 3, 12, 13, and 20.

Question	Linker Score Chi-Square	Confidence Level At Least	Innovator Score Chi-Square	Confidence Level At Least
1			29.32	90%
2	56.14	99%	75.43	99%
3			14.02	10%
4	66.47	99%	60.83	99%
5			54.90	99%
6	79.46	99%	53.88	99%
7			44.63	99%
8	90.07	99%		
9	108.36	99%	74.00	99%
10			72.20	99%
11	72.03	99%		
12			26.90	75%
13	34.10	99%	22.14	50%
14			31.60	95%
15	127.93	99%	77.85	99%
16	106.28	99%	67.76	99%
17			105.94	99%
18			37.01	95%
19			37.58	99%
20			19.11	25%
21	63.77	99%	45.58	99%

Table III. Summary of the Calculated Chi-Square Values for Questions in EXPPC and the Resulting Confidence Level of Dependency between Trait Score and Question Score.

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q2 MEETINGS ATTENDED BY LR LINKER RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* * * * * * * * * * * * * * * * * * * CROSSTABULATION OF * * * * * * * * * * * * * * * * * * *

Q4 SOCIAL STRATA ASPIRATIONS BY LR LINKER RATING

* PAGE 1 OF 1

Q4	LR	2 POTENTIAL STABIL	3 MAJORITY	4 MAJORITY	5 POTENTIAL LINKER	6 LINKER	ROW TOTAL
LOWER-MIDDLE	1	0	2	0	0	0	2
		0.0	100.0	0.0	0.0	0.0	0.9
		0.0	2.3	0.0	0.0	0.0	
		0.0	0.9	0.0	0.0	0.0	
MIDDLE	2	8	3	2	2	0	15
		53.3	20.0	13.3	13.3	0.0	6.6
		22.2	3.5	3.0	6.7	0.0	
		3.5	1.3	0.9	0.9	0.0	
UPPER-MIDDLE	3	22	51	19	9	2	103
		21.4	49.5	18.4	8.7	1.9	45.0
		61.1	59.3	28.8	30.0	18.2	
		9.6	22.3	8.3	3.9	0.9	
LOWER-UPPER	4	5	23	27	7	3	65
		7.7	35.4	41.5	10.8	4.6	28.4
		13.9	26.7	40.9	23.3	27.3	
		2.2	10.0	11.8	3.1	1.3	
UPPER	5	1	7	18	12	6	44
		2.3	15.9	40.9	27.3	13.6	19.2
		2.8	8.1	27.3	40.0	54.5	
		0.4	3.1	7.9	5.2	2.6	
COLUMN TOTAL		36	86	66	30	11	229
		15.7	37.6	28.8	13.1	4.8	100.0

RAW CHI SQUARE = 66.47270 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000

CRAMER'S V = 0.26939

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.11180 WITH Q4 DEPENDENT. = 0.09806 WITH LR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.10448

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q6 SOCIETY MEMBERSHIP BY LR LINKER RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *

Q8 LEADS RECOMMENDED TO COLLEAGUES BY LR LINKER RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

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Q11 TIMES ADVICE SOUGHT FROM RESPONDENT BY LR LINKER RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* * * * * * * * * * * * * * * * * * * CROSSTABULATION OF * * * * * * * * * * * * * * * * * * *
Q13 INFORMATION CREDIBILITY BY LR LINKER RATING
* PAGE 1 OF 1

Q13	COUNT / ROW PCT / COL PCT / TOT PCT	LR 2 POTENTIAL STABIL	3 MAJORITY	4 MAJORITY	5 POTENTIAL LINKER	6 LINKER	ROW TOTAL
1 EXPERIMENTATION		19	32	23	7	3	84
		22.6	38.1	27.4	8.3	3.6	36.7
		52.8	37.2	34.8	23.3	27.3	
		8.3	14.0	10.0	3.1	1.3	
2 LITERATURE		11	23	8	1	1	44
		25.0	52.3	18.2	2.3	2.3	19.2
		30.6	26.7	12.1	3.3	9.1	
		4.8	10.0	3.5	0.4	0.4	
4 ASSOCIATED STAFF		2	4	5	1	1	13
		15.4	30.8	38.5	7.7	7.7	5.7
		5.6	4.7	7.6	3.3	9.1	
		0.9	1.7	2.2	0.4	0.4	
5 PERSONAL KNOWLED		4	27	30	21	6	88
		4.5	30.7	34.1	23.9	6.8	38.4
		11.1	31.4	45.5	70.0	54.5	
		1.7	11.8	13.1	9.2	2.6	
COLUMN TOTAL		36	86	66	30	11	229
		15.7	37.6	28.8	13.1	4.8	100.0

RAW CHI SQUARE = 34.09933 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0007
CRAMER'S V = 0.22279
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.06652 WITH Q13 DEPENDENT. = 0.05656 WITH LR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.06114

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *
Q15 TIMES INFO SOUGHT BY RESPONDENT BY LR LINKER RATING
* PAGE 1 OF 1

Q15	COUNT / ROW PCT / COL PCT / TOT PCT	LR 2 POTENTIAL STABIL	3 MAJORITY	4 MAJORITY	5 POTENTIAL LINKER	6 LINKER	ROW TOTAL
0-2	1	23	45	11	1	0	80
		28.8	56.3	13.8	1.3	0.0	34.9
		63.9	52.3	16.7	3.3	0.0	
		10.0	19.7	4.8	0.4	0.0	
3-4	2	13	26	31	6	1	77
		16.9	33.8	40.3	7.8	1.3	33.6
		36.1	30.2	47.0	20.0	9.1	
		5.7	11.4	13.5	2.6	0.4	
5-6	3	0	11	16	7	2	36
		0.0	30.6	44.4	19.4	5.6	15.7
		0.0	12.8	24.2	23.3	18.2	
		0.0	4.8	7.0	3.1	0.9	
7-8	4	0	1	4	10	2	17
		0.0	5.9	23.5	58.8	11.8	7.4
		0.0	1.2	6.1	33.3	18.2	
		0.0	0.4	1.7	4.4	0.9	
MORE THAN 8	5	0	3	4	6	6	19
		0.0	15.8	21.1	31.6	31.6	8.3
		0.0	3.5	6.1	20.0	54.5	
		0.0	1.3	1.7	2.6	2.6	
COLUMN TOTAL		36 15.7	86 37.6	66 28.8	30 13.1	11 4.8	229 100.0

RAW CHI SQUARE = 127.92953 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000
CRAMER'S V = 0.37371
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.18475 WITH Q15 DEPENDENT. = 0.18411 WITH LR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.18443

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

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Q16 JOURNALS READ BY LR LINKER RATING
* PAGE 1 OF 1

Q16	LR COUNT ROW PCT COL PCT TOT PCT	2 POTENTIAL STABIL	3 MAJORITY	4 MAJORITY	5 POTENTIAL LINKER	6 LINKER	ROW TOTAL
0-3	1	30 46.2 83.3 13.1	20 30.8 23.3 8.7	11 16.9 16.7 4.8	3 4.6 10.0 1.3	1 1.5 9.1 0.4	65 28.4
4-5	2	6 6.5 16.7 2.6	49 53.3 57.0 21.4	25 27.2 37.9 10.9	9 9.8 30.0 3.9	3 3.3 27.3 1.3	92 40.2
6-7	3	0 0.0 0.0 0.0	12 28.6 14.0 5.2	17 40.5 25.8 7.4	10 23.8 33.3 4.4	3 7.1 27.3 1.3	42 18.3
8-9	4	0 0.0 0.0 0.0	4 25.0 4.7 1.7	7 43.8 10.6 3.1	5 31.3 16.7 2.2	0 0.0 0.0 0.0	16 7.0
MORE THAN 9	5	0 0.0 0.0 0.0	1 7.1 1.2 0.4	6 42.9 9.1 2.6	3 21.4 10.0 1.3	4 28.6 36.4 1.7	14 6.1
COLUMN TOTAL		36 15.7	86 37.6	66 28.8	30 13.1	11 4.8	229 100.0

RAW CHI SQUARE = 106.27740 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000
CRAMER'S V = 0.34062
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.15504 WITH Q16 DEPENDENT. = 0.15095 WITH LR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.15297

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* * * * * * * * * * * * * * * * * CROSSTABULATION OF * * * * * * * * * * * * * * * * * *

Q21 KNOWLEDGE ACQUISITION TIMING BY LR LINKER RATING

* PAGE 1 OF 1

Q21	LR: POTENTIAL STABIL (2)	MAJORITY (3)	MAJORITY (4)	POTENTIAL LINKER (5)	LINKER (6)	ROW TOTAL
1 SOMETIME AFTER	2	1	0	0	0	3
	66.7	33.3	0.0	0.0	0.0	1.3
	5.6	1.2	0.0	0.0	0.0	
	0.9	0.4	0.0	0.0	0.0	
2 LATER THAN	7	5	5	0	0	17
	41.2	29.4	29.4	0.0	0.0	7.4
	19.4	5.8	7.6	0.0	0.0	
	3.1	2.2	2.2	0.0	0.0	
3 ABOUT THE SAME A	26	53	28	9	0	116
	22.4	45.7	24.1	7.8	0.0	50.7
	72.2	61.6	42.4	30.0	0.0	
	11.4	23.1	12.2	3.9	0.0	
4 SOONER THAN	1	23	26	16	9	75
	1.3	30.7	34.7	21.3	12.0	32.8
	2.8	26.7	39.4	53.3	81.8	
	0.4	10.0	11.4	7.0	3.9	
5 CONSIDERABLY BEF	0	4	7	5	2	18
	0.0	22.2	38.9	27.8	11.1	7.9
	0.0	4.7	10.6	16.7	18.2	
	0.0	1.7	3.1	2.2	0.9	
COLUMN TOTAL	36	86	66	30	11	229
	15.7	37.6	28.8	13.1	4.8	100.0

RAW CHI SQUARE = 63.77261 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000

CRAMER'S V = 0.26386

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.14109 WITH Q21 DEPENDENT. = 0.11449 WITH LR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.12641

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* * * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * * *

Q1 TASKS MOST ENJOYABLE BY IR INNOVATOR RATING

* PAGE 1 OF 1

Q1 / IR	1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATOR	ROW TOTAL
1 NO TECH DETAIL	1	2	7	5	1	0	16
	6.3	12.5	43.8	31.3	6.3	0.0	7.0
	33.3	7.1	7.0	7.1	4.5	0.0	
	0.4	0.9	3.1	2.2	0.4	0.0	
2 MINOR TECH DETAI	1	9	15	7	5	1	38
	2.6	23.7	39.5	18.4	13.2	2.6	16.6
	33.3	32.1	15.0	10.0	22.7	16.7	
	0.4	3.9	6.6	3.1	2.2	0.4	
3 HALF TECH DETAIL	1	9	21	12	3	0	46
	2.2	19.6	45.7	26.1	6.5	0.0	20.1
	33.3	32.1	21.0	17.1	13.6	0.0	
	0.4	3.9	9.2	5.2	1.3	0.0	
4 MAJOR TECH DETAI	0	8	39	25	7	2	81
	0.0	9.9	48.1	30.9	8.6	2.5	35.4
	0.0	28.6	39.0	35.7	31.8	33.3	
	0.0	3.5	17.0	10.9	3.1	0.9	
5 ALL TECH DETAIL	0	0	18	21	6	3	48
	0.0	0.0	37.5	43.8	12.5	6.3	21.0
	0.0	0.0	18.0	30.0	27.3	50.0	
	0.0	0.0	7.9	9.2	2.6	1.3	
COLUMN TOTAL	3	28	100	70	22	6	229
	1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 29.31944 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0817

CRAMER'S V = 0.17891

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.05099 WITH Q1 DEPENDENT. = 0.05636 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.05354

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *
Q2 MEETINGS ATTENDED BY IR INNOVATOR RATING
* PAGE 1 OF 1

Q2	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATO R	ROW TOTAL
0	1	2	22	60	34	3	2	123
		1.6	17.9	48.8	27.6	2.4	1.6	53.7
		66.7	78.6	60.0	48.6	13.6	33.3	
		0.9	9.6	26.2	14.8	1.3	0.9	
1-2	2	1	6	26	28	5	1	67
		1.5	9.0	38.8	41.8	7.5	1.5	29.3
		33.3	21.4	26.0	40.0	22.7	16.7	
		0.4	2.6	11.4	12.2	2.2	0.4	
3-4	3	0	0	12	6	7	2	27
		0.0	0.0	44.4	22.2	25.9	7.4	11.8
		0.0	0.0	12.0	8.6	31.8	33.3	
		0.0	0.0	5.2	2.6	3.1	0.9	
5-6	4	0	0	2	2	3	0	7
		0.0	0.0	28.6	28.6	42.9	0.0	3.1
		0.0	0.0	2.0	2.9	13.6	0.0	
		0.0	0.0	0.9	0.9	1.3	0.0	
MORE THAN 6	5	0	0	0	0	4	1	5
		0.0	0.0	0.0	0.0	80.0	20.0	2.2
		0.0	0.0	0.0	0.0	18.2	16.7	
		0.0	0.0	0.0	0.0	1.7	0.4	
	COLUMN TOTAL	3	28	100	70	22	6	229
		1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 75.43462 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000
CRAMER'S V = 0.28697
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.11698 WITH Q2 DEPENDENT. = 0.09779 WITH IR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.10653

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *

Q3 TASK DELEGATION BY WORK TYPE BY IR INNOVATOR RATING

* PAGE 1 OF 1

Q3	IR: 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATOR	ROW TOTAL
1 DEL TO SUBORDINA	2	5	17	12	6	2	44
	4.5	11.4	38.6	27.3	13.6	4.5	19.2
	66.7	17.9	17.0	17.1	27.3	33.3	
	0.9	2.2	7.4	5.2	2.6	0.9	
2 ONLY MAKE OUTLIN	1	10	28	17	6	1	63
	1.6	15.9	44.4	27.0	9.5	1.6	27.5
	33.3	35.7	28.0	24.3	27.3	16.7	
	0.4	4.4	12.2	7.4	2.6	0.4	
3 DIRECT SUPERVISI	0	11	44	30	7	2	94
	0.0	11.7	46.8	31.9	7.4	2.1	41.0
	0.0	39.3	44.0	42.9	31.8	33.3	
	0.0	4.8	19.2	13.1	3.1	0.9	
4 DEL ONLY ROUTINE	0	2	5	7	1	1	16
	0.0	12.5	31.3	43.8	6.3	6.3	7.0
	0.0	7.1	5.0	10.0	4.5	16.7	
	0.0	0.9	2.2	3.1	0.4	0.4	
5 DEL ONLY TYPING	0	0	6	4	2	0	12
	0.0	0.0	50.0	33.3	16.7	0.0	5.2
	0.0	0.0	6.0	5.7	9.1	0.0	
	0.0	0.0	2.6	1.7	0.9	0.0	
COLUMN TOTAL	3	28	100	70	22	6	229
	1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 14.01573 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.8297

CRAMER'S V = 0.12370

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.02455 WITH Q3 DEPENDENT. = 0.02491 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.02473

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

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Q4 SOCIAL STRATA ASPIRATIONS BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q5 INNOVATION PERSEVERENCE BY IR INNOVATOR RATING

Q5	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVATOR	6 INNOVATOR	ROW TOTAL
1 EXPLAIN ONCE		1	8	21	4	1	0	35
		2.9	22.9	60.0	11.4	2.9	0.0	15.3
		33.3	28.6	21.0	5.7	4.5	0.0	
		0.4	3.5	9.2	1.7	0.4	0.0	
2 EXPLAIN TWICE		2	9	39	19	5	0	74
		2.7	12.2	52.7	25.7	6.8	0.0	32.3
		66.7	32.1	39.0	27.1	22.7	0.0	
		0.9	3.9	17.0	8.3	2.2	0.0	
3 WRITE REPORT		0	9	29	28	4	4	74
		0.0	12.2	39.2	37.8	5.4	5.4	32.3
		0.0	32.1	29.0	40.0	18.2	66.7	
		0.0	3.9	12.7	12.2	1.7	1.7	
4 SEND REPORT TO S		0	0	7	9	3	0	19
		0.0	0.0	36.8	47.4	15.8	0.0	8.3
		0.0	0.0	7.0	12.9	13.6	0.0	
		0.0	0.0	3.1	3.9	1.3	0.0	
5 SEND REPORT TO E		0	2	4	10	9	2	27
		0.0	7.4	14.8	37.0	33.3	7.4	11.8
		0.0	7.1	4.0	14.3	40.9	33.3	
		0.0	0.9	1.7	4.4	3.9	0.9	
COLUMN TOTAL		3	28	100	70	22	6	229
		1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 54.89555 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000
CRAMER'S V = 0.24481
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.08423 WITH Q5 DEPENDENT. = 0.09152 WITH IR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.08772

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q6 SOCIETY MEMBERSHIP BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *

Q7 PERCIEVED OFFENSE BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

* * * * * * 09 IDEAS PROVIDED BY RESPONDENT * * * * * * * * * * * * * * * * BY IR INNOVATOR RATING * * * * * * * * * * * * * * * * PAGE 1 OF 1

09	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATOR	ROW TOTAL
0-2	1	3	27	77	34	7	2	150
		2.0	18.0	51.3	22.7	4.7	1.3	65.5
		100.0	96.4	77.0	48.6	31.8	33.3	
		1.3	11.8	33.6	14.8	3.1	0.9	
3-4	2	0	1	20	24	6	0	51
		0.0	2.0	39.2	47.1	11.8	0.0	22.3
		0.0	3.6	20.0	34.3	27.3	0.0	
		0.0	0.4	8.7	10.5	2.6	0.0	
5-6	3	0	0	3	9	5	2	19
		0.0	0.0	15.8	47.4	26.3	10.5	8.3
		0.0	0.0	3.0	12.9	22.7	33.3	
		0.0	0.0	1.3	3.9	2.2	0.9	
7-8	4	0	0	0	2	2	1	5
		0.0	0.0	0.0	40.0	40.0	20.0	2.2
		0.0	0.0	0.0	2.9	9.1	16.7	
		0.0	0.0	0.0	0.9	0.9	0.4	
MORE THAN 8	5	0	0	0	1	2	1	4
		0.0	0.0	0.0	25.0	50.0	25.0	1.7
		0.0	0.0	0.0	1.4	9.1	16.7	
		0.0	0.0	0.0	0.4	0.9	0.4	
	COLUMN TOTAL	3 1.3	28 12.2	100 43.7	70 30.6	22 9.6	6 2.6	229 100.0

RAW CHI SQUARE = 73.99927 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000

CRAMER'S V = 0.28423

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.15569 WITH 09 DEPENDENT. = 0.11145 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.12990

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *

Q10 PROJECTS COMPLETE FROM OWN ORIG IDEA BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q12 EMPATHY BY IR INNOVATOR RATING

Q12	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATOR	ROW TOTAL
1 NORMALLY CONCERN		2	20	61	45	18	3	149
		1.3	13.4	40.9	30.2	12.1	2.0	65.1
		66.7	71.4	61.0	64.3	81.8	50.0	
		0.9	8.7	26.6	19.7	7.9	1.3	
2 SOMETIMES CONCER		1	7	38	25	4	2	77
		1.3	9.1	49.4	32.5	5.2	2.6	33.6
		33.3	25.0	38.0	35.7	18.2	33.3	
		0.4	3.1	16.6	10.9	1.7	0.9	
3 NOT GET INVOLVED		0	0	1	0	0	0	1
		0.0	0.0	100.0	0.0	0.0	0.0	0.4
		0.0	0.0	1.0	0.0	0.0	0.0	
		0.0	0.0	0.4	0.0	0.0	0.0	
4 DO NOT ENJOY HEA		0	1	0	0	0	1	2
		0.0	50.0	0.0	0.0	0.0	50.0	0.9
		0.0	3.6	0.0	0.0	0.0	16.7	
		0.0	0.4	0.0	0.0	0.0	0.4	
COLUMN TOTAL		3	28	100	70	22	6	229
		1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 26.89706 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0296

CRAMER'S V = 0.19787

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.04637 WITH Q12 DEPENDENT. = 0.02428 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.03187

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * * *

Q13 INFORMATION CREDIBILITY BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q14 CERTAINTY REQUIRED FOR DECISION BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

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Q15 TIMES INFO SOUGHT BY RESPONDENT BY IR INNOVATOR RATING

* PAGE 1 OF 1

Q15	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVA	6 INNOVATOR	ROW TOTAL
0-2	1	3	15	47	14	1	0	80
		3.8	18.8	58.8	17.5	1.3	0.0	34.9
		100.0	53.6	47.0	20.0	4.5	0.0	
		1.3	6.6	20.5	6.1	0.4	0.0	
3-4	2	0	13	34	25	3	2	77
		0.0	16.9	44.2	32.5	3.9	2.6	33.6
		0.0	46.4	34.0	35.7	13.6	33.3	
		0.0	5.7	14.8	10.9	1.3	0.9	
5-6	3	0	0	11	16	7	2	36
		0.0	0.0	30.6	44.4	19.4	5.6	15.7
		0.0	0.0	11.0	22.9	31.8	33.3	
		0.0	0.0	4.8	7.0	3.1	0.9	
7-8	4	0	0	2	8	7	0	17
		0.0	0.0	11.8	47.1	41.2	0.0	7.4
		0.0	0.0	2.0	11.4	31.8	0.0	
		0.0	0.0	0.9	3.5	3.1	0.0	
MORE THAN 8	5	0	0	6	7	4	2	19
		0.0	0.0	31.6	36.8	21.1	10.5	8.3
		0.0	0.0	6.0	10.0	18.2	33.3	
		0.0	0.0	2.6	3.1	1.7	0.9	
	COLUMN TOTAL	3	28	100	70	22	6	229
		1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 77.85347 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000

CRAMER'S V = 0.29154

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.12820 WITH Q15 DEPENDENT. = 0.13443 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.13125

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *

Q16 JOURNALS READ BY IR INNOVATOR RATING

* PAGE 1 OF 1

Q16	COUNT / ROW PCT / COL PCT / TOT PCT	IR 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVATOR	6 INNOVATOR	ROW TOTAL
0-3	1	3	14	35	11	2	0	65
		4.6	21.5	53.8	16.9	3.1	0.0	28.4
		100.0	50.0	35.0	15.7	9.1	0.0	
		1.3	6.1	15.3	4.8	0.9	0.0	
4-5	2	0	14	37	33	8	0	92
		0.0	15.2	40.2	35.9	8.7	0.0	40.2
		0.0	50.0	37.0	47.1	36.4	0.0	
		0.0	6.1	16.2	14.4	3.5	0.0	
6-7	3	0	0	19	14	6	3	42
		0.0	0.0	45.2	33.3	14.3	7.1	18.3
		0.0	0.0	19.0	20.0	27.3	50.0	
		0.0	0.0	8.3	6.1	2.6	1.3	
8-9	4	0	0	4	9	3	0	16
		0.0	0.0	25.0	56.3	18.8	0.0	7.0
		0.0	0.0	4.0	12.9	13.6	0.0	
		0.0	0.0	1.7	3.9	1.3	0.0	
MORE THAN 9	5	0	0	5	3	3	3	14
		0.0	0.0	35.7	21.4	21.4	21.4	6.1
		0.0	0.0	5.0	4.3	13.6	50.0	
		0.0	0.0	2.2	1.3	1.3	1.3	
	COLUMN TOTAL	3	28	100	70	22	6	229
		1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 67.76041 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0000

CRAMER'S V = 0.27198

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.10648 WITH Q16 DEPENDENT. = 0.10909 WITH IR DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.10777

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * * *

Q17 PROJECT PERSEVERENCE BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

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Q18 PERCENT TASKS DELEGATED BY IR INNOVATOR RATING

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LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *
Q19 PROJECT ACCOMPLISHMENT BY IR INNOVATOR RATING
* PAGE 1 OF 1

Q19	IR: NON INNOVATOR (1)	POTENTIAL NON IN (2)	MAJORITY (3)	MAJORITY (4)	POTENTIAL INNOVATOR (5)	INNOVATOR (6)	ROW TOTAL
1 APPEASE OPPONENT	1	2	2	0	0	0	5
	20.0	40.0	40.0	0.0	0.0	0.0	2.2
	33.3	7.1	2.0	0.0	0.0	0.0	
	0.4	0.9	0.9	0.0	0.0	0.0	
2 NOT ALIENATING	1	2	2	7	2	0	14
	7.1	14.3	14.3	50.0	14.3	0.0	6.1
	33.3	7.1	2.0	10.0	9.1	0.0	
	0.4	0.9	0.9	3.1	0.9	0.0	
3 CONVINCE	1	21	78	51	13	6	170
	0.6	12.4	45.9	30.0	7.6	3.5	74.2
	33.3	75.0	78.0	72.9	59.1	100.0	
	0.4	9.2	34.1	22.3	5.7	2.6	
4 REFUSE TO TAKE N	0	0	2	4	1	0	7
	0.0	0.0	28.6	57.1	14.3	0.0	3.1
	0.0	0.0	2.0	5.7	4.5	0.0	
	0.0	0.0	0.9	1.7	0.4	0.0	
5 EVERY MEANS REQU	0	3	16	8	6	0	33
	0.0	9.1	48.5	24.2	18.2	0.0	14.4
	0.0	10.7	16.0	11.4	27.3	0.0	
	0.0	1.3	7.0	3.5	2.6	0.0	
COLUMN TOTAL	3	28	100	70	22	6	229
	1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 37.58054 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0100
CRAMER'S V = 0.20255
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.07543 WITH Q19 DEPENDENT. = 0.04783 WITH IR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.05854

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* C R O S S T A B U L A T I O N O F *
Q20 REEVALUATION POTENTIAL BY IR INNOVATOR RATING
* PAGE 1 OF 1

Q20 / IR	1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVATOR	6 INNOVATOR	ROW TOTAL
1 EASY TO REEVALUA	2	3	13	16	5	0	39
	5.1	7.7	33.3	41.0	12.8	0.0	17.0
	66.7	10.7	13.0	22.9	22.7	0.0	
	0.9	1.3	5.7	7.0	2.2	0.0	
2 OFTEN LOOK	1	12	39	27	5	2	86
	1.2	14.0	45.3	31.4	5.8	2.3	37.6
	33.3	42.9	39.0	38.6	22.7	33.3	
	0.4	5.2	17.0	11.8	2.2	0.9	
3 ACCEPT IF NECESS	0	8	33	18	8	3	70
	0.0	11.4	47.1	25.7	11.4	4.3	30.6
	0.0	28.6	33.0	25.7	36.4	50.0	
	0.0	3.5	14.4	7.9	3.5	1.3	
4 SELDOM LOOK	0	3	6	3	0	0	12
	0.0	25.0	50.0	25.0	0.0	0.0	5.2
	0.0	10.7	6.0	4.3	0.0	0.0	
	0.0	1.3	2.6	1.3	0.0	0.0	
5 ONLY SUPERIOR VI	0	2	9	6	4	1	22
	0.0	9.1	40.9	27.3	18.2	4.5	9.6
	0.0	7.1	9.0	8.6	18.2	16.7	
	0.0	0.9	3.9	2.6	1.7	0.4	
COLUMN TOTAL	3	28	100	70	22	6	229
	1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 19.10501 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.5150
CRAMER'S V = 0.14442
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.03164 WITH Q20 DEPENDENT. = 0.03287 WITH IR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.03224

LINKOVATOR 2 08/24/77

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

* CROSSTABULATION OF *
Q21 KNOWLEDGE ACQUISITION TIMING BY IR INNOVATOR RATING
* PAGE 1 OF 1

Q21	IR: 1 NON INNOVATOR	2 POTENTIAL NON IN	3 MAJORITY	4 MAJORITY	5 POTENTIAL INNOVATOR	6 INNOVATOR	ROW TOTAL
1 SOMETIME AFTER	0	0	2	1	0	0	3
	0.0	0.0	66.7	33.3	0.0	0.0	1.3
	0.0	0.0	2.0	1.4	0.0	0.0	
	0.0	0.0	0.9	0.4	0.0	0.0	
2 LATER THAN	0	3	11	3	0	0	17
	0.0	17.6	64.7	17.6	0.0	0.0	7.4
	0.0	10.7	11.0	4.3	0.0	0.0	
	0.0	1.3	4.8	1.3	0.0	0.0	
3 ABOUT THE SAME A	1	21	58	31	4	1	116
	0.9	18.1	50.0	26.7	3.4	0.9	50.7
	33.3	75.0	58.0	44.3	18.2	16.7	
	0.4	9.2	25.3	13.5	1.7	0.4	
4 SOONER THAN	2	3	24	30	13	3	75
	2.7	4.0	32.0	40.0	17.3	4.0	32.8
	66.7	10.7	24.0	42.9	59.1	50.0	
	0.9	1.3	10.5	13.1	5.7	1.3	
5 CONSIDERABLY BEF	0	1	5	5	5	2	18
	0.0	5.6	27.8	27.8	27.8	11.1	7.9
	0.0	3.6	5.0	7.1	22.7	33.3	
	0.0	0.4	2.2	2.2	2.2	0.9	
COLUMN TOTAL	3	28	100	70	22	6	229
	1.3	12.2	43.7	30.6	9.6	2.6	100.0

RAW CHI SQUARE = 45.58160 WITH 20 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0009
CRAMER'S V = 0.22307
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.08772 WITH Q21 DEPENDENT. = 0.07490 WITH IR DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.08080

APPENDIX G

MULTIPLE DISCRIMINANT ANALYSIS

A multiple discriminant analysis was conducted on all questions which contributed to the composite linker score to determine the ability of each question to discriminate linkers and stabilizers from the population, when that question was used in conjunction with the remainder of the contributing questions. The analysis was also used to rank the individual questions in order of their relative importance as discriminators of individual respondents.

The analysis was begun by regrouping the classifications from the original five categories to three categories. The linkers and potential linkers were combined into a group of linkers, and the stabilizers and potential stabilizers were formed into a group of stabilizers. The vast majority remained as they were. This was done to provide more members for each group to make the analysis meaningful. For each of these groups, a linear discriminate function of the original questions which best characterized the multivariate distribution of the group was computed.

The discriminate function for each group is in the form:

$$D = \alpha_G + \sum_{Q=1}^{10} B_Q^G \, X_Q \quad .$$

where α_G = a constant value for each group G,

B_Q^G = a constant value for each group G and each question Q, and

X_Q = individual respondents score for each question, and the three groups were defined as follows:

Group 1 : Stabilizers and Potential Stabilizers.

Group 2 : Majority.

Group 3 : Linkers and Potential Linkers.

CLASSIFICATION FUNCTION COEFFICIENTS

	GROUP 1 STABILIZER	GROUP 2 MAJORITY	GROUP 3 LINKER
Q2	3.88265	5.37530	7.53313
Q4	5.20517	6.47167	7.59550
Q6	2.08628	3.18280	4.48513
Q8	2.32176	3.07958	4.33026
Q9	0.45169	0.79704	2.11719
Q11	2.47152	3.88426	5.38990
Q13	3.23401	4.61759	6.29890
Q15	2.20167	2.99304	5.03843
Q16	2.13993	3.75557	4.83394
Q21	6.64142	8.48736	10.15925
CONSTANT	-29.74065	-54.76337	-96.14789

Table IV. Linker Discriminate Classification Function Coefficients.

Appendix I presents the discriminate functions computed for each group. Using the three discriminate equations, a set of three values was computed for each respondent. The highest of the three values was used to select the group into which the respondent would be placed. Table V, Linker Discriminate Prediction Results, displays the summary results. Perfect discrimination would have placed all of the respondents in the same group as the questionnaire. In this instance, 92.58 percent of the respondents were correctly placed. This minor deviation in the results is well within expectation. It was reasonable to expect that some of the respondents would score equally well in an adjacent group. This is exhibited in the normalized discriminate map, Figure 13. The discriminate function presented in Table IV can be used in the future to place a respondent into one of the three groups by simply computing the three values and selecting the highest of the three and using that as the placement criterion.

Table V. Linker Discriminant Prediction Results.

The analysis also provided a ranking of the questions in the order of their ability to discriminate. The analysis was performed in a stepwise manner. At each step, a question was chosen to be entered into the analysis based on minimizing Wilks' lambda, a measure of group discrimination. Table VI presents a summary of the stepwise procedure. It was interesting to

LINKOVATOR 4

PREDICTION RESULTS -

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP GP. 1	GP. 2	GP. 3
GROUP 1 STABILIZER	36.	36. 100.0%	0. 0.0%	0. 0.0%
GROUP 2 MAJORITY	152.	13. 8.6%	135. 88.8%	4. 2.6%
GROUP 3 LINKER	41.	0. 0.0%	0. 0.0%	41. 100.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 92.58%

Table V. Linker Discriminant Prediction Results.

This table compares the number of cases classified in each group by the EXPPC with the number of cases classified in each group by the discriminate function method.

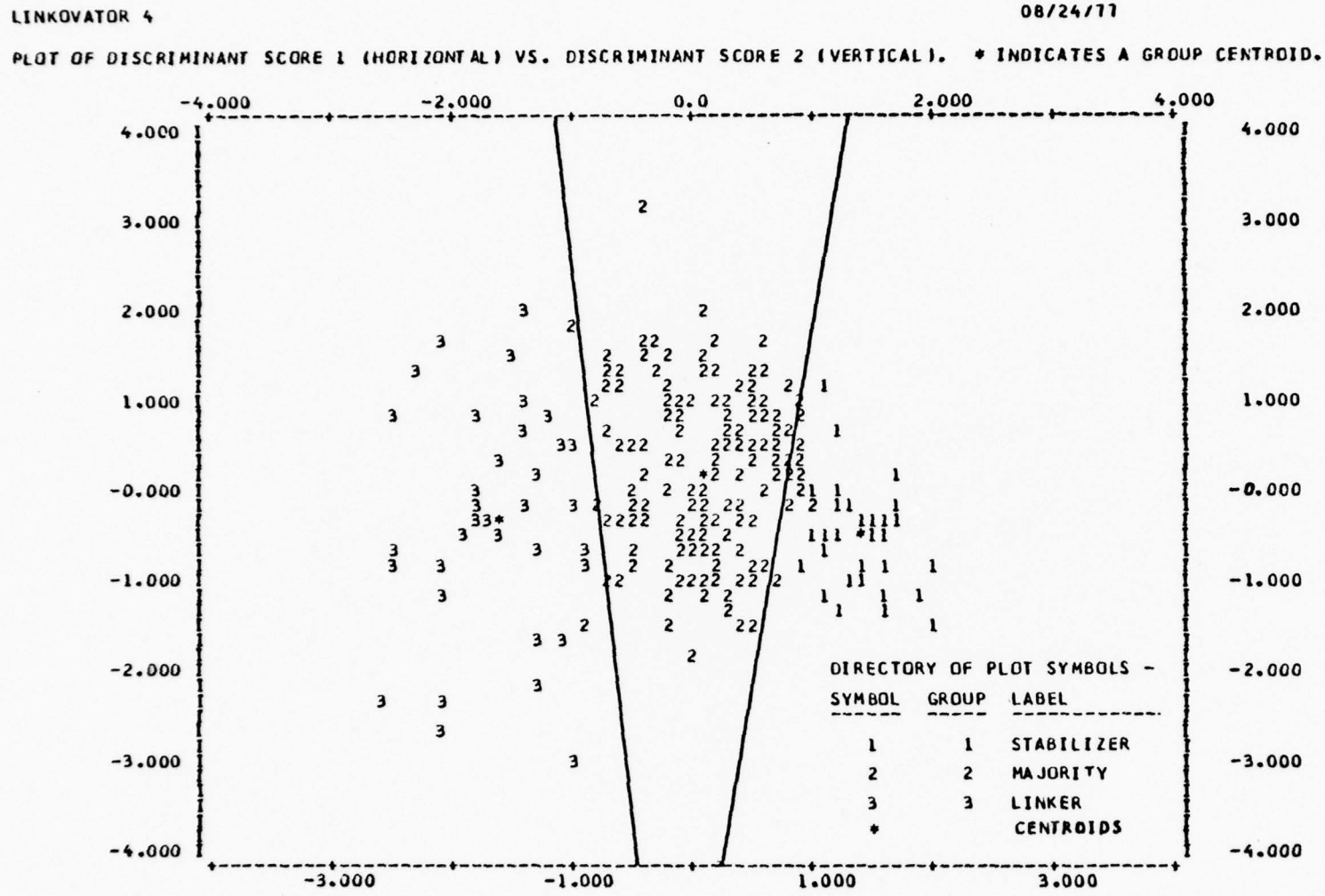


Figure 13. Normalized Linker Discriminant Map.

This plot graphically illustrates the ability of the EXPPC to separate the three linker trait classifications.

LINKOVATOR 4

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

- D I S C R I M I N A N T A N A L Y S I S -

SUMMARY TABLE

STEP NUMBER	VARIABLE ENTERED	VARIABLE REMOVED	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LAMBDA
1	Q15		58.53902	1	0.65874
2	Q13		21.94890	2	0.55120
3	Q6		26.89307	3	0.44448
4	Q9		20.94356	4	0.37419
5	Q21		13.60153	5	0.33334
6	Q2		13.30913	6	0.29751
7	Q11		15.46004	7	0.26085
8	Q16		19.25867	8	0.22183
9	Q4		7.50270	9	0.20755
10	Q8		7.84151	10	0.19356

Table VI. Summary of Stepwise Linker Discriminant Analysis.

This table indicates the step in which each question was added to the analysis. The "F" statistic is indicative of the relative contribution of each question to the discriminatory ability of the EXPPC.

note that as additional questions were added to the analysis, the ability of each question to discriminate with respect to the others varied. For example, at step 5 when question 21 was added to the analysis, it was better than the other questions not yet added, however when all of the questions were included, questions 16 and 11 were better able to discriminate than question 21 as indicated by the F statistic.

An identical analysis was performed to test the ability of the questions of the EXPPC to discriminate innovators and non-innovators from the population.

The discriminate function for each group is in the form:

$$D = \alpha_G + \sum_{Q=1}^{19} B_Q^G X_Q ,$$

where α_G = a constant for each group G,

B_Q^G = a constant value for each group G and each question Q, and

X_Q = individual respondents score for each question.

The three groups were defined as follows:

Group 1 = Non-innovators,

Group 2 = Vast Majority,

Group 3 = Innovators.

The discriminate functions computed in the analysis are presented in Table VII. Table VIII, Innovator Discriminate Prediction Results, displays the summary results of the predictive ability of the discriminate function. In this instance, 90.83 percent of the respondents were correctly placed. Again, this minor deviation is well within expectation. The normalized discriminate map from the innovator discriminate analysis is presented in Figure 14. Table IX lists the summary of the stepwise procedure and presents the ranking of the questions in their ability to discriminate when used along with all of the other questions.

LINKOVATOR 3

CLASSIFICATION FUNCTION COEFFICIENTS

	GROUP 1 NON-INNOVATOR	GROUP 2 MAJORITY	GROUP 3 INNOVATOR
Q1	4.00229	5.00850	5.66237
Q2	5.56150	7.04608	9.57212
Q3	4.85929	5.65595	6.01090
Q4	7.41244	8.66791	9.38690
Q5	2.35005	2.80178	3.59033
Q6	3.49209	3.95586	4.88906
Q7	3.79927	4.82157	6.33030
Q9	1.02585	1.58297	2.78368
Q10	2.15590	2.91228	4.27228
Q12	9.26760	10.07355	10.63606
Q13	4.21916	5.28189	6.29106
Q14	5.01669	5.66096	6.16569
Q15	2.33221	3.12986	4.21198
Q16	3.94657	5.27215	6.48756
Q17	3.39709	4.30764	4.99139
Q18	5.92377	7.10258	7.85397
Q19	8.32754	9.91120	11.24467
Q20	5.40630	6.31925	7.48651
Q21	7.41568	7.96660	9.16342
CONSTANT	-103.17363	-145.83252	-201.05481

Table VII. Innovator Discriminate Classification Function Coefficients.

LINKOVATOR 3

PREDICTION RESULTS -

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP GP. 1	GP. 2	GP. 3
GROUP 1 NON-INNOVATOR	31.	31. 100.0%	0. 0.0%	0. 0.0%
GROUP 2 MAJORITY	170.	15. 8.8%	149. 87.6%	6. 3.5%
GROUP 3 INNOVATOR	28.	0. 0.0%	0. 0.0%	28. 100.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 90.83%

Table VIII. Innovator Discriminant Prediction Results.

A comparison of the number of cases classified in each group by the EXPPC with the number of cases classified in each group by the discriminate function method.

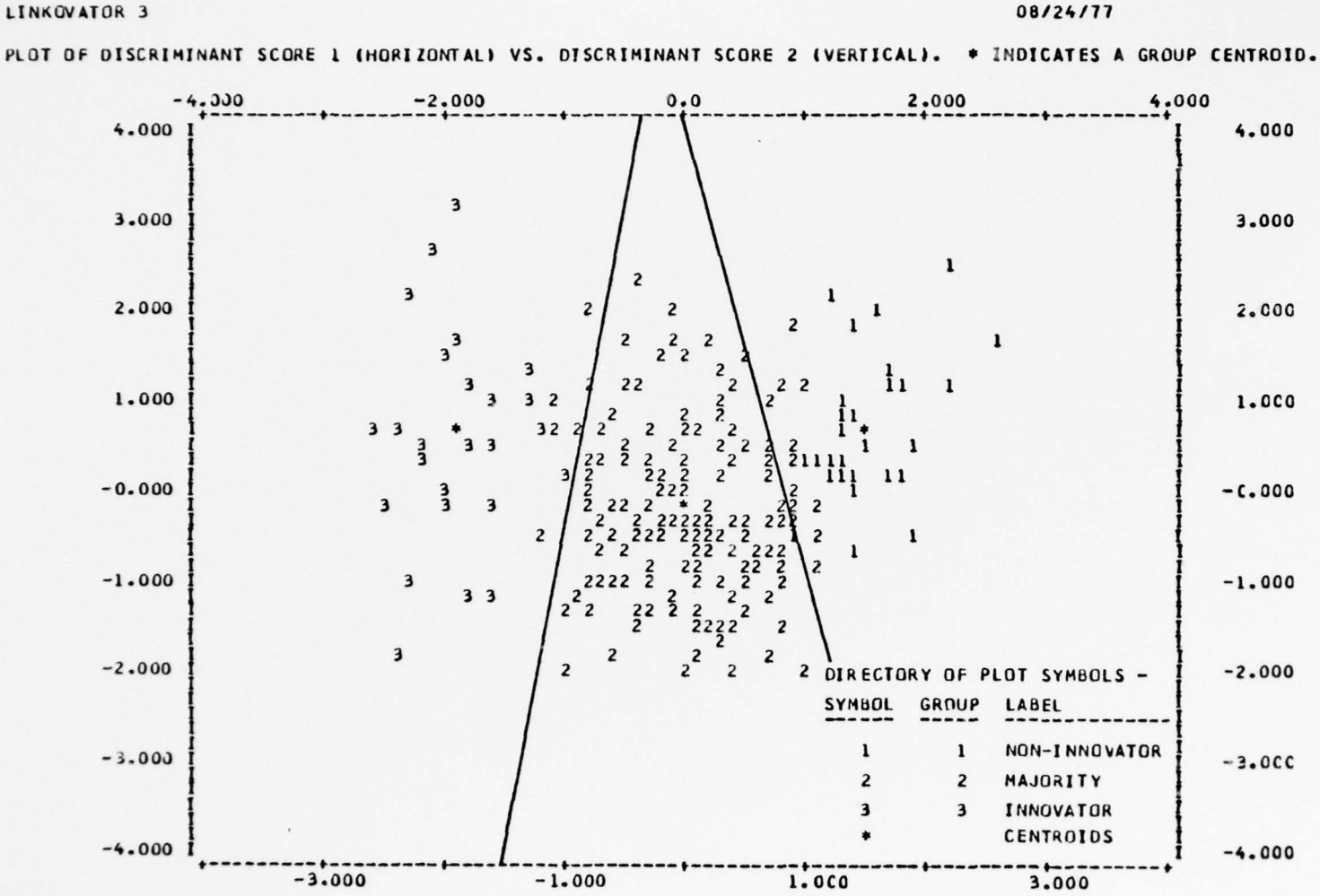


Figure 14. Normalized Innovator Discriminant Map.

This plot graphically illustrates the ability of the EXPPC to separate the three innovator trait classifications.

LINKOVATOR 3

FILE EXPPC (CREATION DATE = 08/24/77) EXPANDED PROFESSIONAL PREFERENCE CENSUS

- D I S C R I M I N A N T A N A L Y S I S -

SUMMARY TABLE

STEP NUMBER	VARIABLE ENTERED	VARIABLE REMOVED	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LAMBDA
1	Q2		35.38112	1	0.76155
2	Q16		19.86771	2	0.64725
3	Q10		16.53841	3	0.56397
4	Q17		9.87030	4	0.51810
5	Q7		11.13564	5	0.47087
6	Q13		10.22639	6	0.43098
7	Q1		8.83471	7	0.39894
8	Q19		8.29976	8	0.37083
9	Q18		7.45609	9	0.34709
10	Q15		9.04556	10	0.32038
11	Q4		5.92052	11	0.30373
12	Q20		7.83978	12	0.28308
13	Q5		5.58242	13	0.26905
14	Q9		3.48611	14	0.26052
15	Q6		4.06050	15	0.25091
16	Q3		2.14464	16	0.24591
17	Q14		2.65965	17	0.23983
18	Q21		2.98222	18	0.23318
19	Q12		1.09059	19	0.23076

Table IX. Summary of Stepwise Innovator Discriminant Analysis.

This table indicates the step in which each question was added to the analysis. The "F" statistic is indicative of the relative contribution of each question to the discriminatory ability of the EXPPC.

APPENDIX H

QUESTIONNAIRE - INTERVIEW CORRELATION

Because the interview and questionnaire used in this research project are both measures of the same traits, a one-to-one or linear relationship would have occurred between the instruments if both measuring instruments had been perfectly developed and administered. The numerical scores from the interviews were plotted against the composite trait scores from the EXPPC. The scattergram, Figure 15, shows the linker interview score plotted against the linker composite score from the EXPPC for each respondent interviewed. The scattergram, Figure 16, shows the innovator interview score plotted against the innovator composite score from the EXPPC for each respondent interviewed.

A linear regression analysis, using the least square criterion, was performed to determine the existing relationship between the traits. A measure of the "goodness-of-fit" of the data to the regression line, i.e.: the Pearson product-moment correlation coefficient was computed for both the linker and innovator traits. For the linker trait, a correlation coefficient of 0.48738 resulted. For the innovator trait, the correlation coefficient was 0.38606. These results indicated that a far from perfect relationship existed, however, the relationship did exist.

The composite innovator scores obtained from various sets of questions were compared to the interview scores for the respondents. The Pearson product-moment correlation coefficient was computed and utilized to measure the "goodness-of-fit". The set of questions which had the highest correlation coefficient was the set which agreed most closely with the interview results. The set of questions consisting of 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21 had a correlation coefficient of 0.38606 which was the highest obtained (Table X). This indicated that the questions in this set were the best at discriminating between innovators and non-innovators.

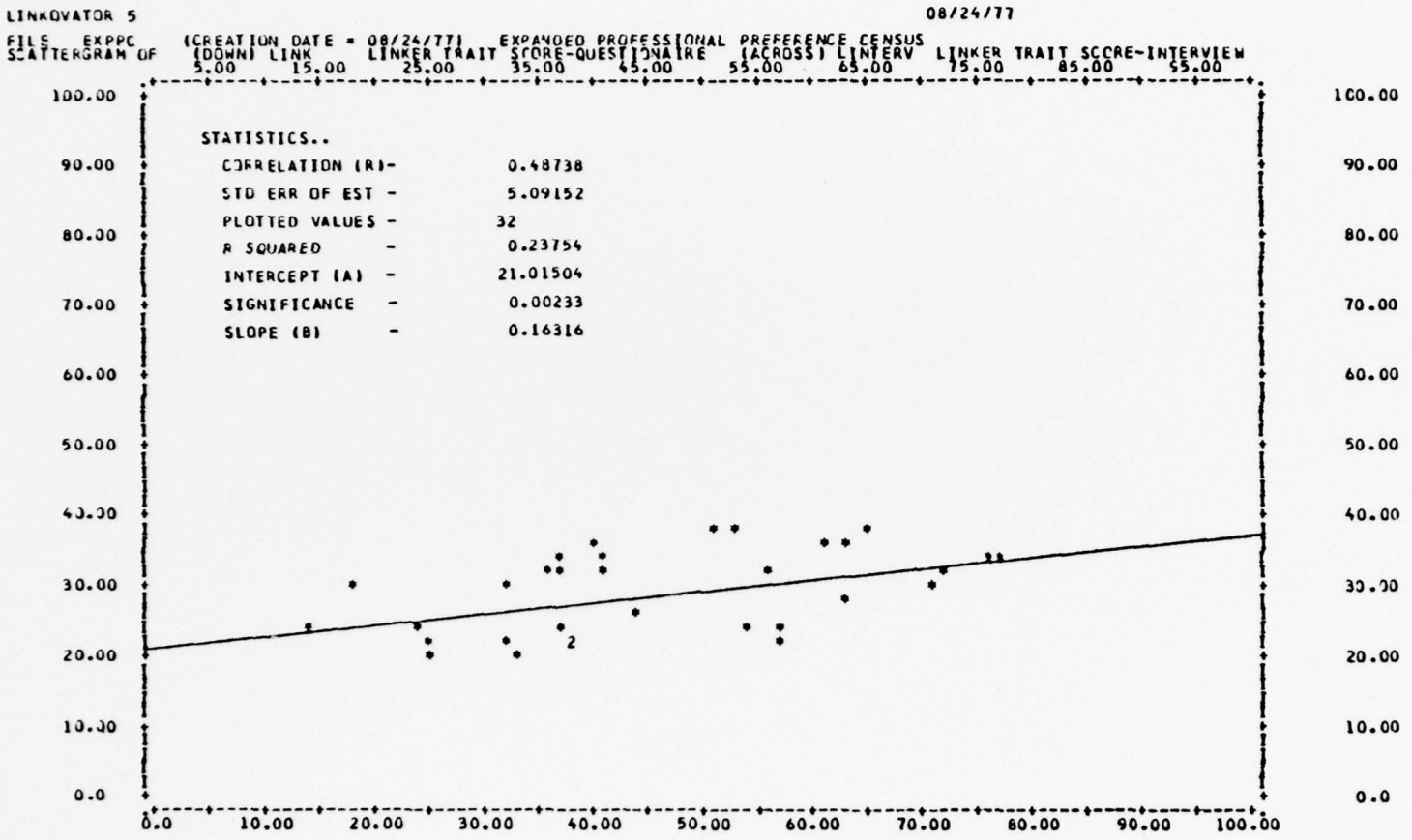


Figure 15. Scattergram Relating Linker Interview Scores to Composite Linker Trait Score from EXPPC.

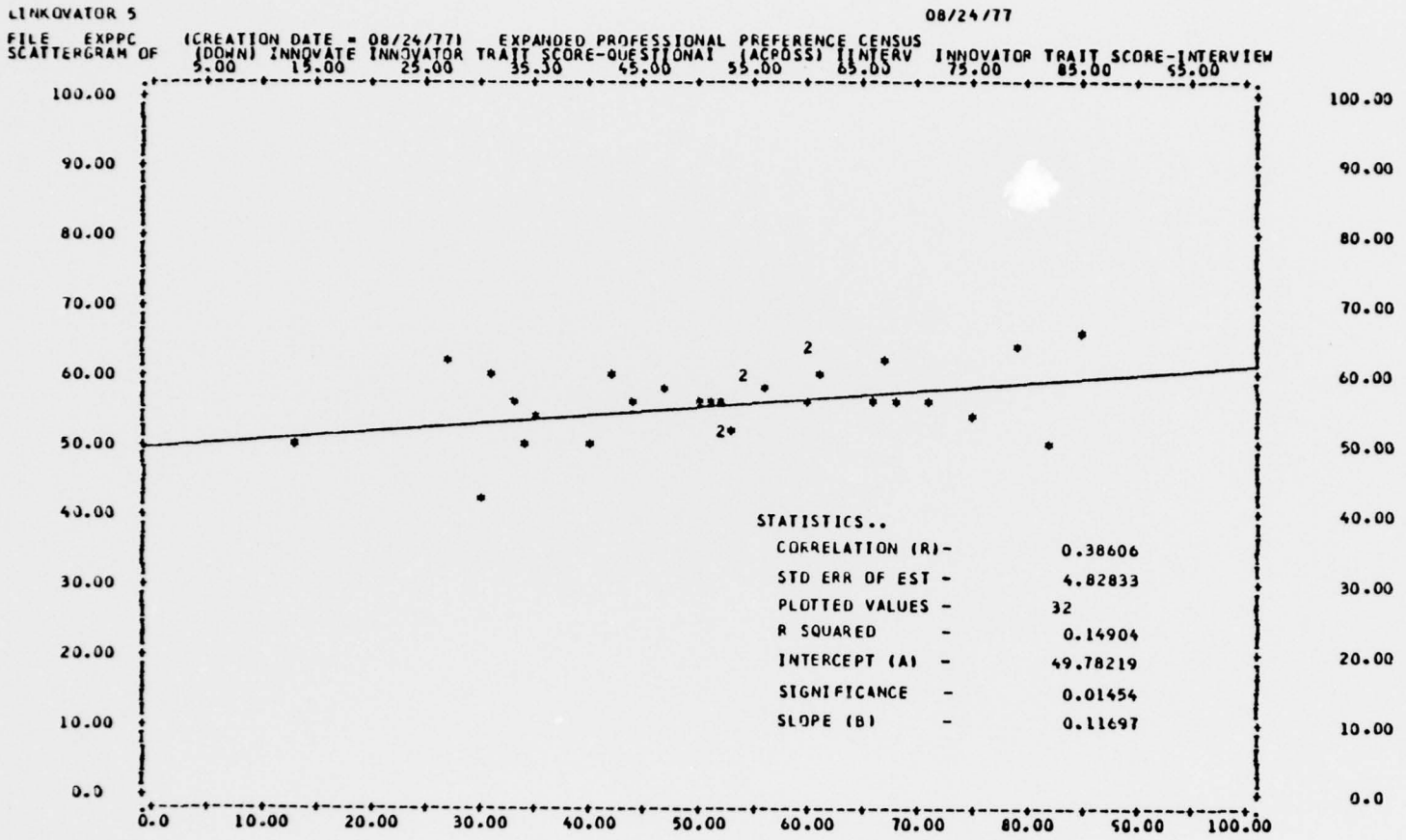


Figure 16. Scattergram Relating Innovator Interview Scores to Composite Innovator Trait Score from EXPPC.

QUESTIONS IN SET BEING COMPARED	CORRELATION COEFFICIENT
FOR LINKER TRAIT	
2, 4, 5, 8, 9, 11, 13, 15, 16, 21	0.48738
FOR INNOVATOR TRAIT	
1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.38606
1 through 21	0.37699
1, 2, 3, 4, 5, 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.36814
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.36519
1, 3, 4, 5, 6, 7, 9, 10, 12, 14, 17, 18, 19, 20, 21	0.34494
1, 3, 4, 5, 6, 7, 9, 10, 14, 17, 18, 19, 20, 21	0.33138
1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.32355
1, 2, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.32161
1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.31517
1, 2, 4, 5, 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21	0.30902
1, 3, 5, 7, 10, 14, 18, 19, 20	0.22915
1, 3, 5, 7, 10, 12, 14, 17, 18, 19, 20	0.22739

Table X. Correlation Coefficients Relating Interview Scores to Composite Trait Scores with Several Sets of Questions Used to Compute the Composite Trait Scores.

APPENDIX I

LINKER-INNOVATOR DEPENDENCY

To determine the innovator - linker relationship exhibited by the population sample with the EXPPC, two techniques were utilized. Using each case in the data base from the EXPPC, a linear regression was performed to a "least squares criteria" with the linker composite score (LR) and the innovator composite score (IR) as the variables. Figure 17 is a scattergram of the results. The resultant equation was:

$$(LR) = -8.53935 + 0.64271\ (IR)$$

To measure the "goodness-of-fit" of the data to the linear regression line, the Pearson product-moment correlation coefficient was computed to be 0.75254. A correlation coefficient this close to unity indicated a reasonably good correlation between the two variables.

As a further test on the relationship, a crosstabulation of the number of respondents in each classification in each category of each variable was arranged in a 6x6 matrix. The matrix, (Table XI) was constructed by counting on the scattergram (Figure 17) the number of respondents which fell into each of the 36 possible combinations. For example, there were 7 respondents whose composite scores placed them in the category of linker - potential innovator. At that point an assumption was made to generate the null hypothesis that the linker trait responses would be normally distributed and that the innovator trait scores would be normally distributed but that there would be no dependence between the two. The resultant expected frequency distribution for respondents in each category is shown in Table XII.

The chi-square statistic with 25 degrees of freedom at the 99.9 percent confidence level is 52.6. The chi-square value calculated using the actual frequency matrix (Table XI) and the expected fequency matrix (Table XII) was 234.48. We can be certain, therefore, at the 99.9

percent confidence level that the two traits are not independent--the innovator composite score and the linker composite score are indeed dependent variables.

	Non-Innovator	Potential Non-Innovator	Majority	Majority	Potential Innovator	Innovator	Total
Linker	0	0	0	2	7	2	11
Potential Linker	0	0	2	14	11	3	30
Majority	0	0	27	35	4	0	66
Majority	2	14	51	18	0	1	86
Potential Stabilizer	1	14	20	1	0	0	36
Stabilizer	0	0	0	0	0	0	0
Total	3	28	100	70	22	6	229

Table XI. Actual Number of Respondents in each Linker Trait and Innovator Trait Classification.

	Non- Innovator	Potential Non-Innovator	Majority	Majority	Potential Innovator	Innovator	Total
Linker	0.1	0.7	1.7	1.7	0.7	0.1	5
Potential Linker	0.7	4.2	10.6	10.6	4.2	0.7	31
Majority	1.7	10.6	26.7	26.7	10.6	1.7	78
Majority	1.7	10.6	26.7	26.7	10.6	1.7	78
Potential Stabilizer	0.7	4.2	10.6	10.6	4.2	0.7	31
Stabilizer	0.1	0.7	1.7	1.7	0.7	0.1	5
Total	5	31	78	78	31	5	228

Table XII. Expected Number of Respondents in each Linker Trait and Innovator Trait Classification Assuming A Normal Distribution of Respondents for each Trait and Independence of the Traits.

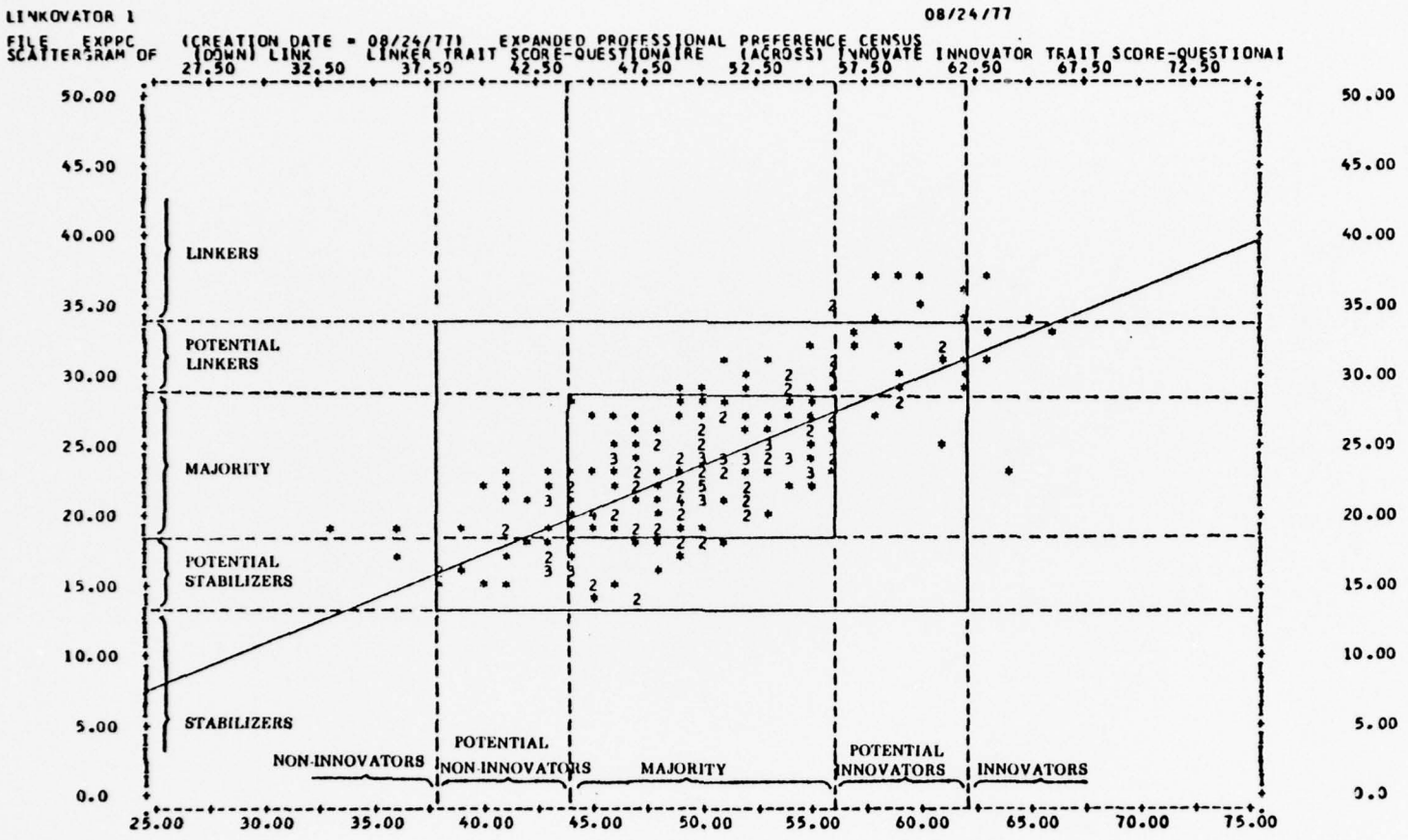


Figure 17. Scattergram Comparing the Linker Trait Score and Innovator Trait Score for each Respondent to the EXPPC.

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