REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION
UNCLASSIFIED/UNLIMITED

1b. RESTRICTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY

3. DISTRIBUTION/AVAILABILITY OF REPORT

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

4. PERFORMING ORGANIZATION REPORT NUMBER(S)
DTIC/TR-85/1

5. MONITORING ORGANIZATION REPORT NUMBER(S)

6a. NAME OF PERFORMING ORGANIZATION
Defense Technical Information Center

6b. OFFICE SYMBOL (If applicable)
DTIC-J

7a. NAME OF MONITORING ORGANIZATION

6c. ADDRESS (City, State, and ZIP Code)
Cameron Station
Alexandria, VA 22304-6145

7b. ADDRESS (City, State, and ZIP Code)

8a. NAME OF FUNDING/SPONSORING ORGANIZATION

8b. OFFICE SYMBOL (If applicable)

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
A Study of User-Defined Searching Requirements for the On-line Version of the Directory of DoD-Sponsored R&D Data Bases on the Defense Gateway Computer System.

12. PERSONAL AUTHOR(S)
G. C. Chastain

13a. TYPE OF REPORT	13b. TIME COVERED FROM ____ TO ____	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final		850300	198

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	
05	02		Interfaces, Artificial Intelligence, Man Computer Interface, Expert System, User-friendly
05	08		

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

In anticipation of the implementation of the Directory of DoD-Sponsored R&D Data Bases in an on-line version on the Defense Gateway Computer System (hereafter the Gateway), a study was undertaken to identify the searching requirements of existing and potential users. The terms "user-friendly interface," "natural language front-end processor," and "expert system" are defined. The procedure followed in conducting the study is described. Results of the study are presented along with a recommendation for an interface to be incorporated into the Gateway for searching the on-line version of the directory.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION
UNCLASSIFIED/UNLIMITED

22a. NAME OF RESPONSIBLE INDIVIDUAL
G. C. Chastain

22b. TELEPHONE (Include Area Code)
(202) 274-7661

22c. OFFICE SYMBOL
DTIC-J

DTIC/TR-85/1 AD-A 153 000

A Study of User-Defined Searching Requirements for the On-Line Version of the Directory of DoD-Sponsored R&D Data Bases on the Defense Gateway Computer System

March 1985

Office of Information Systems and Technology
Defense Technical Information Center
Cameron Station, Alexandria, VA 22304-6145

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

ABSTRACT

In anticipation of the implementation of the Directory of DoD-Sponsored R&D Data Bases in an on-line version on the Defense Gateway Computer System (hereafter the Gateway), a study was undertaken to identify the searching requirements of existing and potential users. The terms "user-friendly interface," "natural language front-end processor," and "expert system" are defined. The procedure followed in conducting the study is described. Results of the study are presented along with a recommendation for an interface to be incorporated into the Gateway for searching the on-line version of the directory.

INTRODUCTION

As technology advances and systems and methods of information retrieval become more and more complex, there arises a greater need to simplify the searching of data bases so that the users of the information can do their own searching. An interface can be described as "a hardware/software layer that can be interposed between users and a database system"[1] to simplify the process of searching the data base or data bases. Its purpose is to act as an intermediary to assist users in accessing and searching heterogenous retrieval systems.

As the Defense Technical Information Center (DTIC) develops new means to access heterogenous data bases (the Defense Gateway Computer System), the need for an interface also becomes apparent.

The Defense Gateway Computer System (hereafter the Gateway), now in test phase, is being developed to provide on-line access to data bases of interest to the DoD RDT&E community. At the time this paper is being written, the Gateway can access the Defense RDT&E On-line System (DROLS), NASA/RECON, DOE/RECON, DIALOG and other data bases. The Directory of DoD-Sponsored R&D Data Bases (hereafter the directory) will be made available for searching on the Gateway, as will some of the data bases described in the directory. The directory, in on-line version, will be called the Data Base of Data Bases. The abstract from DD Form 1473 describes the directory as follows.

> The Directory of DoD R&D Data Bases is a listing of DoD's R&D data bases. Each entry contains information such as the data base name, dates of coverage, points of contact, hardware/software configuration, and a description of the data base. Agency, data base, and subject indices are provided. The subject coverage includes meteorology, weapon systems, hazardous materials, medicine, oceanography, antennas, survivability, reliability, and chemistry.[2]

PURPOSE OF STUDY

In anticipation of the implementation of the directory in an on-line version on the Gateway, the purpose of this study will be to identify the searching requirements of existing and potential users of the directory. These requirements will suggest specifications for an interface to be incorporated into the Gateway system for searching the Data Base of Data Bases.

BACKGROUND

Interfaces have been developed to make searching of data bases easier for the user of the system. Several kinds of searching obstacles may be overcome by the addition of an appropriate and useful interface, for example, choosing the correct data base, connecting to a communication network, connecting and logging on to a data base, communicating with the data base in its native language and understanding the replies from the data base. If information is sought from more than one data base, an important function of an interface identified by Lancaster and Smith is "to shield users from the incompatibilities that exist among various systems and data bases."[3]

In his 1978 article, Charles Goldstein noted that "different user classes are identified (professional intermediary searchers, casual infrequent users, etc.) but different classes of users are not, by and large, reflected in the actual user interface."[4] The users of a data base may be members of a heterogenous population with a variety of searching needs. It is important, when developing an interface, to keep these searching needs in mind. An interface should not be developed which is more sophisticated than the potential user population requires. For those reasons the interface which will be developed to search the on-line version of the directory - the Data Base of Data Bases - on the Gateway should include features which have been identified as necessary by the potential users of the Data Base of Data Bases. This study will report the results obtained from actually contacting a sample group of these users.

The results of this study will suggest what type of interface will be most effective for the Data Base of Data Bases on the Gateway, and what features it

should include. These features will be compared to features of four existing interfaces: CONIT (Conversion for Network Information Transfer), a user-friendly interface for searching commercial on-line bibliographic data bases developed by Dr. Richard Marcus at the Massachusetts Institute of Technology; ASSIST, a more sophisticated version of CONIT, which includes some expert system features, also developed by Dr. Marcus; FRED (a FRont End for Data Bases), a natural language front-end processor developed by Dr. Gabriel Jakobson at GTE; and CITE (Current Information Transfer in English), a natural language front-end processor with some expert system capabilities developed to search the MEDLINE data base by Dr. Tamas Doszkocs at the National Library of Medicine.

A number of articles have been written that describe these four interfaces in considerably greater detail. For example, Marcus[5] describes the philosophy, design, and implementation of his experimental interface called CONIT, and evaluates[6] the concept and its effectiveness. Crystal and Jakobson's article[7] defines the concept and functions of FRED, the interface they developed at GTE. A natural language interface to MEDLINE, called CITE by its developers, is described in detail by Doszkocs and Rapp[8]. Marcus[9] describes EXPERT, an earlier version of ASSIST, as a computer intermediary system which simulates an expert human information specialist.

Artificial intelligence has been proposed as a possibility for making on-line systems available to a wider range of people. Smith[10] presented this idea as early as 1980. Other authors who suggest expert systems that can be used as on-line search intermediaries are DeJong[11], Obermeier and Cooper[12], Pollitt[13], and Walker and Janes[14]. Yaghmai and Maxin[15] present a state-of-the-art overview of expert systems, how they work and their uses in the library/information science field.

DEFINITIONS

Before a detailed description of this study can begin, a few terms must be defined and some features must be described. The terms to be defined are: user-friendly interface, natural language front-end processor, and expert system.

User-friendly interface - While there is no consensus in the field, for the purposes of this study a "user-friendly interface" is defined as one which makes a data base easy to use by any user. A user-friendly interface includes features which allow a system to be used by a heterogenous user population. For example a user-friendly interface may include a common command language, a series of menus from which to choose actions, or a help feature in which the system will explain in greater detail a segment of the search process if asked.

An example of a user-friendly interface is CONIT, developed by Dr. Richard Marcus at MIT. CONIT incorporates a common command language for searching different commercial on-line bibliographic data bases which normally have different languages and protocols. CONIT also provides extensive instructional dialogue for the inexperienced searcher.

Natural language front-end processor - A natural language front-end processor is a type of interface that can be inserted into a data base system between the data base and the user. It can accept natural English language queries, compensate for spelling errors, unknown words and partial sentences, and respond with natural English language output.

An example is FRED, a natural language front-end processor developed by Dr. Gabriel Jakobson at GTE. "User queries and commands are routed to FRED which sets up appropriate data base connections and makes necessary language translations so that different data bases all have uniform appearance to the user."[16] FRED accepts English language queries and compensates for any input errors.

A natural language front-end processor may also include a knowledge base containing the content and vocabulary of the specific subject area it was designed to interpret. Thus, it could "understand" the context of a query. An example of such an interface is CITE, a natural language front-end processor developed for searching the MEDLINE data base by Dr. Tamas Doszkocs at the National Library of Medicine. CITE is based on the Medical Subject Headings (MeSH) vocabulary, which is a controlled hierarchical vocabulary. A linkage capability exists from the text words in a query to appropriate MeSH headings, thus allowing English language query input. Other features of CITE include ranked output, which is the display of retrieved documents in order by degree of satisfaction of the user query, and relevance feedback, which is the provision of the text words and MeSH headings under which the documents were indexed.[17]

Expert system - An expert system is an application of artificial intelligence that can be used to solve problems that would otherwise require human intervention to apply reasoning and experience. An expert system for information retrieval would have some knowledge of the task domain--on-line searching of data bases--and would perform the reasoning processes of a specialist in the task.

An expert system consists of a data base, a rule base and a rule interpreter.

1. The data base is a term for the working memory where factual information is stored.
2. The rule base or knowledge base is a file of judgemental rules applicable to a specified set of problems; the rules are obtained from human experts. These rules are also known as heuristics.
3. The rule interpreter or inference engine applies the rules in the rule base to the facts stored in the data base.[18]

The single most important feature that characterizes an expert system is its ability to make decisions and reveal the logic it followed in making those decisions. Thus, an expert system could provide answers to a query in an on-line bibliographic data base by giving "detailed information on documents, including why they were retrieved."[19] Such "relevancy judgments" can also aid in refining search strategy by "finding new good search terms or emphasizing the importance of terms already in use."[20]

In order to design an expert system for on-line searching, it would be necessary not only to identify what a human expert searcher needs to know to be an expert searcher, but also to apply this expertise. Since no one has yet been successful in passing this expertise on to a machine, no expert system for on-line searching of data bases exists. But a few interfaces now in development do possess some expert system features.

For example, CITE will rank retrieved records according to their relevancy, and it will suggest related terms so that a search can be expanded to find other items that contain terminology similar to the selected citations. ASSIST, a more sophisticated version of CONIT also developed by Dr. Marcus, includes some features of an expert system. ASSIST questions the user to refine and reformulate a search strategy, and it displays the process it followed to obtain the search results.

METHODOLOGY

The plan for this study was to contact a sample group of people who were familiar with the directory to ask them how they used the print directory, and try to determine their searching requirements for an on-line version of the directory.

A questionnaire was used to gather this information. This instrument was chosen to define and standardize the information that would be gathered. This standardization served to increase reliability and facilitate analysis of the results. It was decided that telephone interviews would be used to gather participant responses rather than mailing out the questionnaires, because the results needed to be gathered within a limited time frame. The advantages of the telephone interview are rapid completion with a high response rate.

Due to the length and complexity of the questionnaire and the short time frame in which the study was to be completed, it was decided that a copy of the questionnaire would be sent to each participant on the list along with a memo explaining the purpose of the study. The participants were then contacted by telephone with the questionnaire serving as a script. This method of direct contact allowed for a standardized questioning of each participant. The participants had the opportunity to be prepared ahead of time and had time to think about their answers. If the participants had any questions, they could easily be answered by the interviewer.

PROCEDURE

SELECTION OF POTENTIAL PARTICIPANTS

A list of potential study participants was compiled. This list appears in Appendix B. The list was compiled in the following way.

A total of 39 people were invited to participate in the study. Twelve people who are presently Gateway users were chosen because of their familiarity with the Gateway. They were contacted and a copy of the directory was sent to them if they did not yet have a copy. Eight individuals from organizations with listings in the directory were chosen because the contact person was known to have an interest in the Gateway. They had been sent copies of the directory as a result of being listed in it. Ten individuals from organizations which participate in the Shared Bibliographic Input Network (SBIN) were chosen because of a demonstrated interest in new technologies. The contact persons of these ten organizations were also on a list of those who had requested and been sent a copy of the directory. Finally nine individuals from miscellaneous organizations were chosen to question because the contact person was known to have an interest in the Gateway and/or the directory. These individuals were also on the list as having requested and received a copy of the directory.

PROCEDURE

CONSTRUCTION OF THE QUESTIONNAIRE

The questionnaire was compiled by a committee consisting of the author, and committee members, Carol Jacobson, Marjorie Powell, Marcia Hanna, and Gladys Cotter. The final version of the questionnaire which was used in this study appears in Appendix A.

Questions number 1-7 were designed to inform the prospective participant of the purpose of the telephone call and to determine if and when the person was willing to participate.

Question number 8 is self-explanatory. Question number 9 served to differentiate those participants who were librarians and probably did on-line searching of data bases for other people. Questions number 10-12 were answered only by this group. Those participants who answered No to question number 9 were assumed to be end users who probably did on-line searching of data bases for their own purposes, or did not do any on-line searching at all. Questions number 13-17 were answered only by this group.

Question number 18 identified those participants who presently used the directory; question number 20 identified those participants who would be using the directory in the future. The description of the directory in question number 18 was quoted directly from the abstract of the DD Form 1473 for the directory.

Question number 19 identified the indices most consulted by the present users of the directory.

Question number 21 indicated whether participants felt they would still need the directory in hard-copy if it were available on-line.

Question number 22 provided the number of people who would be using the on-line version of the directory when it became available.

The information in the description of the Gateway was taken from the Research and Development Project Summaries, October, 1984, issued by the Defense Technical Information Center, Office of Information Systems and Technology.

Question number 23-24 identified those who would be doing the actual searching of the on-line version of the directory.

Question number 25 was directional. Question number 26 was designed to ascertain whether a substantial number of end users might do their own searching of the on-line version of the directory if it was easy to use.

Question number 27 indicated how participants were likely to use the on-line version of the directory and what kinds of information they would be using the directory for. The fields in the directory in questions number 27 and 30(b) were quoted from the Guide to Data Base Entries (page v) in the directory. Any additional fields not included in the present version of the directory which participants felt would be useful were identified by questions number 28 and 29.

Question number 30 identified the fields which participants felt they did not need to see displayed. Any additional fields not included in the present version of the directory which participants felt they would like to see displayed were identified by questions number 31 and 32.

The list of features (questions number 33-60) which could be included in the on-line version of the directory was gathered from articles describing ASSIST, CITE, CONIT and FRED. Other features which the committee felt would be useful in an interface for the directory were added to the list drawn from the journal articles.

Additional searching requirements not mentioned in questions number 33-60 which the participants felt they would need for searching an on-line version of the directory were identified by questions number 61 and 62.

The questionnaire was designed to gather more information than was necessary for this study. Although all the results are presented in this report, only the results to questions number 34-60 are analyzed in order to make a recommendation. The purpose of this study was to define user searching requirements for the Directory of DoD-Sponsored R&D Data Bases, however, some of the data bases described in the directory will also be available on-line eventually, and accessible through the Gateway. An interface will then be necessary for cross-searching these data bases. At that point, information on searching requirements would again have to be gathered, probably from the same sample group of participants. The additional information gathered in this study and presented but not analyzed in this report will be used at a later date.

A draft version of the questionnaire was pretested on 3-4 January 1985 with two DTIC employees under conditions similar to those in which the study would be conducted. Suggestions for changes were made by the respondents and these changes were incorporated by the author into the final version of the questionnaire. Copies of the questionnaire were mailed to participants on 7 January 1985. The telephone interviews were begun on 11 January 1985 and concluded on 25 January 1985.

PROBLEMS ENCOUNTERED

Some problems encountered with specific questions in the questionnaire are as follows.

Question number 8, "Approximate number of people in organization", was meant to indicate, in the case of librarians, the number of people working in their library. Unfortunately some participants misunderstood, and answered question number 8 with the number of people in their building, organization, base, etc. The data collection was partially completed before this misunderstanding was realized, so the responses for this question are not included in the results.

Question number 31 repeats question number 28. In order to fit into the questionnaire better, question number 31 should read, "Are there any additional fields which you would like to display in the on-line version?"

Question number 33 caused some confusion. Some of the participants thought that the interface which could include the features indicated would be used to search only the on-line version of the directory. The paragraph in the questionnaire describing the Gateway (between questions number 22 and 23) states that "Some of the data bases described in the directory will be accessible through the Gateway." Question number 33 should probably have said something to the effect that the features would be included in an interface that would be used to search the data bases on the Gateway as well as the directory. The confusion, when it occurred, was noticed and corrected before the questionnaire was completed; it is not likely that the results were affected.

RESULTS

Of the 39 people asked to participate in this study, 32 (82%) completed the questionnaire (see Appendix A). From this group, 23 people (71.8%) identified themselves as a member or supervisor of the library staff in question number 9.

Results of questions number 9-12 pertaining to this group of participants are shown in Tables 1-3.

The responses to question number 10 are shown in Table 1. The number of individuals doing on-line searching of data bases is divided into categories (i.e., 1-3, 4-6). The number of responses is recorded under these categories.

TABLE 1

INDIVIDUALS DOING ON-LINE SEARCHING OF DATA BASES

Number of individuals	1-3	4-6	7-9	over 9
Number of responses	8	10	4	1

The responses to question number 11 are shown in Table 2. The most frequently searched data bases are listed in the left column. The number of participants searching these data bases is recorded in the column under Responses. The percentage of the total group (23 people) indicating that they searched that particular data base is included in the right column.

TABLE 2

DATA BASES SEARCHED MOST FREQUENTLY

Data Bases	Responses	%
DROLS	23	100%
DIALOG	17	74%
OCLC	12	52%
BRS	10	43.4%
NASA/RECON	8	34.8%
ORBIT	7	30%

NOTE. -- Other data bases searched included: in-house data bases, intelligence data bases, Chemical Abstracts, DoE/RECON, International Data Bases, NEXIS, FAXON, and MEDLINE.

The responses to question number 12 are shown in Table 3. The hardware available to the participants of this group are listed in the left column. The number of No responses is listed in the next column. The number of Yes responses to question number 12 is divided into categories by how many of each type of hardware was available to the participant.

TABLE 3

HARDWARE USED

	No	Yes			
		1	2	3	over 3
Dedicated terminals	3	9	5	3	3
Dial-up terminals	2	11	4	1	4
Communicating microcomputers	16	4	1	0	3
Dedicated microcomputers	20	1	0	0	2

Of the 32 people who completed the questionnaire, 9 (28%) responded with a No to question number 9, and were thus directed to question number 13. Results of questions number 13-17 pertaining to this group of participants only are shown in Tables 4-5.

The responses to question number 13 are shown in Table 4. Participants described their work by more than one of the terms in most cases.

TABLE 4

END USER OCCUPATION

	No. Responses
Planner	6
Marketer	3
Scientist or Engineer	5

Note. -- Other occupations included: operations manager, program manager, economist, management, programmer, consultant, technical information specialist.

In response to question number 14, seven menbers of this sample group of nine (77.7%) did their own on-line searching.

In response to question number 15, four participants searched DTIC's on-line data bases; two participants searched DIALOG. Other data bases searched included: LEXIS/NEXIS, BRS, CIRC, Defense Manpower Data Center, Defense Resources, Inc., NASA/RECON, Aerospace Daily, Dow Jones, robotics data bases, management data bases, standards data bases, and directives data bases.

The responses to question number 16 are shown in Table 5. The hardware available to the participants of this group are listed in the left column.

The number of No responses are listed in the next column. The number of Yes responses to question number 16 are divided into categories by how many of each type of hardware was available to the participant.

TABLE 5

HARDWARE USED

	No	Yes			
		1	2	3	over 3
Dedicated terminals	5	3	0	0	0
Dial-up terminals	4	12	0	1	1
Communicating microcomputers	3	3	0	1	1
Dedicated microcomputers	6	1	0	0	1

No responses to question number 17 were recorded.

The responses to questions number 18-62 presented here reflect the group of participants as a whole (32 people).

In response to question number 18, 13 participants (40.6%) stated that they presently used the directory.

For those who used the directory, in response to question number 19, indices used are shown in Table 6. Participants indicated that they used more than one index in most cases. The indices are listed in the left column. The number of participants using each index is recorded in the column under Responses. The percentage of the total group (13 people) indicating that they used that particular index is included in the right column.

TABLE 6

INDICES USED

	Responses	%
Data Base Index	12	92.3%
Organization Index	11	84.6%
Subject Index	13	100%

In response to question number 20, all 32 participants expected to use the directory in the future.

In response to question number 21, 25 participants (78%) replied that they would still need the hard copy version of the directory if it were available on-line.

In response to question number 22, 30 participants (93.7%) replied that their organization would use the directory if it were available on-line and accessible through dial-up terminals.

In response to question number 23, 28 participants (87.5%) replied that they would be the ones searching the directory on-line on the Gateway. Of the group of participants who replied No to question number 23, three participants would want someone to search the directory for them. One participant replied that he would rather use the directory in paper form, but would use the Gateway to search the data bases themselves if they were available on-line.

Those participants who identified themselves as members or supervisors of a library staff (see question number 9) were asked to respond to question number 26. Twelve participants (50%) replied that they thought their library users and/or researchers would use the on-line version of the directory if it

were easy to search. Ten participants (41.6%) replied No to question number 26, and two participants (8.3%) replied that they were not sure. Those participants who replied that their library users and/or researchers would not do their own searching of the directory gave the following reasons:

-Their library was not set up to handle end-user searching.

-The library could afford only a limited number of terminals and there were not enough for the public.

-They believed that their library users/researchers would rather have someone else do their searches.

The responses to question number 27 are shown in Table 7. One participant chose not to respond to question number 27. Fields in the directory are listed in the left column. The number of participants who indicated that they would not search a particular field is recorded in the middle column next to the field along with the percentage of the total group responding (31 people). The number of participants who indicated that they would search a particular field is recorded in the column to the right of the field along with the percentage of the total group responding (31 people).

TABLE 7

FIELDS IN THE DIRECTORY MOST LIKELY TO BE SEARCHED

	No	%	Yes	%
Data Base Name	4	13%	27	87%
Acronym	3	9.7%	28	90%
Update frequency	15	48%	16	51.6%
Beginning date	16	51.6%	15	48%
Ending date	14	45%	17	54.8%
Size	18	58%	13	41.9%
Data Base Producer Name	4	13%	27	87%

TABLE 7--Continued

	No	%	Yes	%
Data Base Producer Address	18	58%	13	41.9%
Data Base Producer Contact	11	35.5%	20	64.5%
Data Base Distributor Name	11	35.5%	20	64.5%
Data Base Distributor Address	22	71%	9	29%
Data Base Distributor Contact	16	51.6%	15	48%
Data Base Generator Name	11	35.5%	20	64.5%
Data Base Generator Address	24	77.4%	7	22.5%
Data Base Generator Contact	19	61.2%	12	38.7%
Availability	9	29%	22	80%
Descriptors	0	-	31	100%
Data Base Type	9	29%	22	80%
Code Character Set	23	74%	8	25.8%
Density	28	90%	3	9.7%
Number of Tracks	28	90%	3	9.7%
Labeled	28	90%	3	9.7%
Programming language	20	64.5%	11	35.5%
Computer	19	61.2%	12	38.7%
Storage Media	23	74%	8	25.8%
Input Media	24	77.4%	7	22.5%
Output Media	21	67.7%	10	32.2%
Documentation	19	61.2%	12	38.7%
Classification Restrictions	7	22.5%	24	77.4%
Abstract	0	-	31	100%

In response to question number 28, six participants indicated that there are additional fields they would like to see included in the on-line version. These fields included:

-A sampling of the data.

-Other users of the data base.

-Cost to purchase or search the data base.

-Availability of the data base for purchase or lease.

-Operating system used in the data base.

-Software used in the data base.

-Inclusion of foreign source material, and from which countries.

In response to question number 30(a), ten participants (32.2%) replied that there are fields in the directory that they would not want to display. The responses to question number 30(b) are shown in Table 8. The fields that these participants did not want to display are listed in the left column. Participants indicated more than one field that they did not want to display in most cases. The number of responses for each field is recorded on the right under Responses.

TABLE 8

FIELDS PARTICIPANTS DID NOT WANT TO DISPLAY

Field	Responses
Density	8
No. of Tracks	8
Labeled	8
Code Character Set	7
Programming Language	6
Computer	6
Storage Media	6
Input Media	6
Output Media	6
Documentation	3
Data Base Type	2
Data Base Dist. Address	2
Data Base Dist. Contact	2
Data Base Prod. Address	1
Data Base Prod. Contact	1
Data Base Dist. Name	1
Data Base Gener. Name	1
Data Base Gener. Address	1
Data Base Gener. Contact	1

In response to question number 31, four participants indicated that there are additional fields they would like to display. These fields included:

-More descriptors.

-Working paragraph on purpose of data base.

-Operating systems used in the data base.

-Software used in the data base.

-Cost.

-Availability of the data base for purchase or lease.

-Descriptor terms other than DRIT terms if the vocabulary used is controlled.

One participant commented that he would like a choice of fields that can be displayed each time the directory is searched.

The responses to questions number 34-60 are shown in the form of stacked bar graphs on the pages that follow (Figures 1-27). For each graph, the Y axis represents the number of responses for that feature. The X axis represents each option in the scale on which participants were asked to rank the features. On the scale of 1 through 5, a 1 meant the feature was not useful, a 2 meant the feature was somewhat useful, a 3 meant the feature was neither not useful nor essential, in other words, the participant was indifferent, a 4 meant the feature was very useful, and a 5 meant the feature was essential. Intermediary responses are represented by the cross-hatched area; end user responses are represented by the clear area on each bar graph.[21]

Histograms generated by the SPSS Batch System illustrating responses to questions number 34-60 are included in Appendix C. Cross-tabulations generated by the SPSS Batch System for these questions are included in Appendix D.

In response to question number 61, eight participants indicated that they had additional requirements which they would like to see included in the on-line version of the directory. These requirements were:

-A menu of help features.

-An on-line tutor.

-The ability to reformat the order in which items in the record are displayed.

-Color graphics.

-Sort procedures.

-A limiting feature.

-The option to display, order or print off-line.

-Selective dissemination of information.

-Full-text capabilities.

-Ability to access the directory on a dedicated rather than a dial-up terminal.

-A cost statement at the end of each file searched.

-Classified access.

Figure 1. Participants' ranking on a scale of 1-5 of the feature "Minimum Amount of Keyboarding" in answer to question number 34 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them.

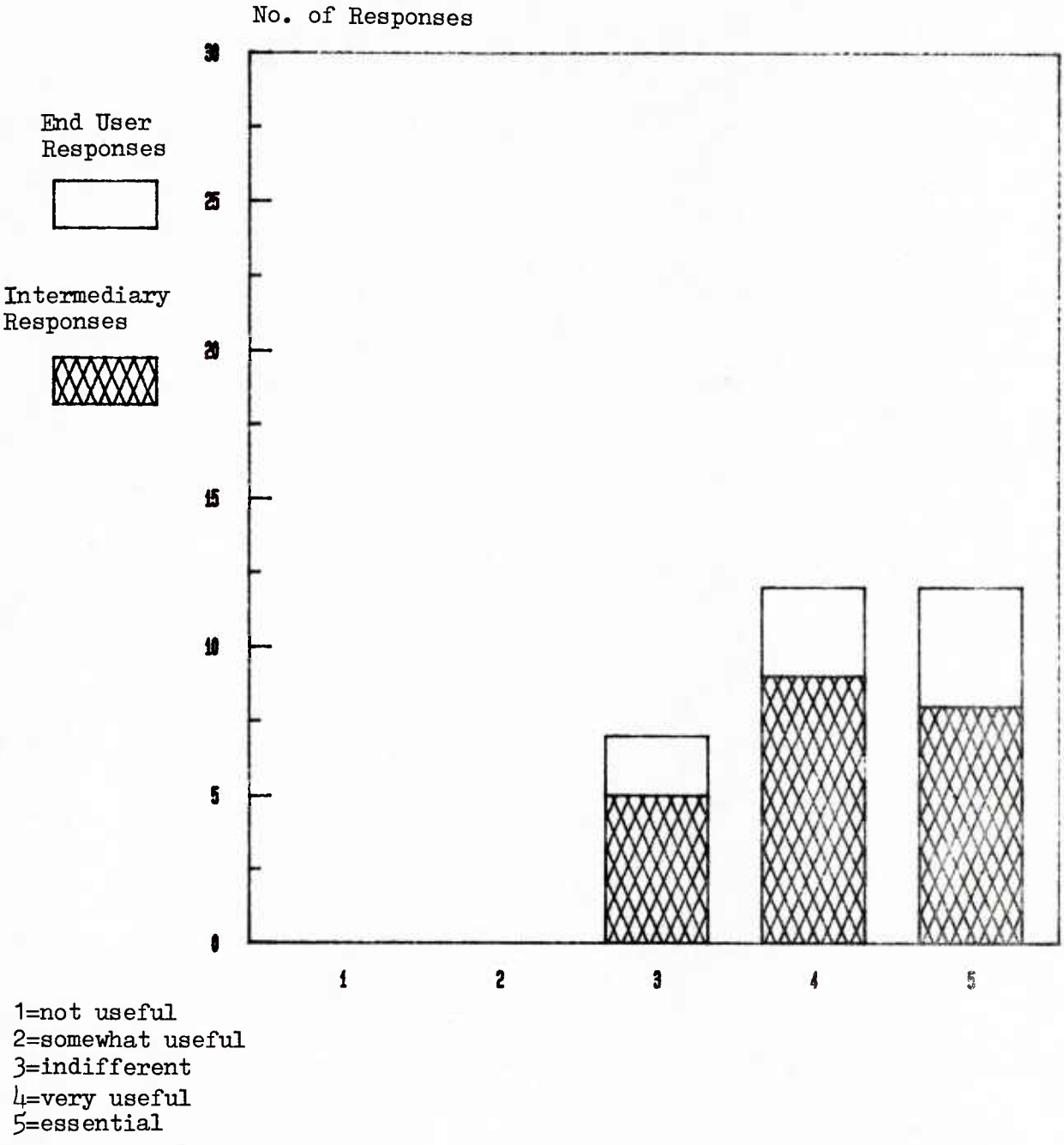
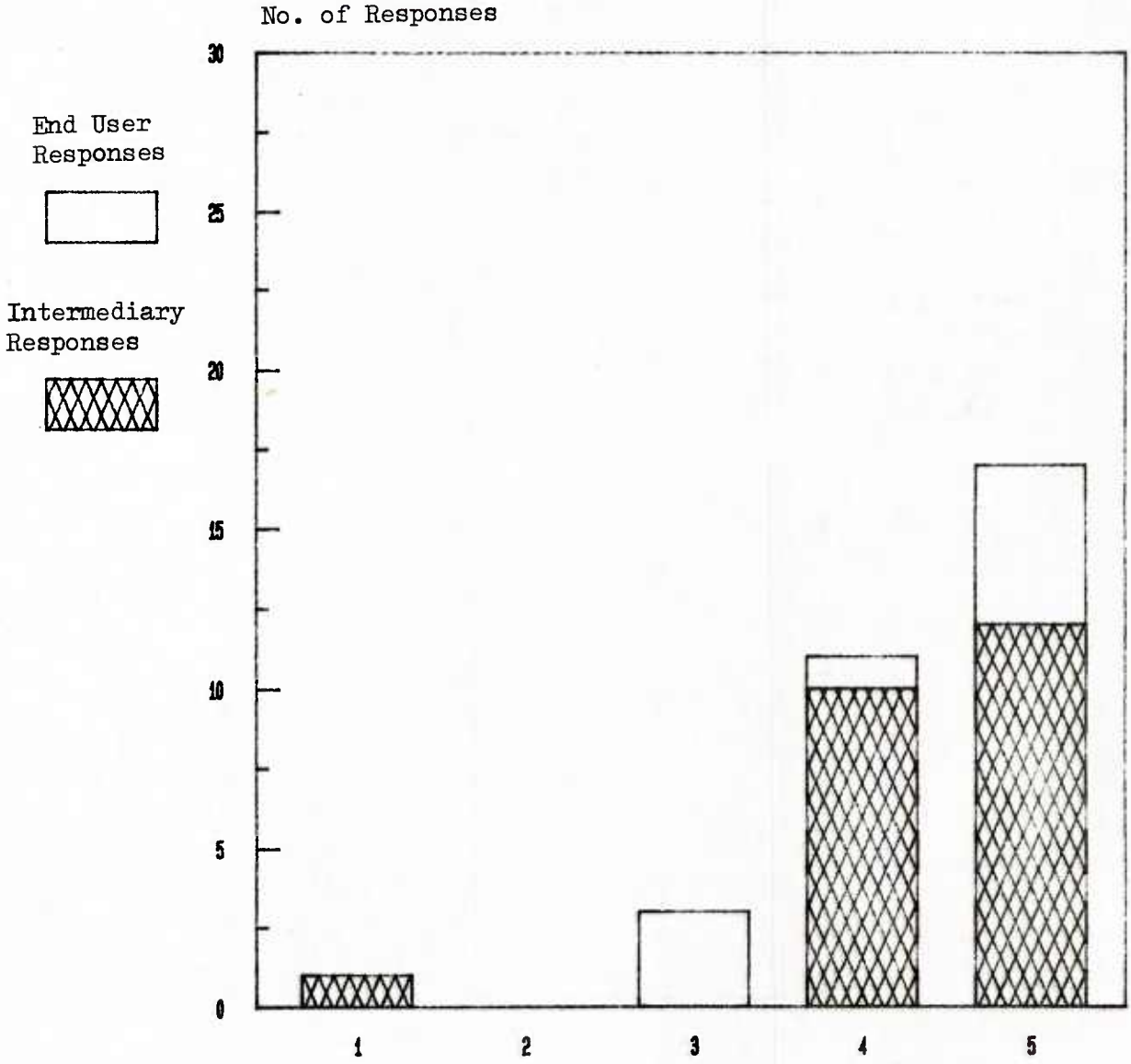
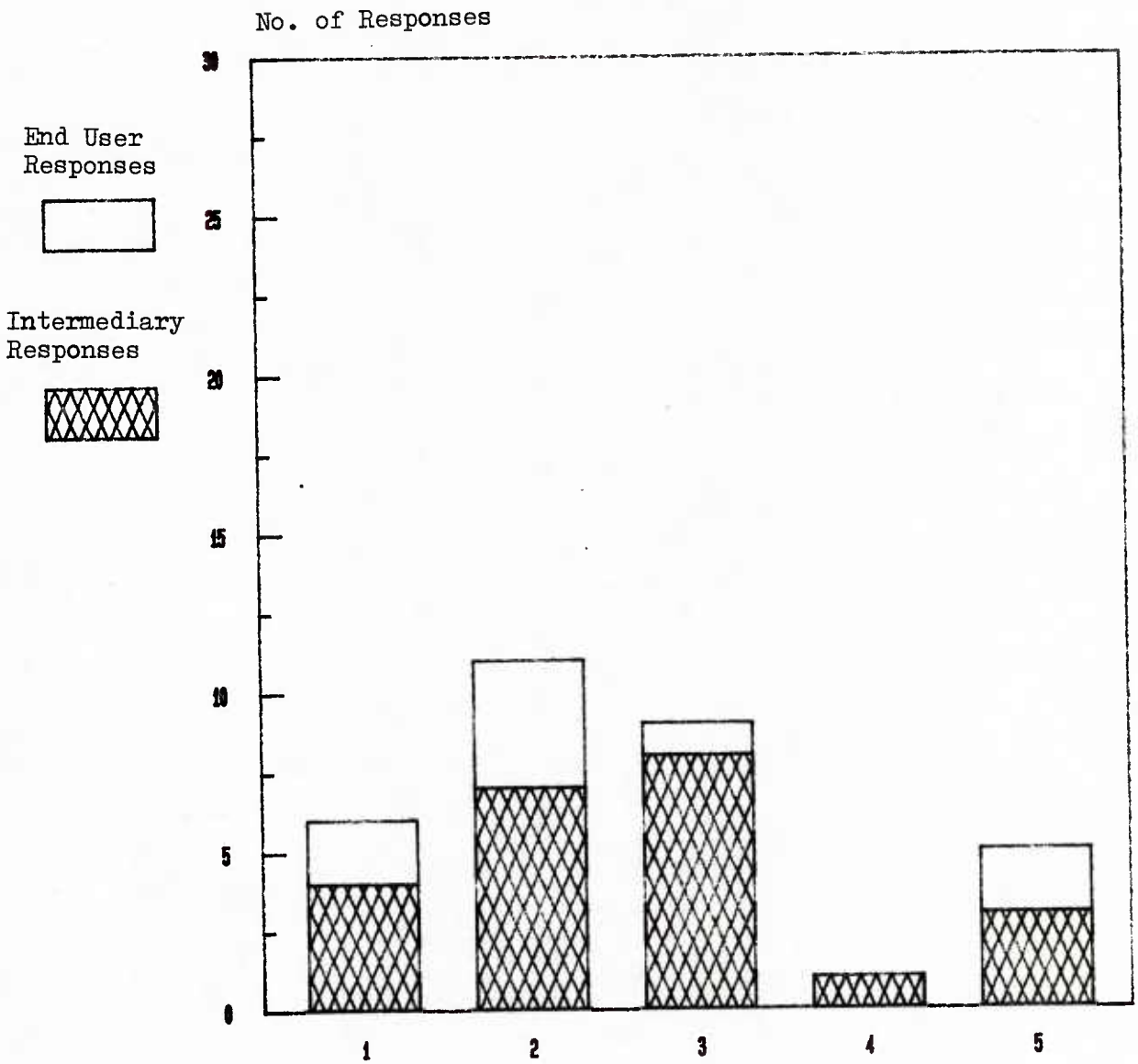


Figure 2. Participants' ranking on a scale of 1-5 of the feature "Choice Between Commands or Menus" in answer to question number 35 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them, except for a few end users who were indifferent, and one intermediary who ranked this feature as not useful.



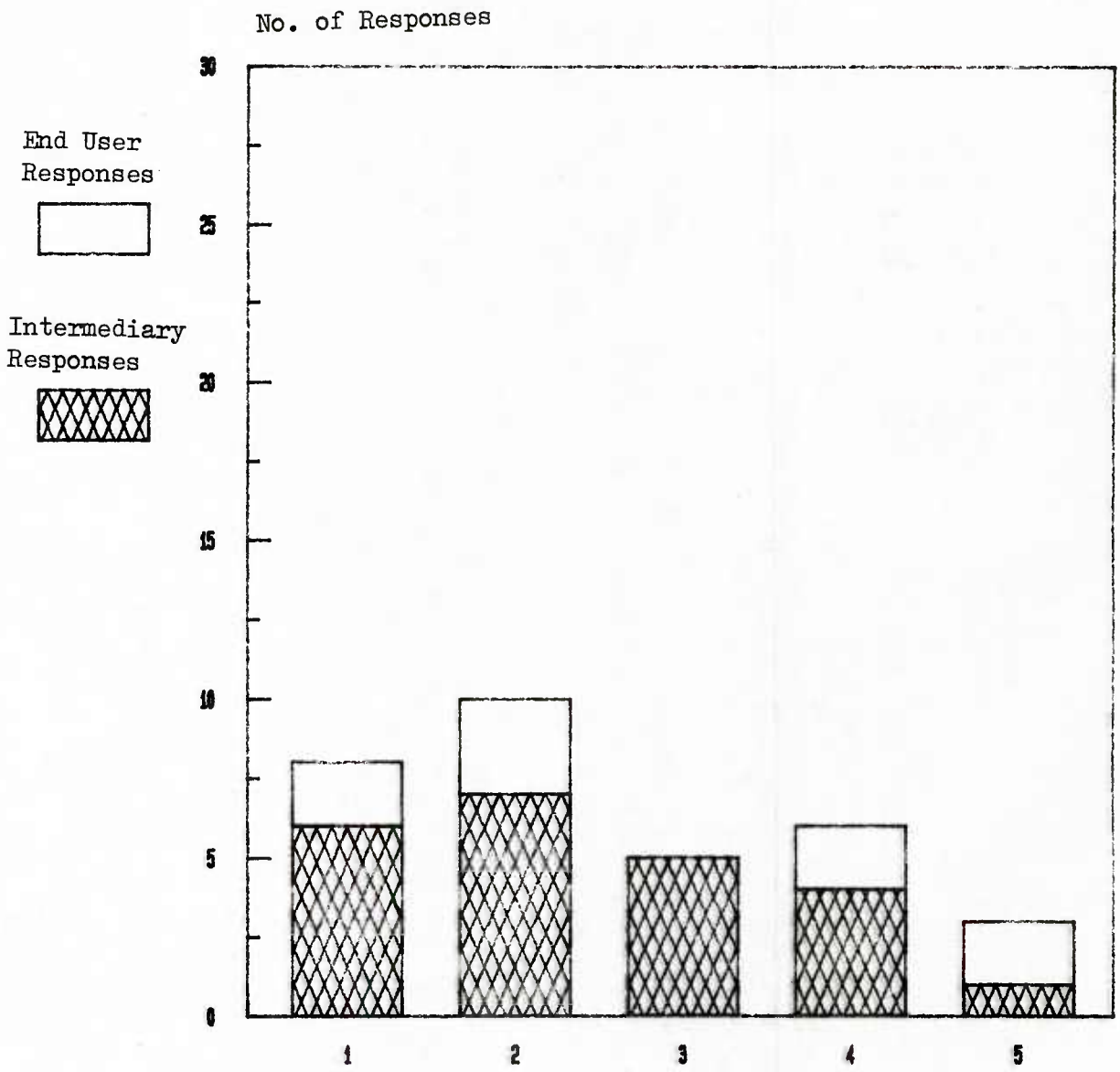
1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 3. Participants' ranking on a scale of 1-5 of the feature "Command Driven Only" in answer to question number 36 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being not useful or somewhat useful to them, or else they were indifferent. A minority of the participants ranked this feature as very useful or essential to them.



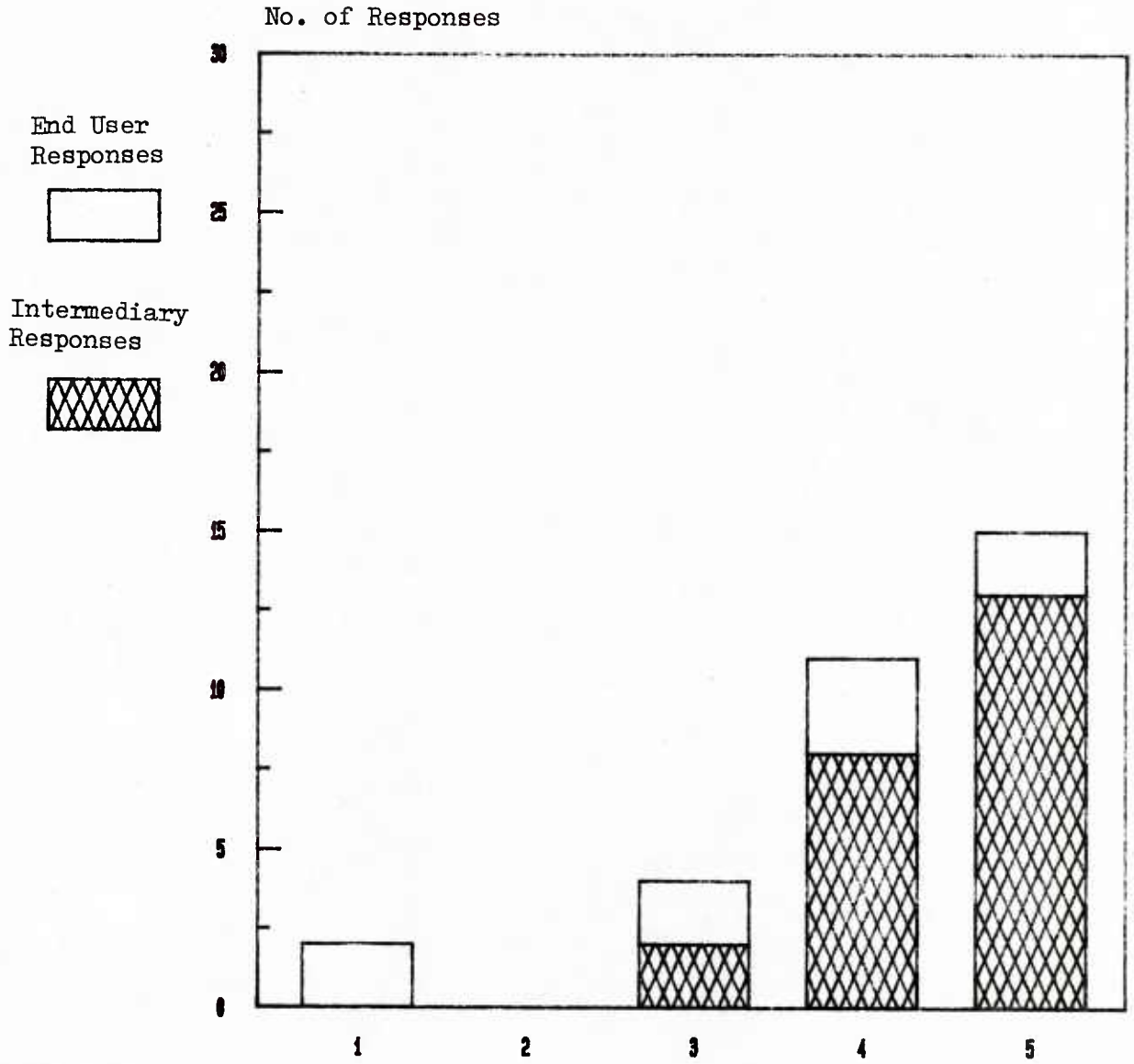
1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 4. Participants' ranking on a scale of 1-5 of the feature "Menu Driven Only" in answer to question number 37 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.



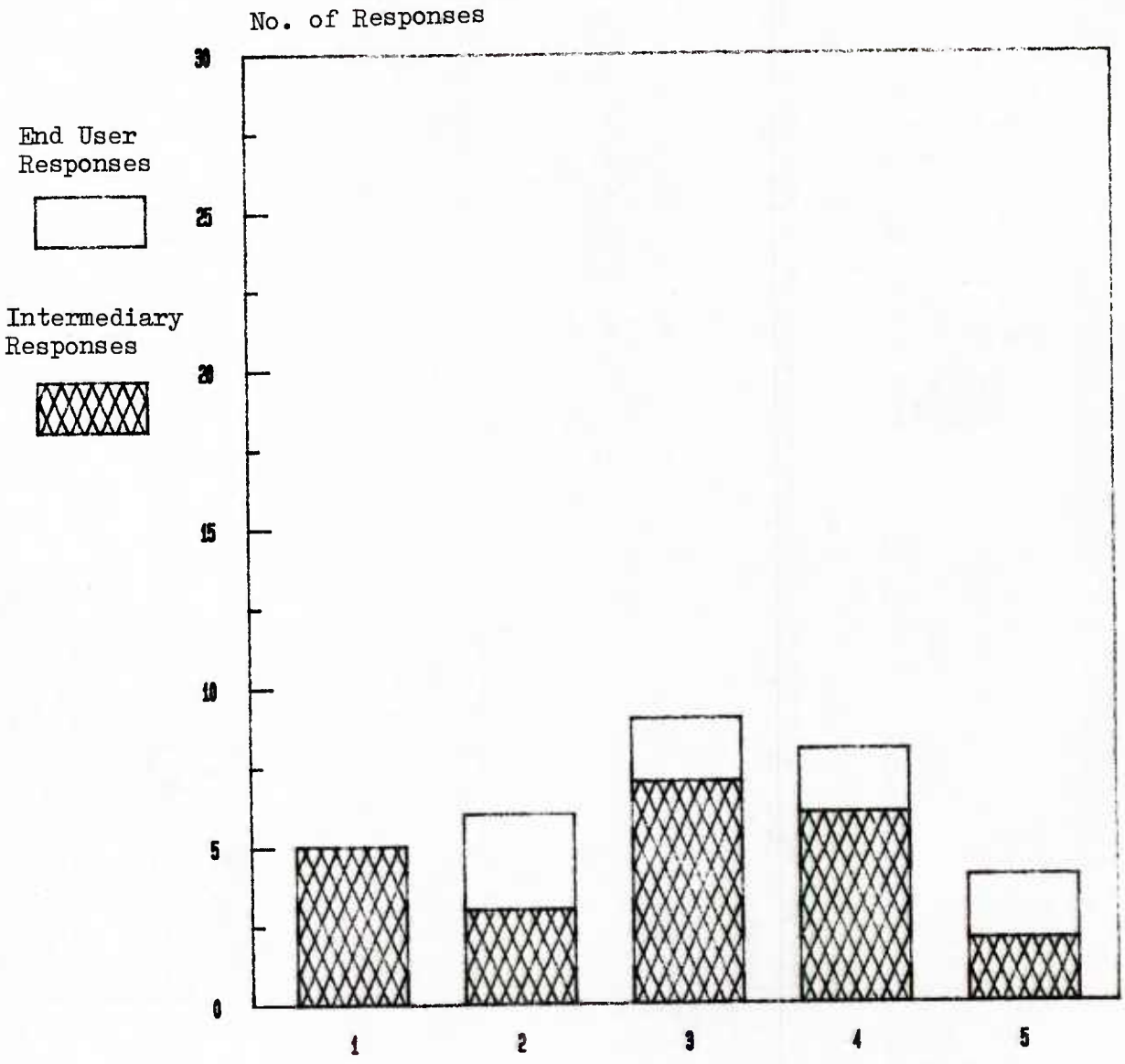
1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 5. Participants' ranking on a scale of 1-5 of the feature "Common Retrieval Language" in answer to question number 38 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them. A few participants in both categories were indifferent about this feature. A few end users ranked this feature as not useful to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 6. Participants' ranking on a scale of 1-5 of the feature "Accepts User-Defined Commands" in answer to question number 39 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 7. Participants' ranking on a scale of 1-5 of the feature "User Chooses Command Language" in answer to question number 40 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A majority of the participants who were intermediaries ranked this feature as being very useful or essential to them. A majority of the participants who were end users were indifferent about this feature.

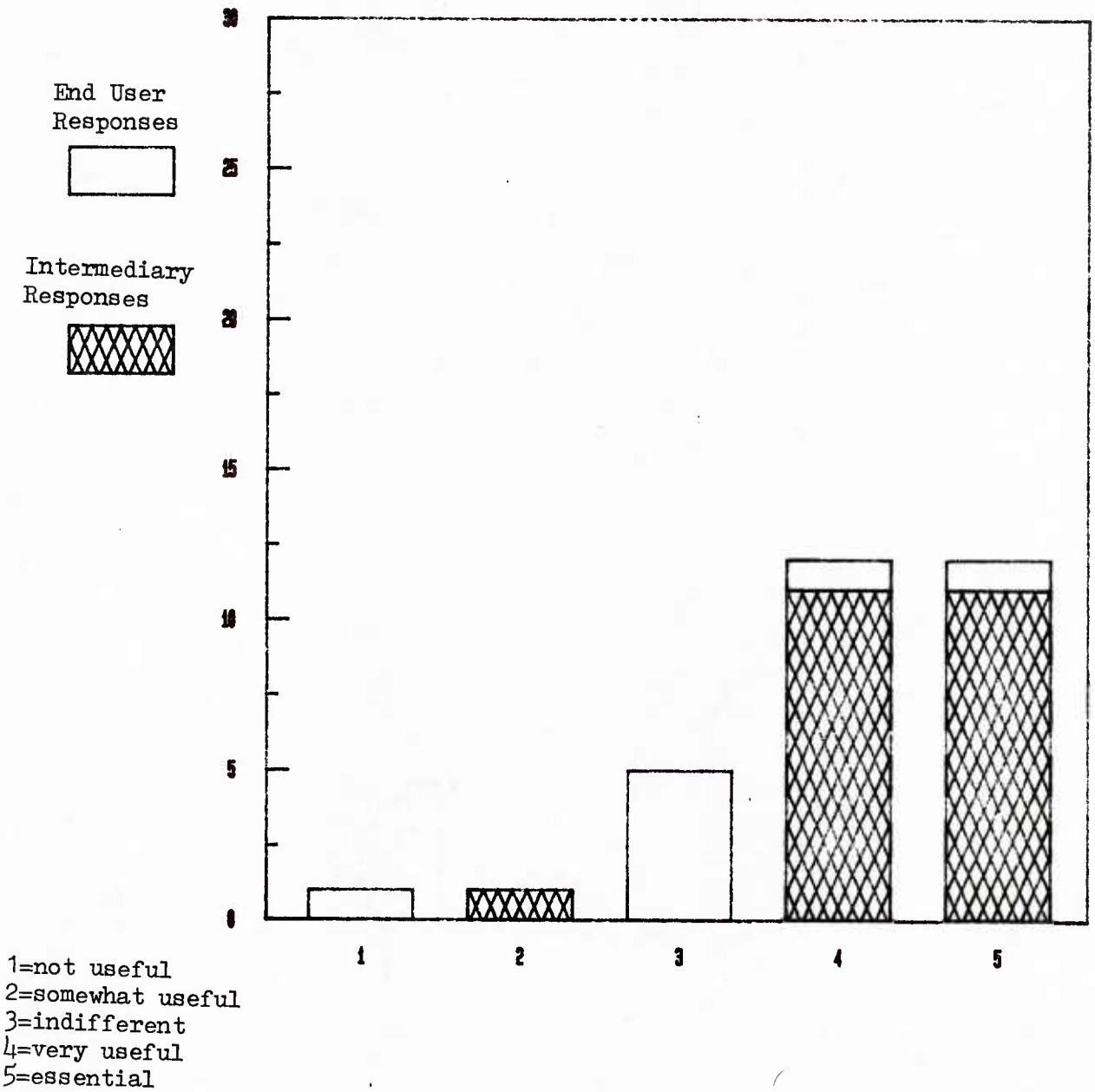


Figure 8. Participants' ranking on a scale of 1-5 of the feature "Choose Among Levels of Expertise" in answer to question number 41 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A majority of the participants who were intermediaries ranked this feature as being very useful to them, but a substantial number of the intermediaries ranked this feature as being essential to them, or they were indifferent. A majority of the participants who were end users ranked this feature as being essential to them.

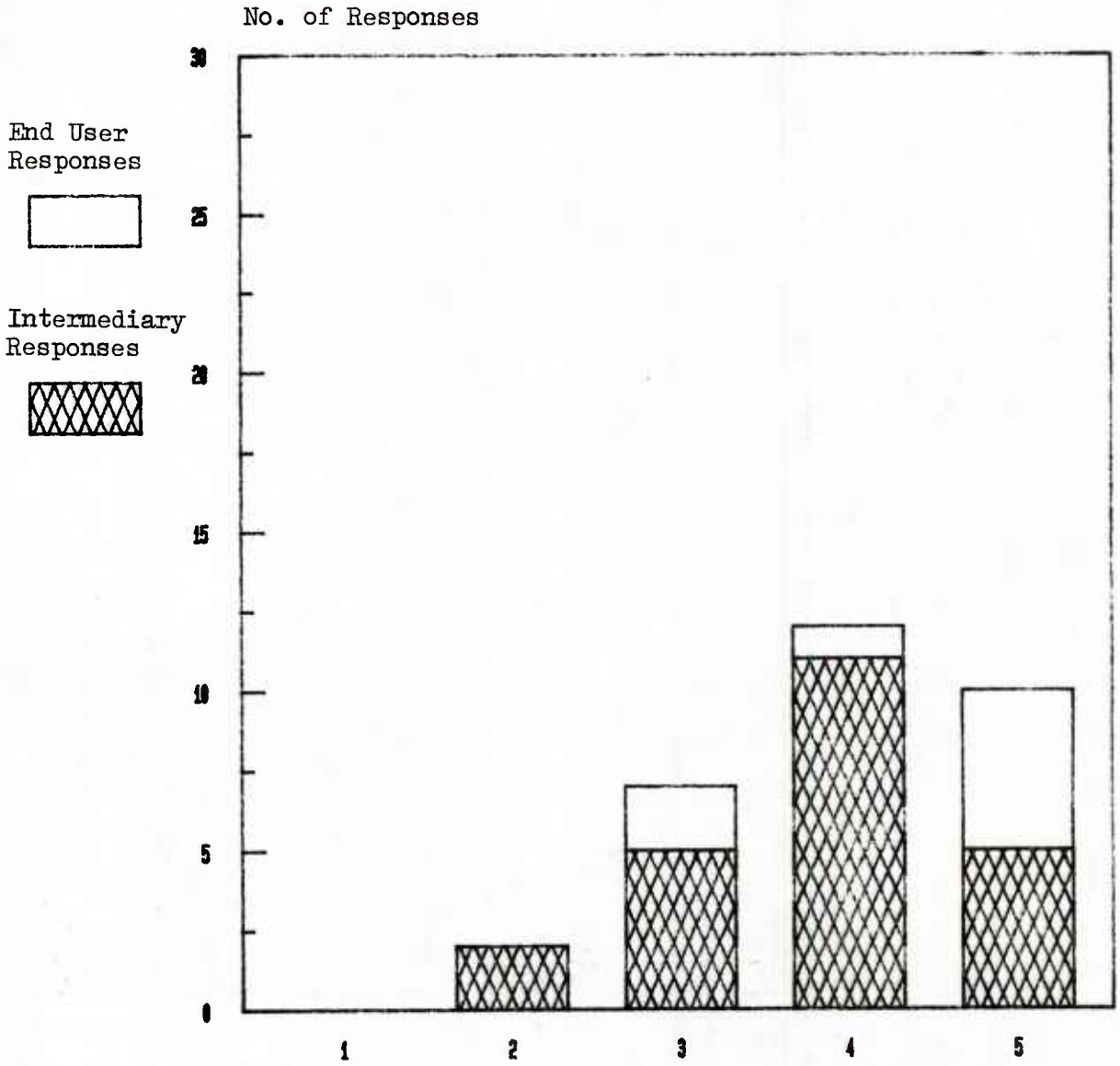


Figure 9. Participants' ranking on a scale of 1-5 of the feature "Accepts Natural English Language" in answer to question number 42 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.

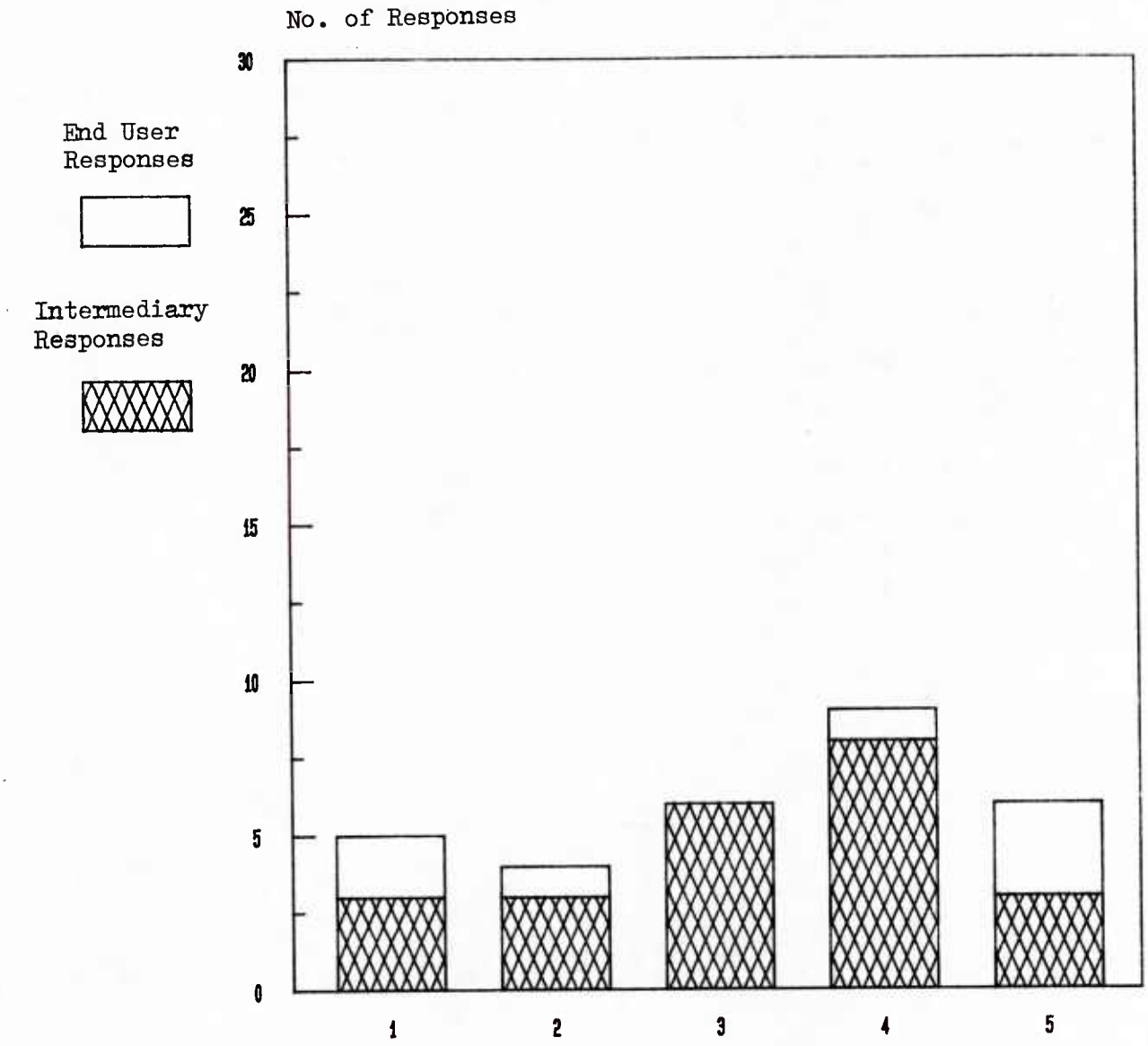


Figure 10. Participants' ranking on a scale of 1-5 of the feature "Compensates for Spelling Errors" in answer to question number 43 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.

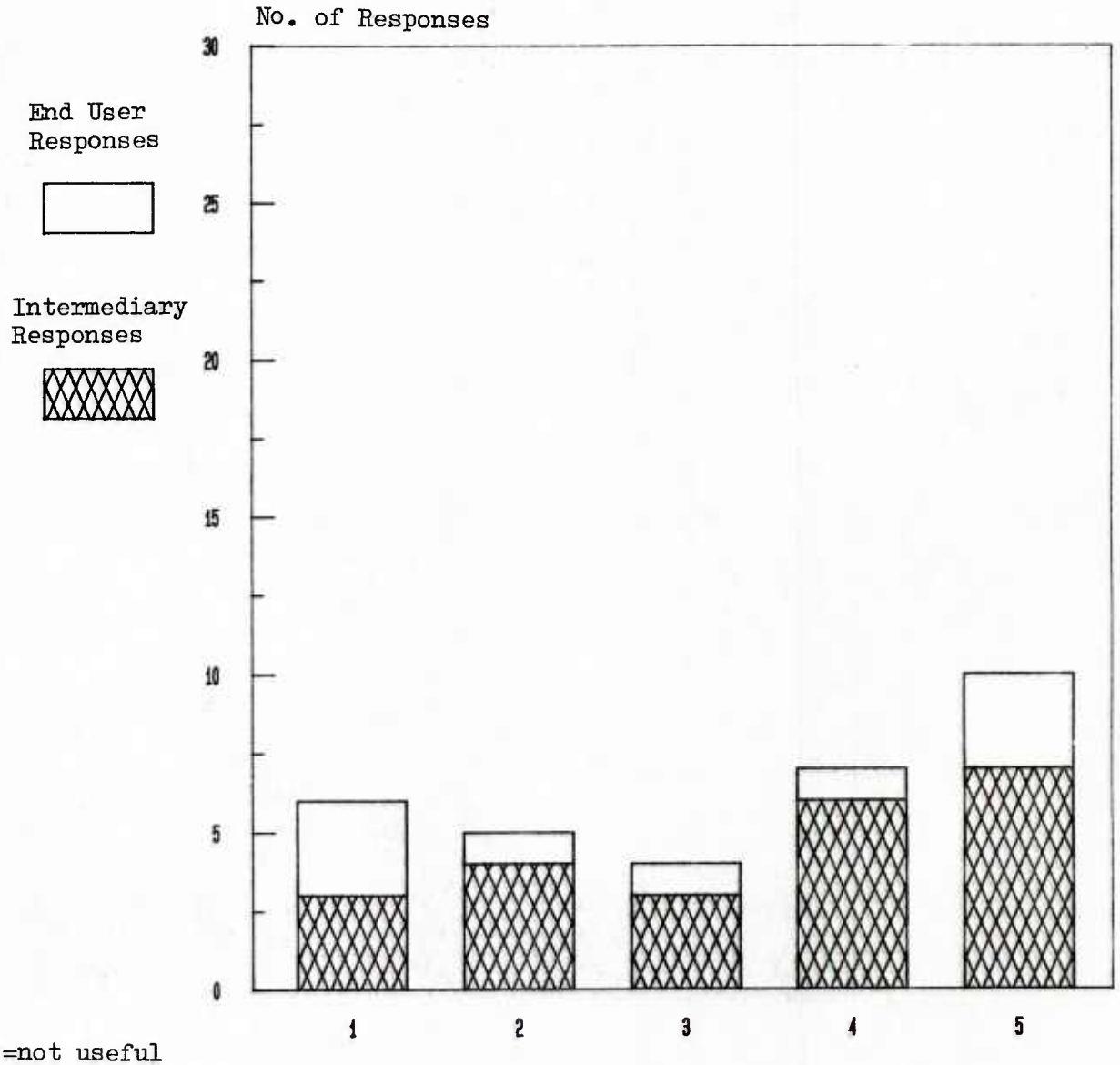
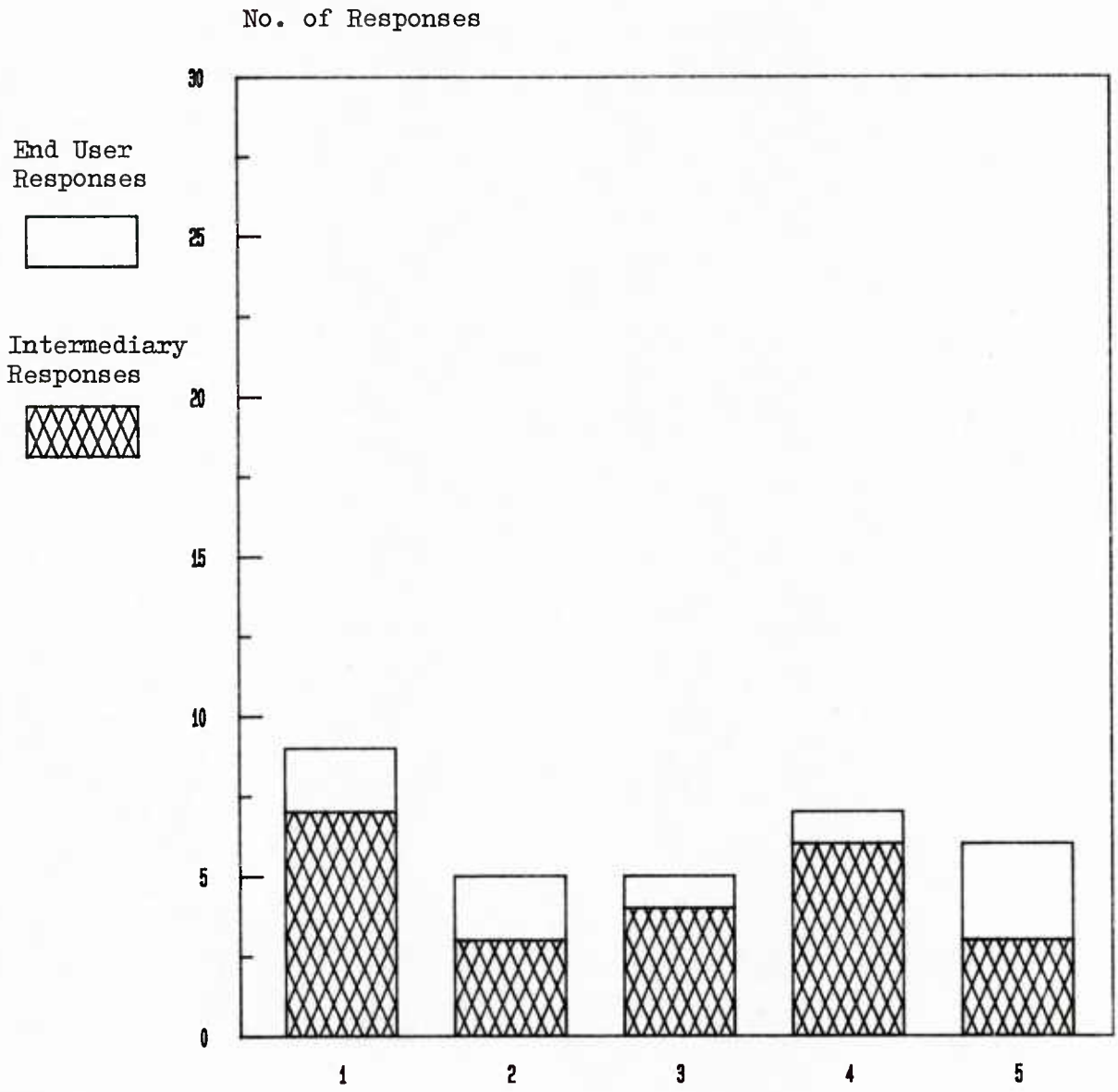
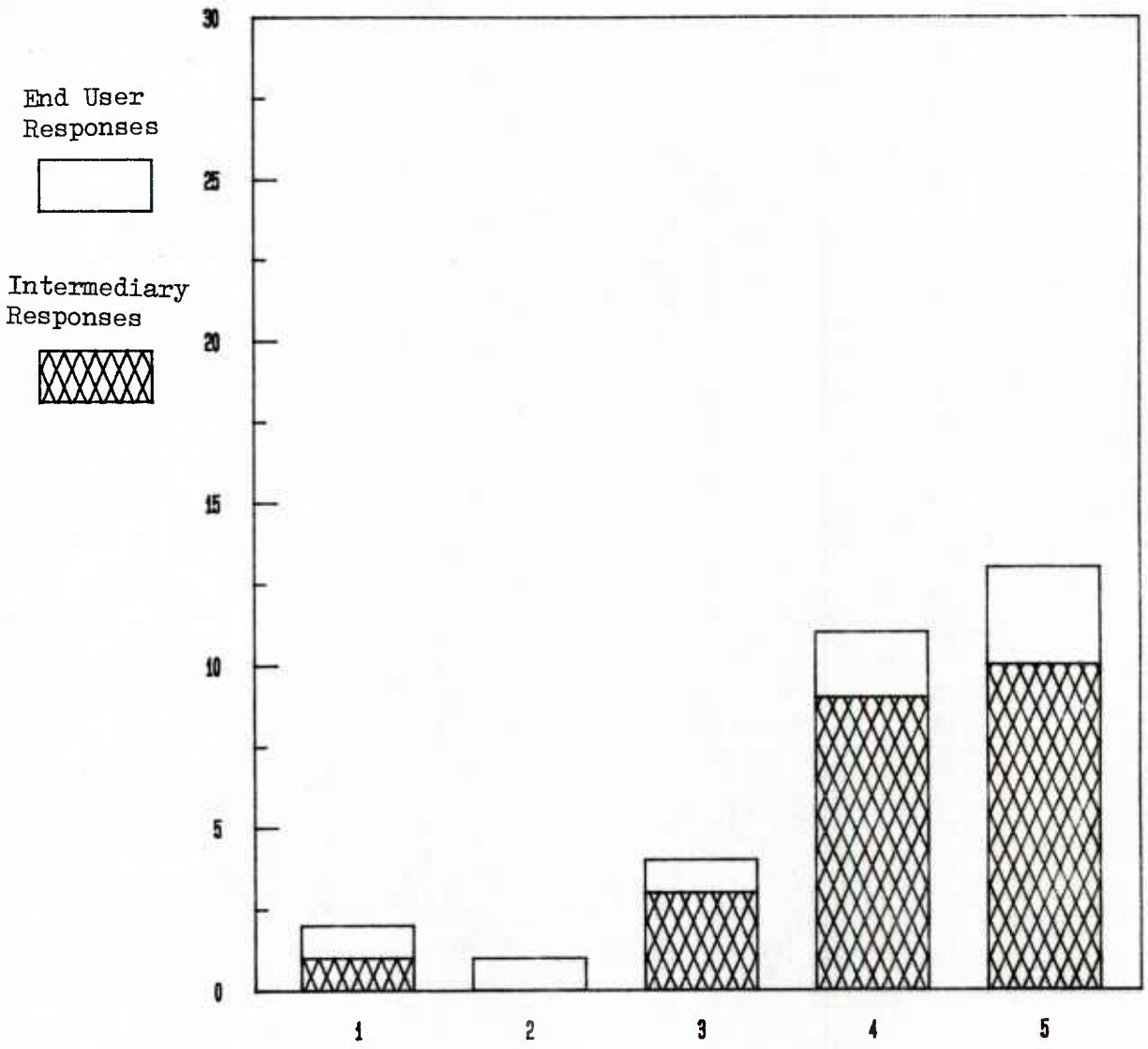


Figure 11. Participants' ranking on a scale of 1-5 of the feature "Questions to Formulate Search Strategy" in answer to question number 44 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 12. Participants' ranking on a scale of 1-5 of the feature "Suggests Related Terms" in answer to question number 45 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being essential or very useful to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 13. Participants' ranking on a scale of 1-5 of the feature "Gives Feedback on Search Strategy" in answer to question number 46 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A majority of the participants who were intermediaries ranked this feature as being very useful or essential to them. A majority of the participants who were end users were indifferent about this feature or else they ranked this feature as being somewhat useful or essential to them.

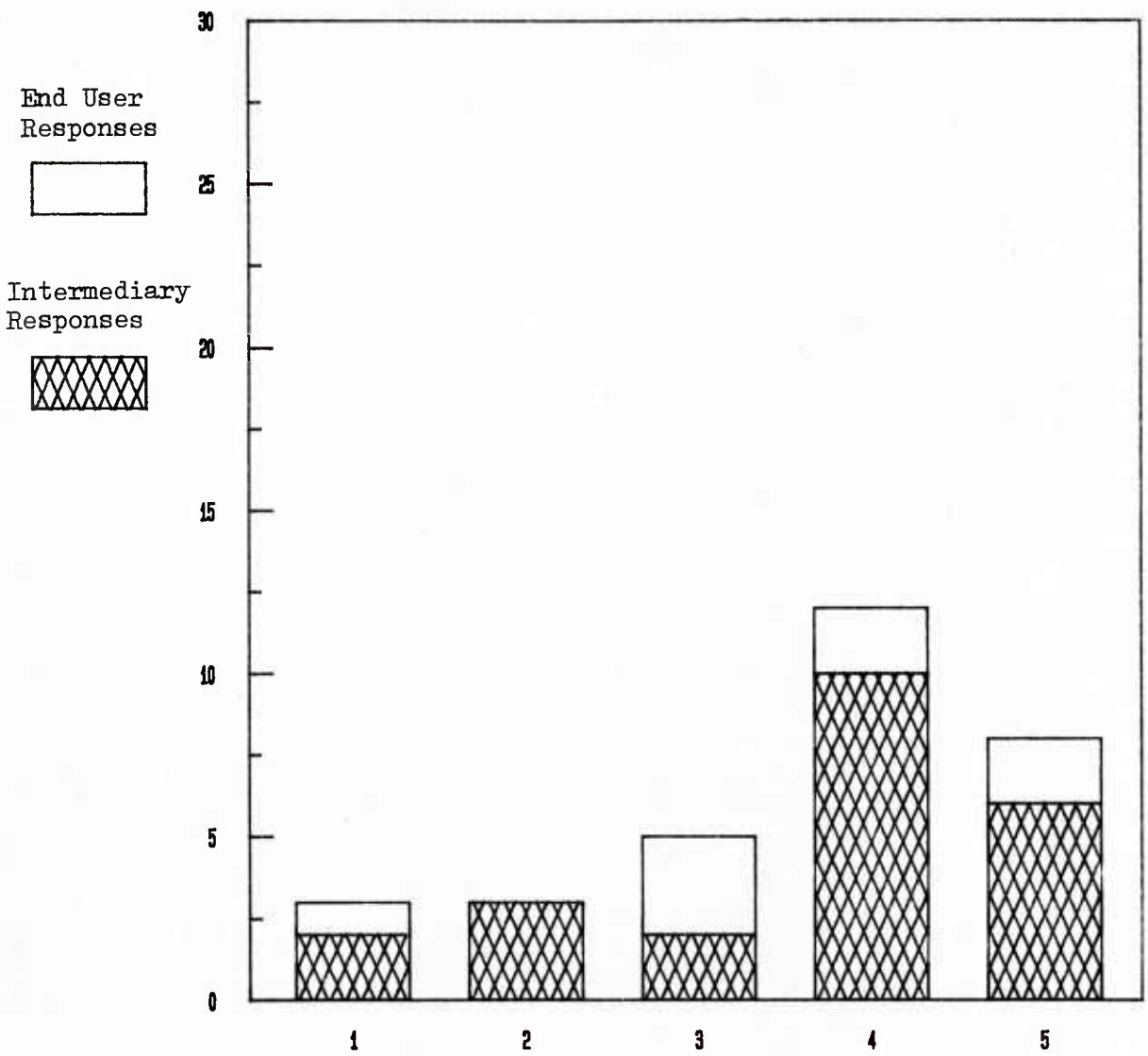


Figure 14. Participants' ranking on a scale of 1-5 of the feature "System or User Selects Data Base" in answer to question number 47 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A majority of the participants who were intermediaries ranked this feature as being either very useful or essential to them. A majority of the participants who were end users ranked this feature as being essential to them or being very useful to them or else they were indifferent.

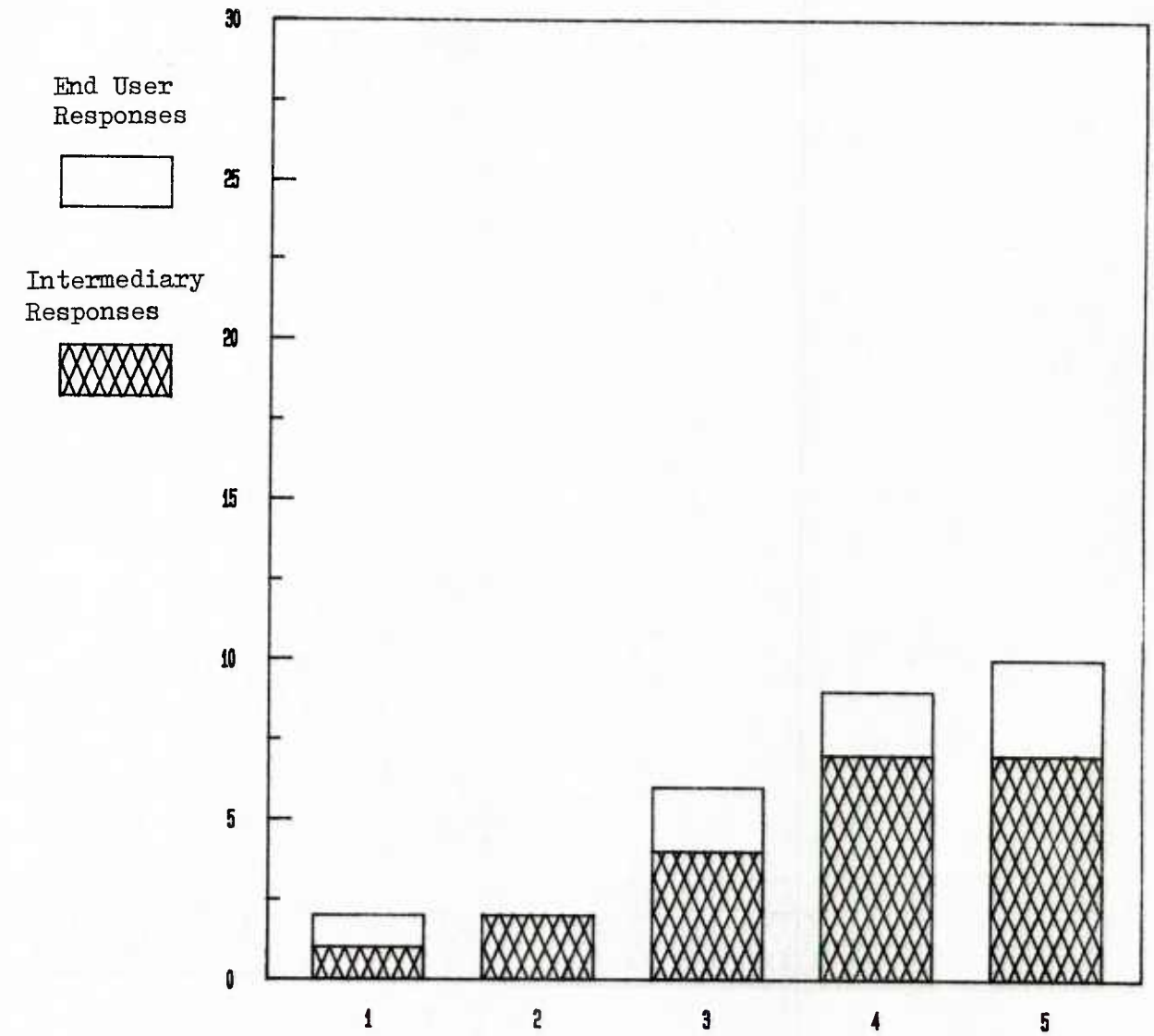
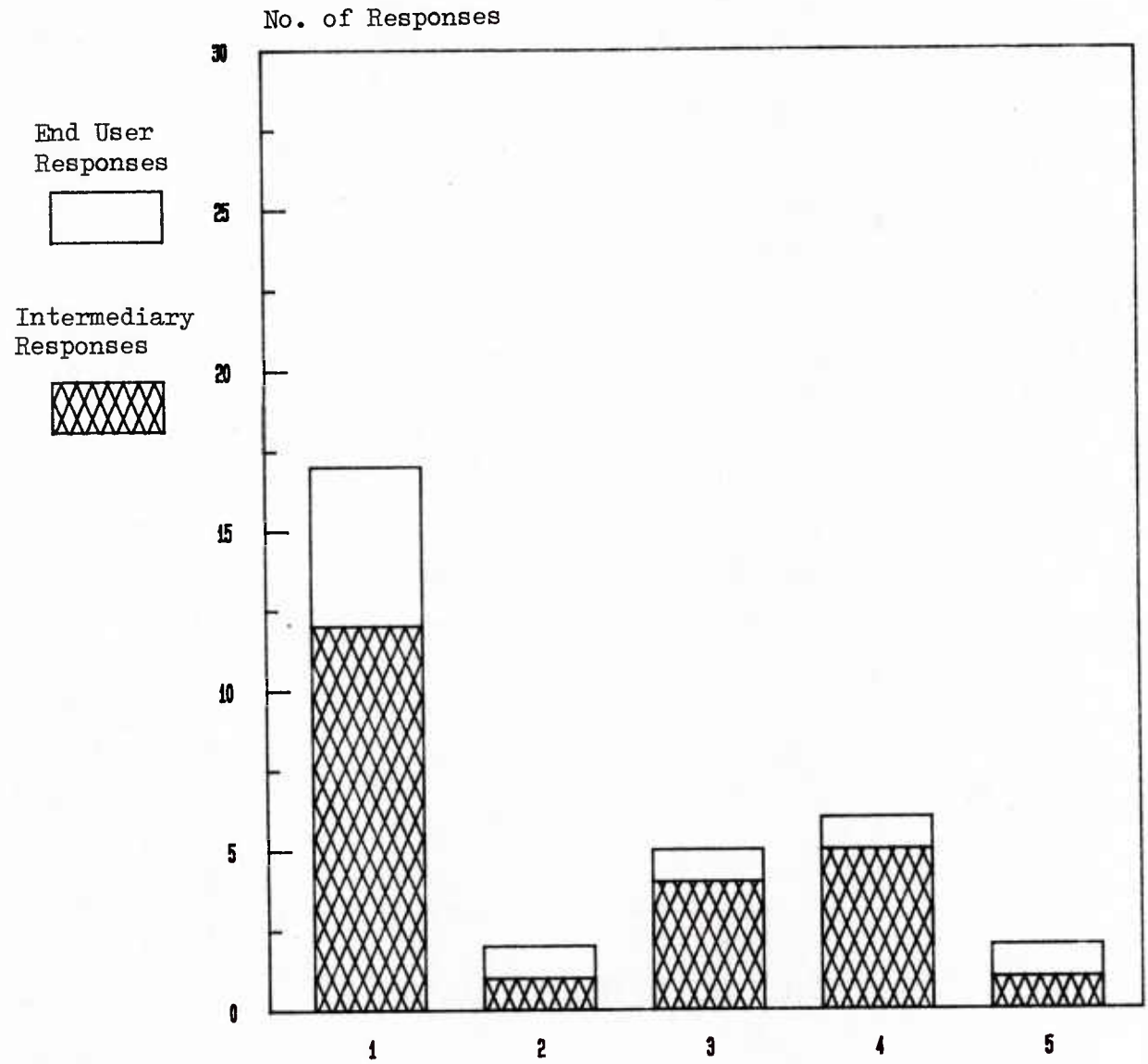
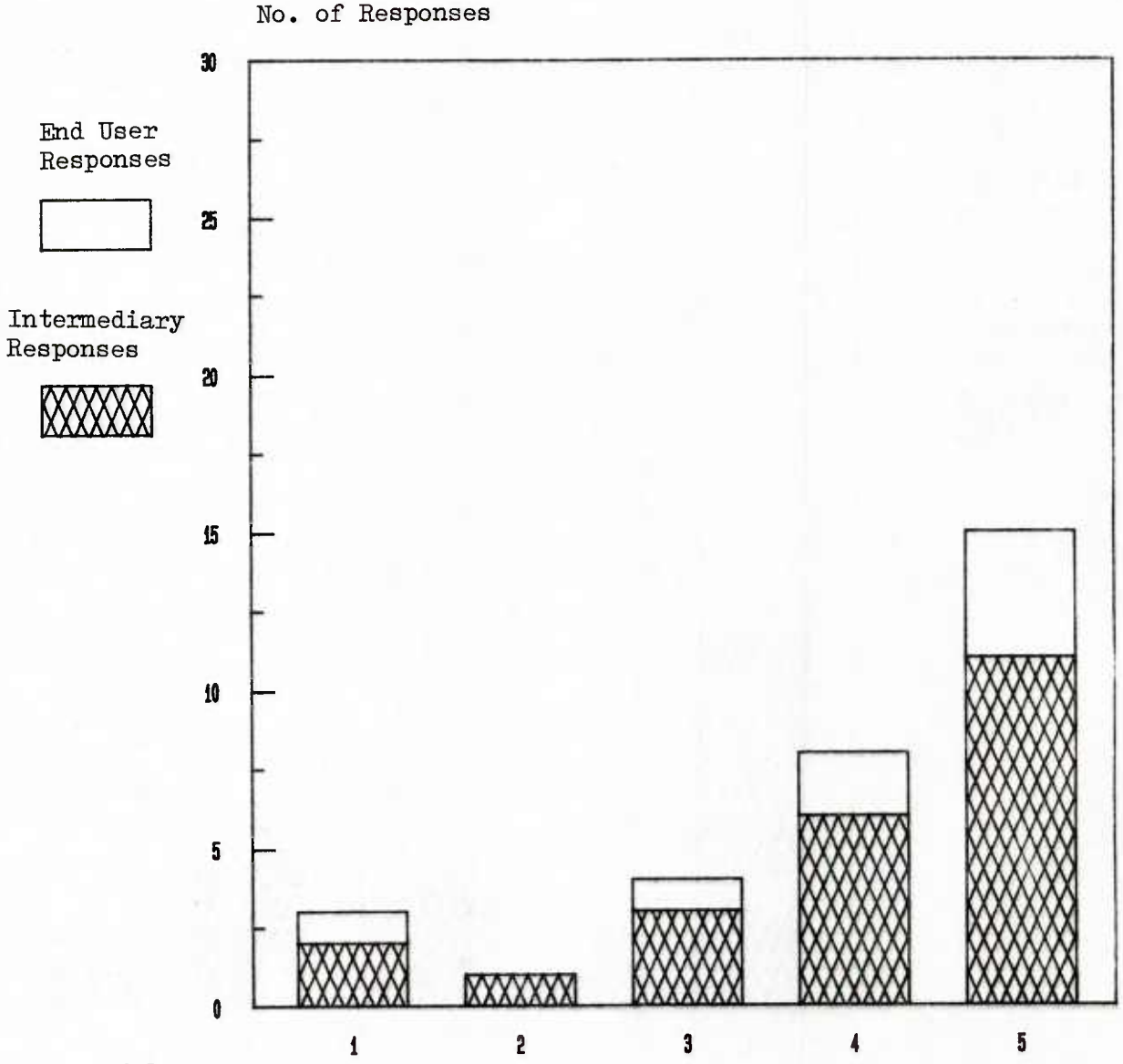


Figure 15. Participants' ranking on a scale of 1-5 of the feature "System Chooses the Data Base" in answer to question number 48 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A majority of the participants in both categories ranked this feature as being not useful to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 16. Participants' ranking on a scale of 1-5 of the feature "Displays Process It Followed" in answer to question number 49 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. A large number of the participants in both categories ranked this feature as being essential to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 17. Participants' ranking on a scale of 1-5 of the feature "Ranks Retrieved Results for Relevancy" in answer to question number 50 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants who were intermediaries ranked this feature as being either very useful or essential to them. A substantial number of participants who were intermediaries were indifferent about this feature. Most of the participants who were end users ranked this feature as being either not useful or essential to them.

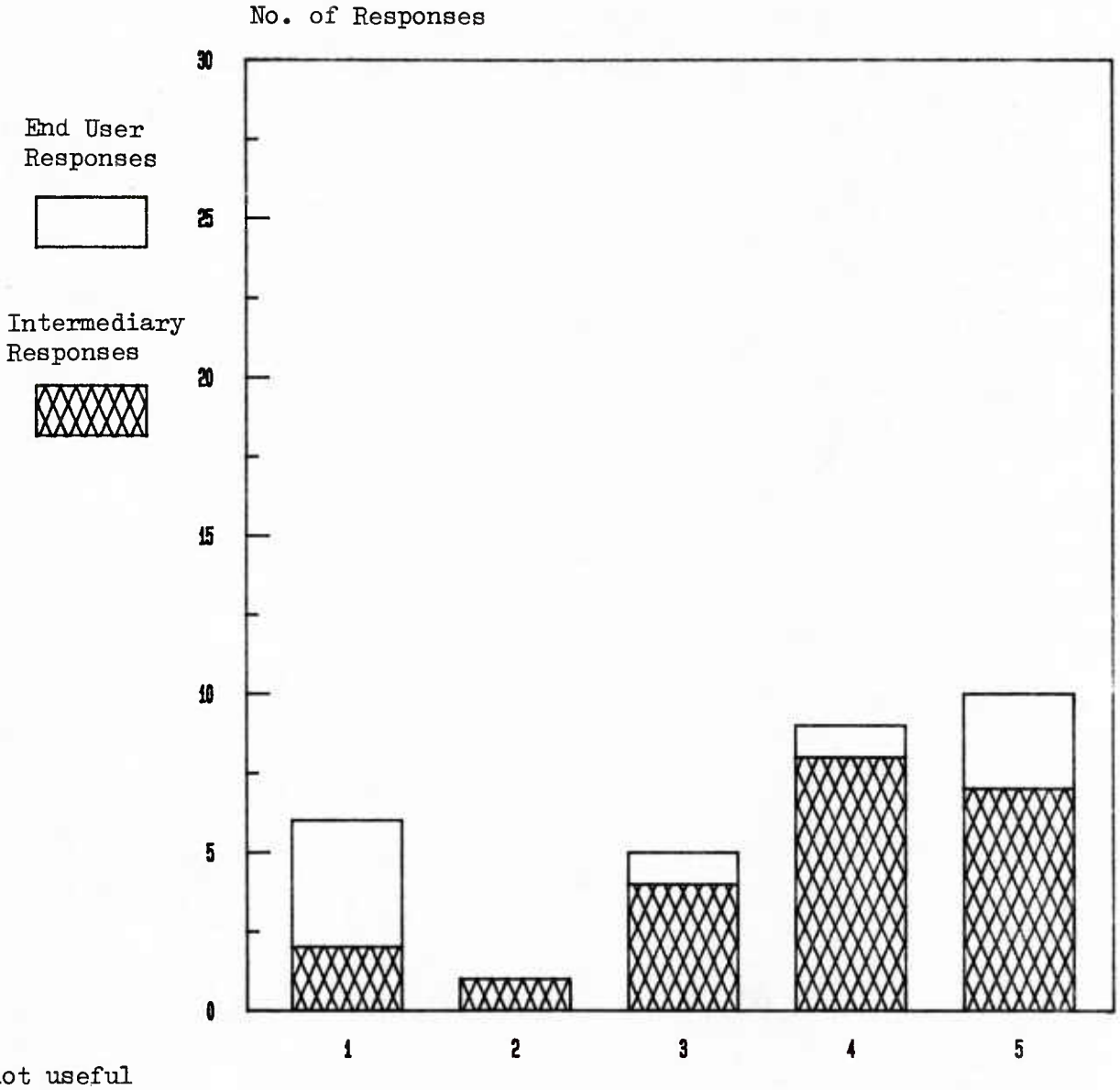


Figure 18. Participants' ranking on a scale of 1-5 of the feature "Explains User Errors" in answer to question number 51 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them. A substantial number of participants who were intermediaries were indifferent about this feature.

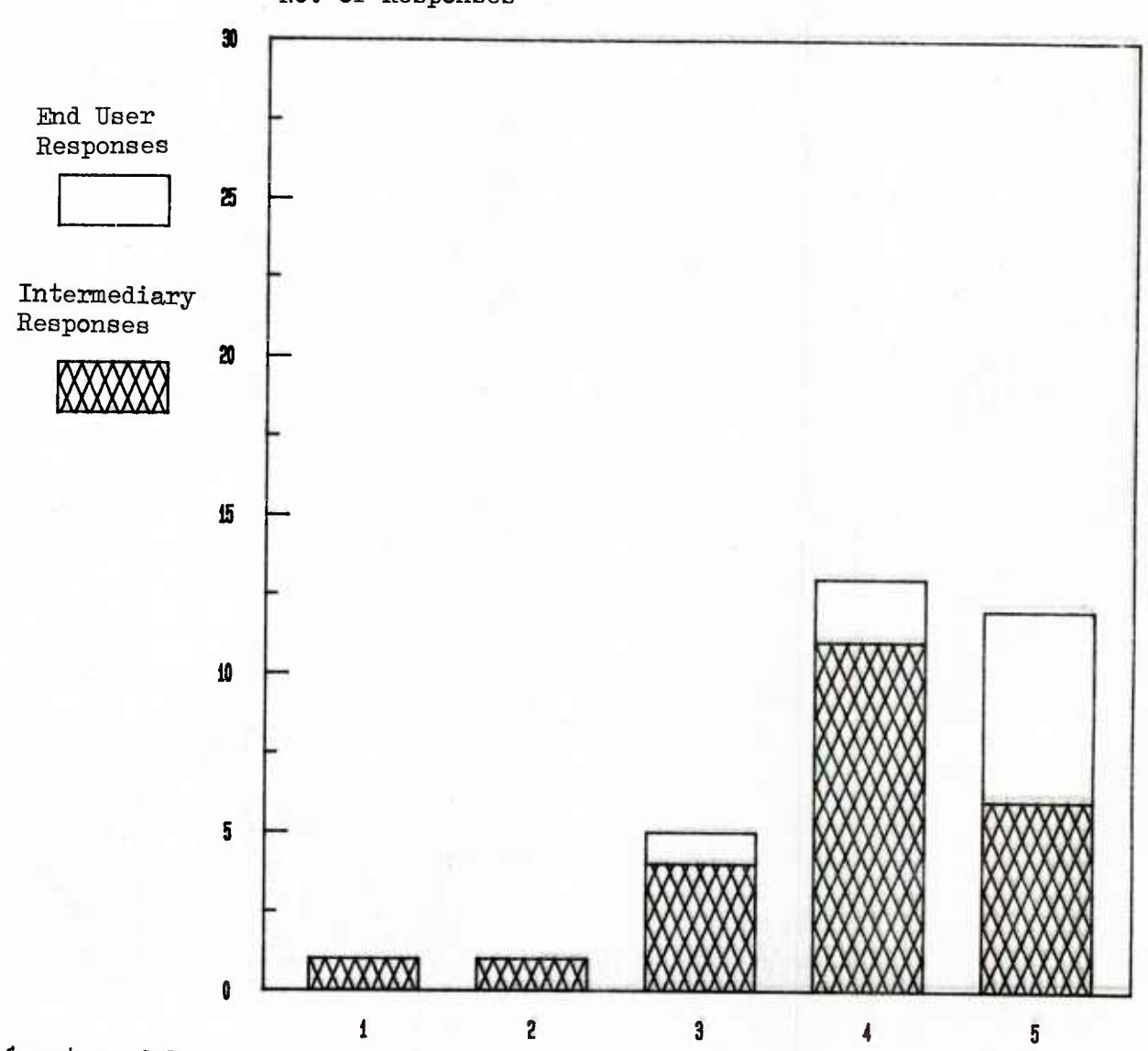
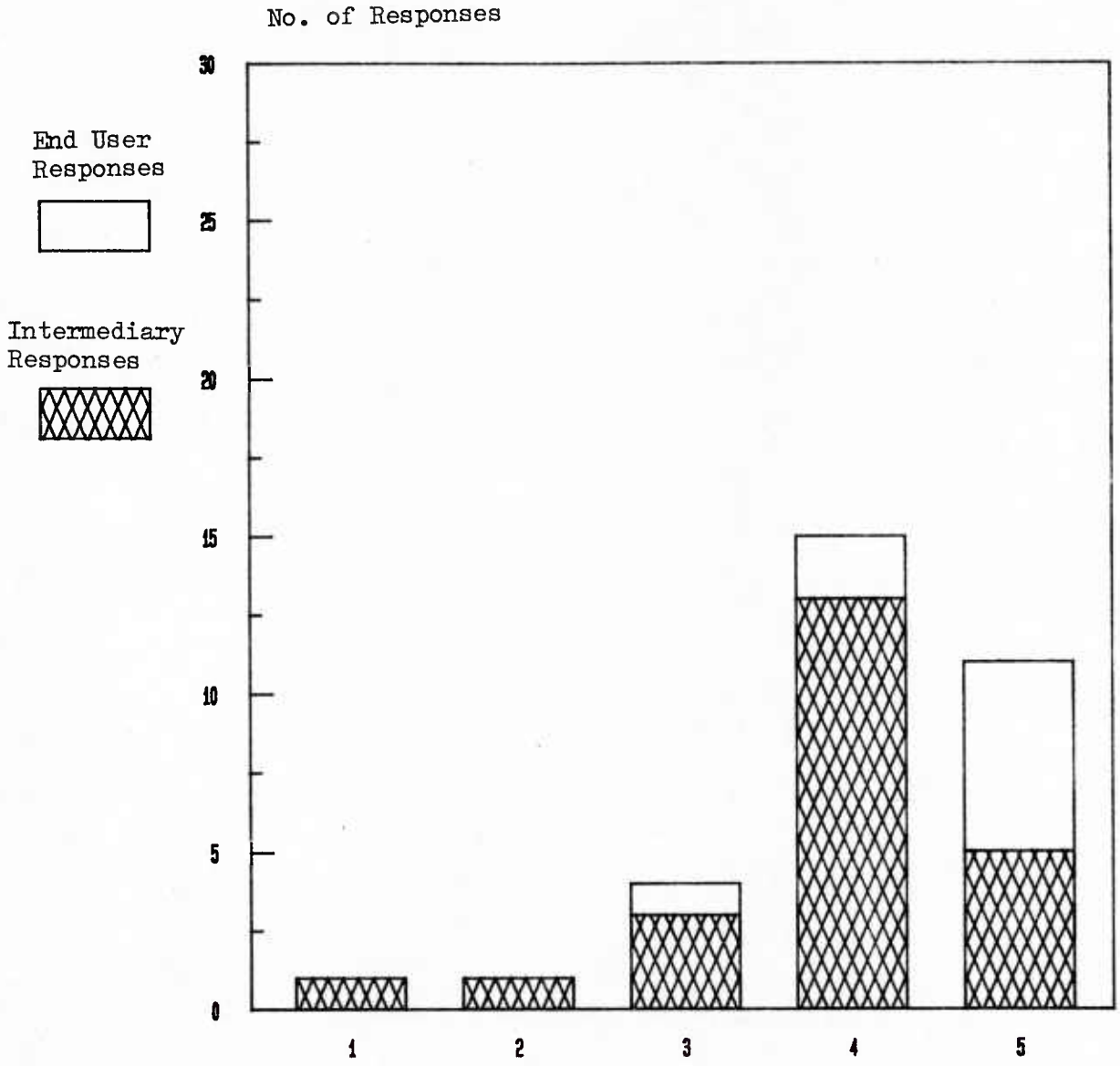


Figure 19. Participants' ranking on a scale of 1-5 of the feature "Includes a Help Feature" in answer to question number 52 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them. A substantial number of participants who were intermediaries were indifferent about this feature.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 20. Participants' ranking on a scale of 1-5 of the feature "Stores Search Strategy" in answer to question number 53 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being essential to them.

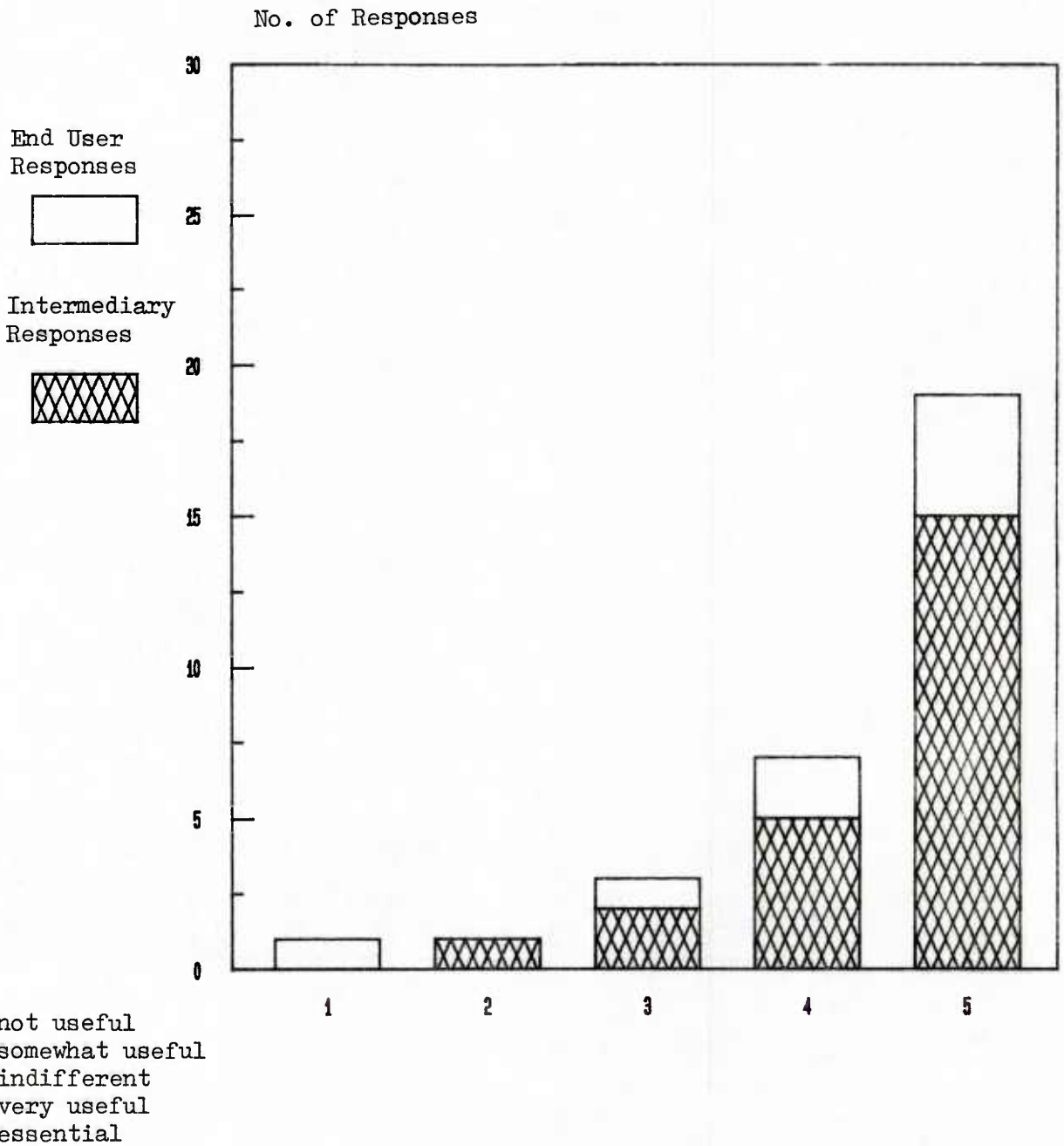
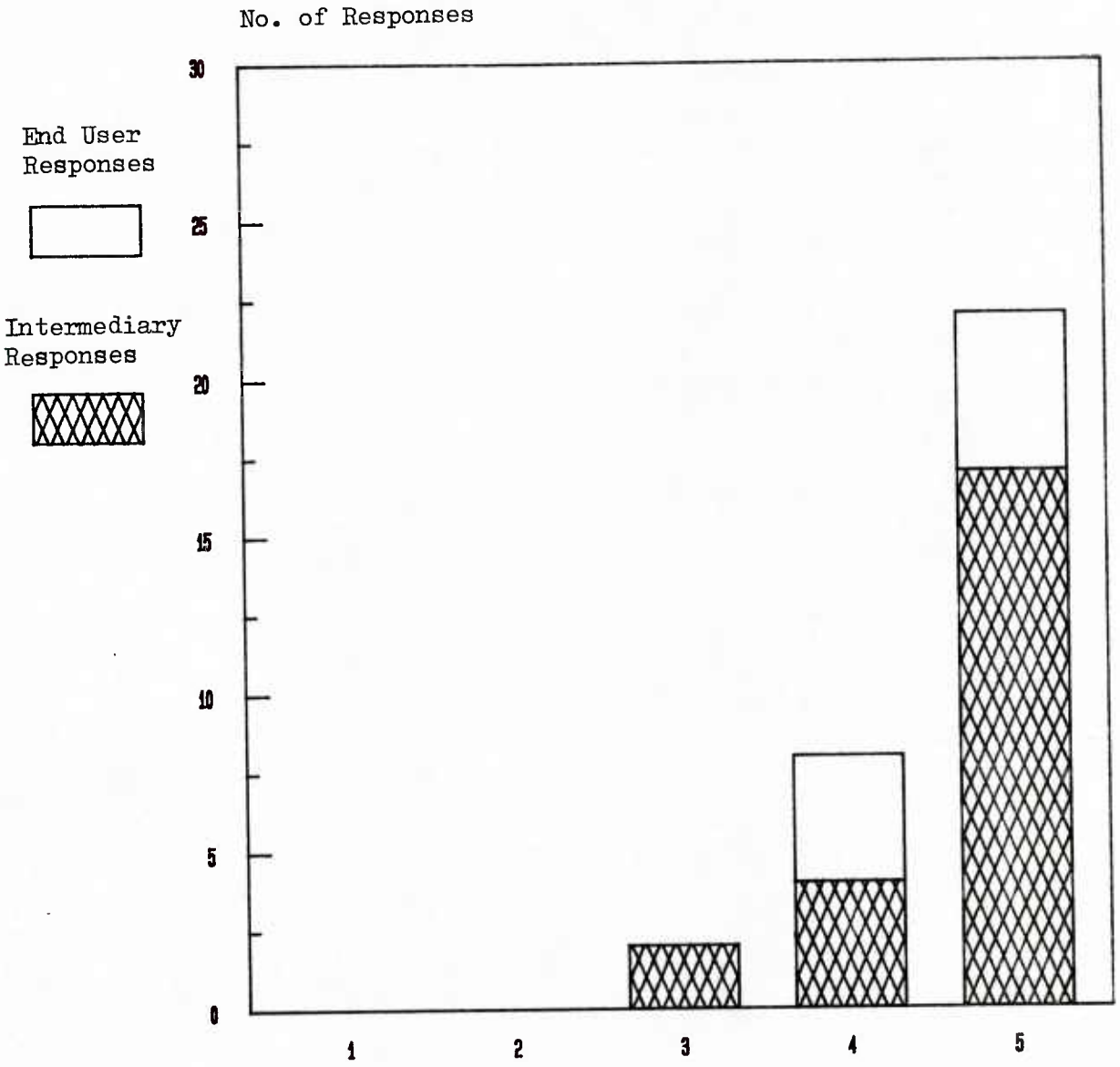
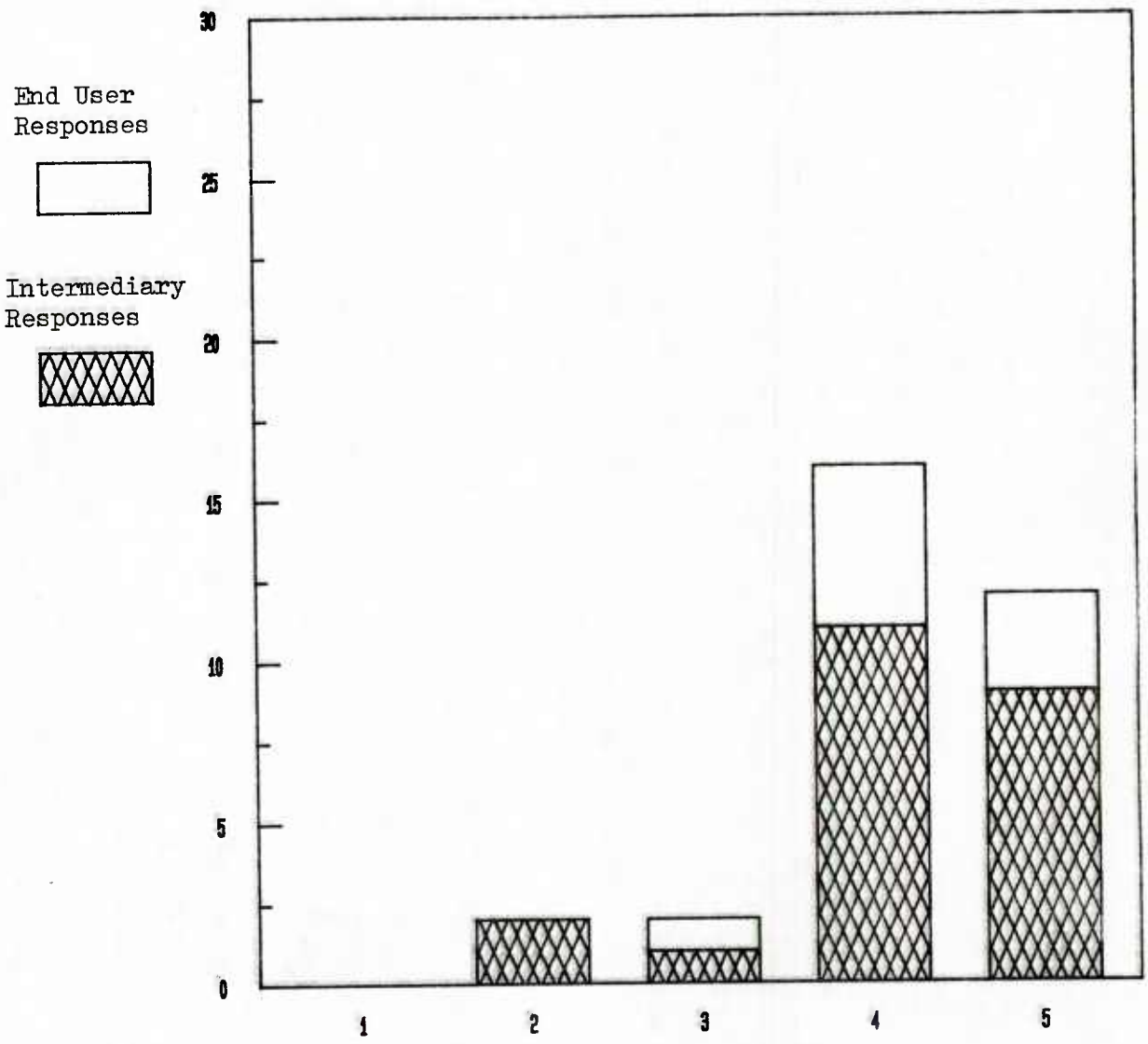


Figure 21. Participants' ranking on a scale of 1-5 of the feature "User Can Define Output Formats" in answer to question number 54 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants who were intermediaries ranked this feature as being essential to them. Most of the participants who were end users ranked this feature as being either essential or very useful to them.



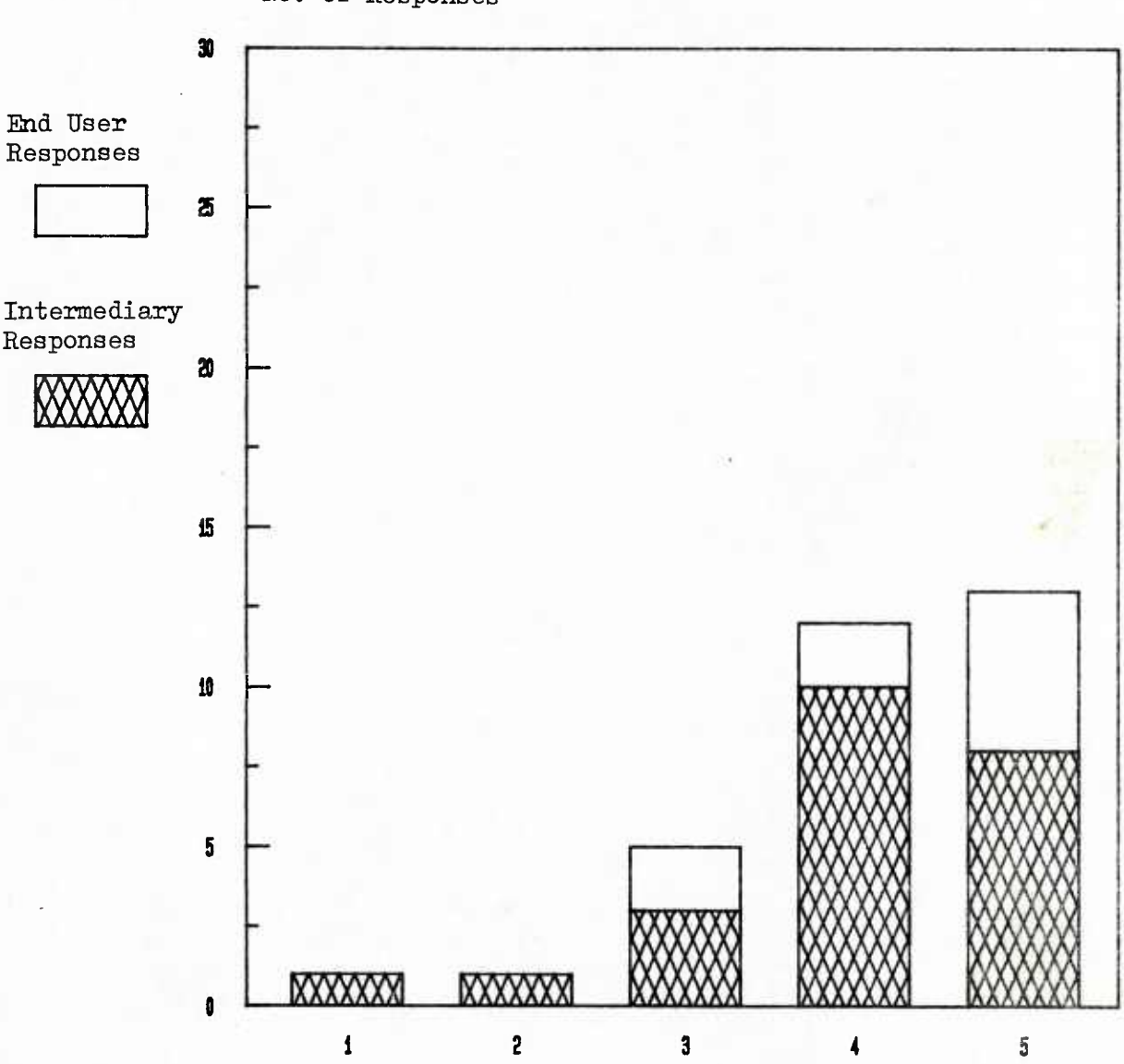
1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 22. Participants' ranking on a scale of 1-5 of the feature "Stores User-Defined Formats" in answer to question number 55 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 23. Participants' ranking on a scale of 1-5 of the feature "Has Menu of Canned Formats" in answer to question number 56 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being very useful or essential to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

Figure 24. Participants' ranking on a scale of 1-5 of the feature "Allows User to Create Charts" in answer to question number 57 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.

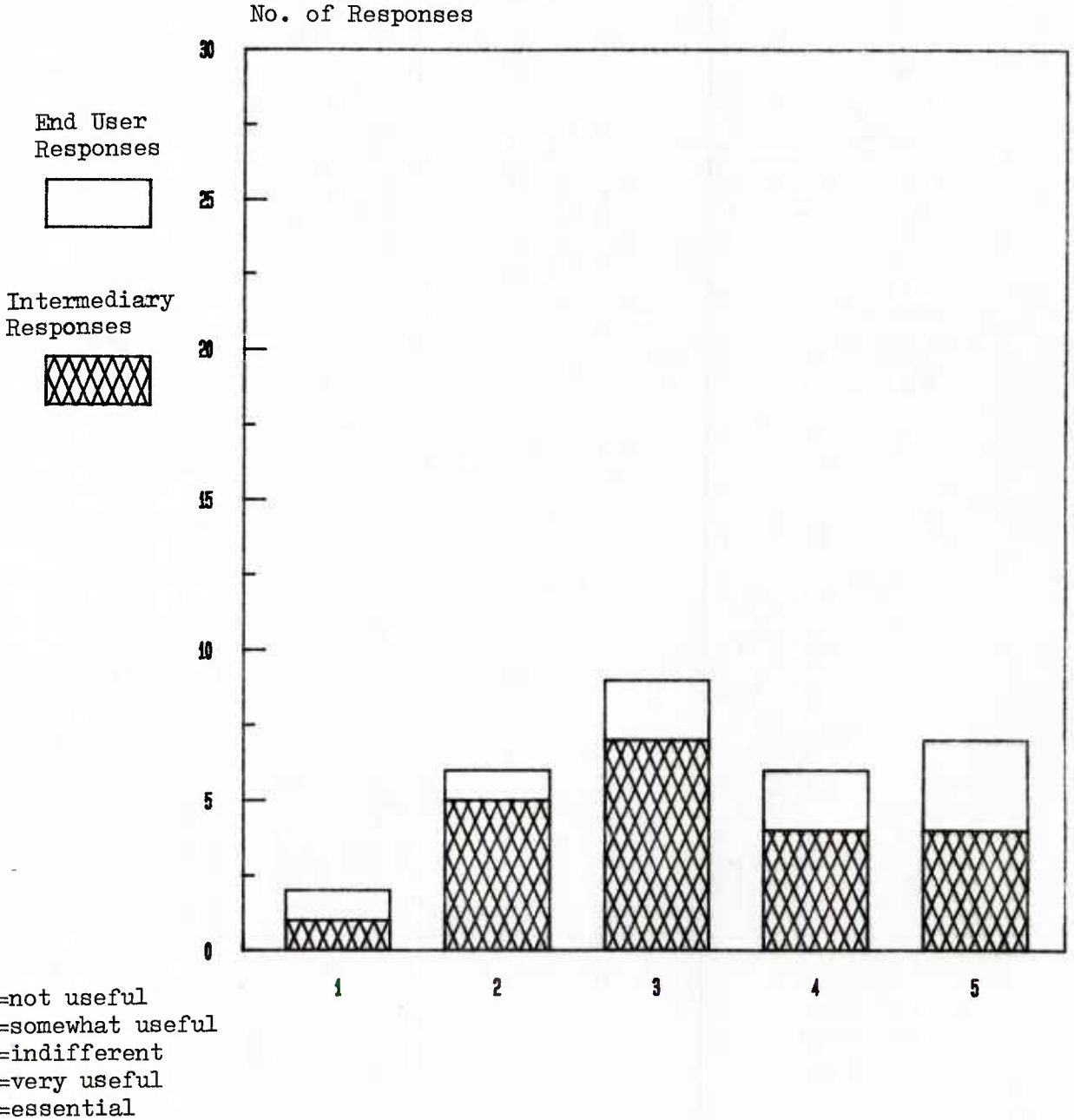


Figure 25. Participants' ranking on a scale of 1-5 of the feature "Allows User to Create Graphs" in answer to question number 58 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Participants ranked this feature across the scale; no significant majority of opinion is apparent.

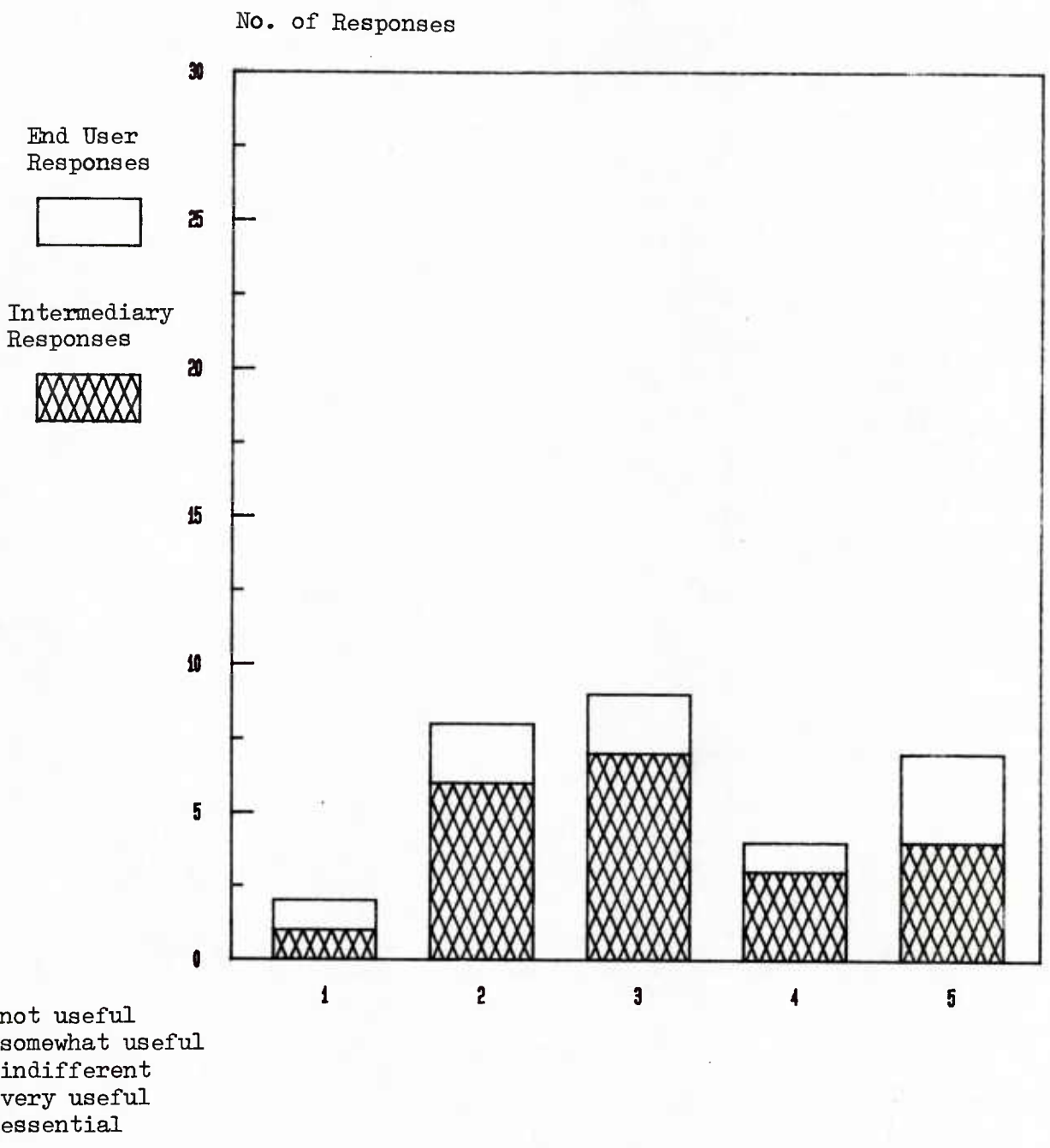


Figure 26. Participants' ranking on a scale of 1-5 of the feature "Allows User to Download Information" in answer to question number 59 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being essential to them.

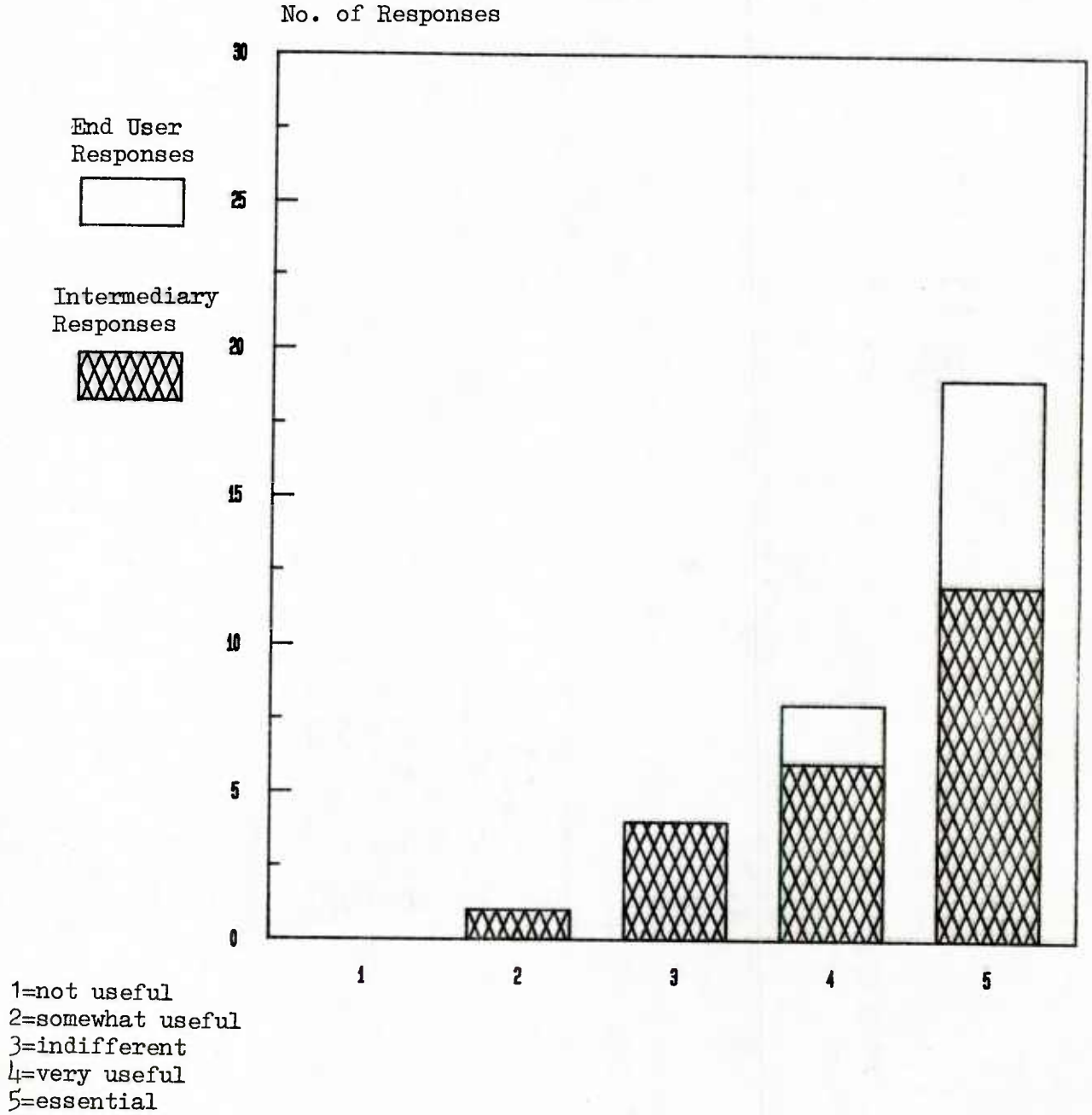
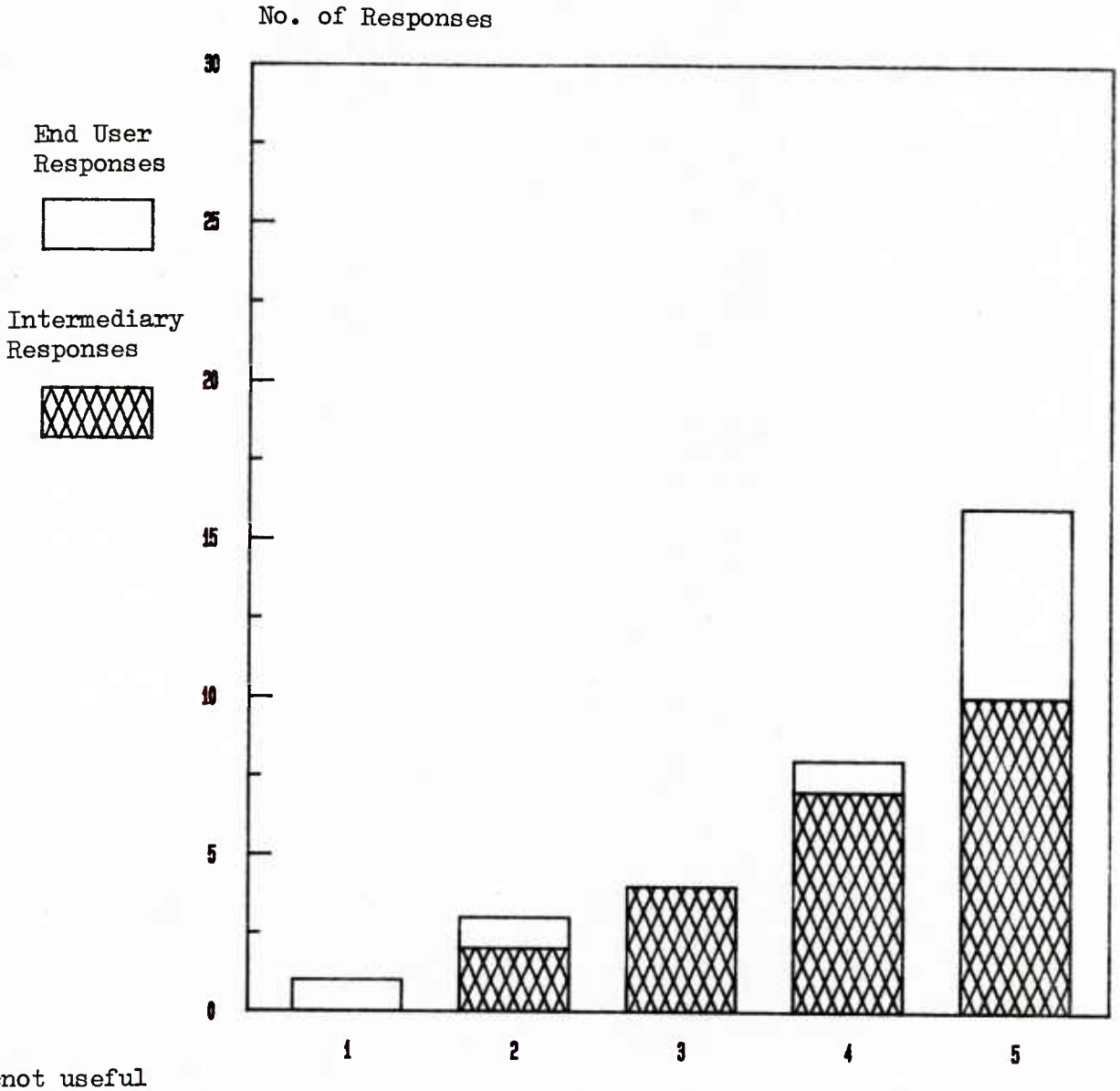


Figure 27. Participants' ranking on a scale of 1-5 of the feature "Allows User to Reformat Information" in answer to question number 60 of the questionnaire. The Y axis represents the number of responses. The X axis represents each option in the scale 1-5. Most of the participants in both categories ranked this feature as being essential or very useful to them.



1=not useful
2=somewhat useful
3=indifferent
4=very useful
5=essential

DISCUSSION OF SIGNIFICANT GRAPHS

In a large number of the stacked bar graphs (Figures 1-27), intermediaries' and end users' responses appeared to be similar, for example, if a majority of the intermediaries' responses in ranking a particular feature were in the positive range of the scale, a majority of the end users' responses in ranking the same feature were also in the positive range of the scale. Some of the intermediaries' and end users' responses did not appear similar, but the differences may not be significant.

In order to determine if there were any features with a significant difference between the way intermediaries and end users ranked the feature, a chi-square test was done using the SPSS Batch System. This chi-square test calculated the independence of the two variables-intermediaries and end users. The chi-square statistic was also converted to a probability statistic by SPSS called the significance level. The significance levels are included with the chi-square values for each feature in the cross-tabulations in Appendix D.

Those relationships between variables which are accepted for this study as statistically significant have a .05 probability of occurring by chance. The .05 significance level means that there is a 5% possibility that the variables are unrelated except by chance.

When the value of .05 was used as a comparison, three of the 27 features had a significance level less than .05. These three features were then assumed to have a significant level of difference between the way intermediaries and end users ranked the features. These three features were:

Feature Number 35-Choice Between Commands or Menus (significance level=.0182) (see Figure 28),

Feature Number 38-Common Retrieval Language (significance level=.0530, which is above but very close to .05) (see Figure 29), and

Feature Number 40-User Chooses Command Language (significance level=.0001) (see Figure 30).

Figure 28. Crosstabulation of "Choice Between Commands or Menus".

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

COMENU   COMMANDS OR MENUS   BY USER   USER TYPE

* PAGE 1 OF 1

COMENU		USER: COUNT / ROW PCT / COL PCT / TOT PCT	INTERMEDIARY 1	END-USER 2	ROW TOTAL
NOT USEFUL	1	COUNT	1	0	1
		ROW PCT	100.0	.0	3.1
		COL PCT	4.3	.0	
		TOT PCT	3.1	.0	
INDIFFERENT	3	COUNT	0	3	3
		ROW PCT	.0	100.0	9.4
		COL PCT	.0	33.3	
		TOT PCT	.0	9.4	
VERY USEFUL	4	COUNT	10	1	11
		ROW PCT	90.9	9.1	34.4
		COL PCT	43.5	11.1	
		TOT PCT	31.3	3.1	
ESSENTIAL	5	COUNT	12	5	17
		ROW PCT	70.6	29.4	53.1
		COL PCT	52.2	55.6	
		TOT PCT	37.5	15.6	
		COLUMN TOTAL	23	9	32
			71.9	28.1	100.0

6 OUT OF 8 (75.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 10.04335 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = .0182
CRAMER'S V = .56023
CONTINGENCY COEFFICIENT = .48875
LAMBDA (ASYMMETRIC) = .00000 WITH COMENU DEPENDENT. = .33333 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .12500
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .16218 WITH COMENU DEPENDENT. = .28206 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .20594
KENDALL'S TAU B = -.07599. SIGNIFICANCE = .3290
KENDALL'S TAU C = -.07422. SIGNIFICANCE = .3290
GAMMA = -.13869
SOMERS'S D (ASYMMETRIC) = -.09179 WITH COMENU DEPENDENT. = -.06291 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.07466
ETA = .08563 WITH COMENU DEPENDENT. = .56023 WITH USER DEPENDENT.
PEARSON'S R = -.08563 SIGNIFICANCE = .3206

Figure 29. Crosstabulation of "Common Retrieval Language".

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

COMRET   COMMON RETRIEVAL LANG   BY USER   USER TYPE

* PAGE 1 OF 1

COMRET (COUNT / ROW PCT / COL PCT / TOT PCT)		USER: INTERMEO IARY 1	USER: ENO-USER 2	ROW TOTAL
NOT USEFUL	1	0	2	2
		.0	100.0	6.3
		.0	22.2	
		.0	6.3	
INOIFFERENT	3	2	2	4
		50.0	50.0	12.5
		8.7	22.2	
		6.3	6.3	
VERY USEFUL	4	8	3	11
		72.7	27.3	34.4
		34.8	33.3	
		25.0	9.4	
ESSENTIAL	5	13	2	15
		86.7	13.3	46.9
		56.5	22.2	
		40.6	6.3	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

6 OUT OF 8 (75.0%) OF THE VALIO CELLS HAVE EXPECTEO CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTEO CELL FREQUENCY = .563
RAW CHI SQUARE = 7.68543 WITH 3 OEGREES OF FREEOOM. SIGNIFICANCE = .0530
CRAMER'S V = .49007
CONTINGENCY COEFFICIENT = .44007
LAMBOA (ASYMMETRIC) = .05882 WITH COMRET OEPENOENT. = .22222 WITH USER OEPENOENT.
LAMBOA (SYMMETRIC) = .11538
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .10559 WITH COMRET OEPENOENT. = .20534 WITH USER OEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .13946
KENOALL'S TAU B = -.38702. SIGNIFICANCE = .0110
KENOALL'S TAU C = -.39453. SIGNIFICANCE = .0110
GAMMA = -.66013
SOMERS'S O (ASYMMETRIC) = -.48792 WITH COMRET OEPENOENT. = -.30699 WITH USER OEPENOENT.
SOMERS'S O (SYMMETRIC) = -.37687
ETA = .48386 WITH COMRET OEPENOENT. = .49007 WITH USER OEPENOENT.
PEARSON'S R = -.48386 SIGNIFICANCE = .0025

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

CHOCOM USER CHOOSES COM LANG BY USER USER TYPE

* PAGE 1 OF 1

CHOCOM	USER: COUNT / ROW PCT / COL PCT / TOT PCT	INTERMEO IARY 1	ENO-USER 2	ROW TOTAL
NOT USEFUL	1	0 .0 .0 .0	1 100.0 11.1 3.1	1 3.1
SOMEWHAT USEFUL	2	1 100.0 4.3 3.1	0 .0 .0 .0	1 3.1
INOIFFERENT	3	0 .0 .0 .0	6 100.0 66.7 18.8	6 18.8
VERY USEFUL	4	11 91.7 47.8 34.4	1 8.3 11.1 3.1	12 37.5
ESSENTIAL	5	11 91.7 47.8 34.4	1 8.3 11.1 3.1	12 37.5
COLUMN TOTAL		23 71.9	9 28.1	32 100.0

8 OUT OF 10 (80.0%) OF THE VALIO CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTEO CELL FREQUENCY = .281
RAW CHI SQUARE = 22.93076 WITH 4 OEGREES OF FREEOOM. SIGNIFICANCE = .0001
CRAMER'S V = .84651
CONTINGENCY COEFFICIENT = .64610
LAMBOA (ASYMMETRIC) = .25000 WITH CHOCOM DEPENOENT. = .77778 WITH USER DEPENOENT.
LAMBOA (SYMMETRIC) = .41379
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .29935 WITH CHOCOM OEPENOENT. = .63791 WITH USER OEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .40748
KENOALL'S TAU B = -.54691. SIGNIFICANCE = .0005
KENOALL'S TAU C = -.57422. SIGNIFICANCE = .0005
GAMMA = -.79459
SOMERS'S O (ASYMMETRIC) = -.71014 WITH CHOCOM OEPENOENT. = -.42120 WITH USER OEPENDENT.
SOMERS'S O (SYMMETRIC) = -.52878
ETA = .58509 WITH CHOCOM DEPENOENT. = .84651 WITH USER OEPENDENT.
PEARSON'S R = -.58509 SIGNIFICANCE = .0002

Figure 30. Crosstabulation of "User Chooses Command Language".

DISCUSSION OF USER-DEFINED REQUIREMENTS

The results to questions number 34-60, features which could be included in the on-line version of the directory, were analyzed in order to identify the user-defined requirements for searching the on-line version of the directory on the Gateway.

The features were ranked in order of preference by the participants in the study as follows. All responses were counted and assigned point values: The number one responses were assigned the value -2, the number 2 responses were assigned the value -1, the number 3 responses were assigned 0 points, the number 4 responses were assigned the value +1, and the number 5 responses were assigned the value +2. The responses under each number in the scale were multiplied by the point values assigned and a total was computed for each feature. The total for each feature was the score assigned to that feature.

Seventeen "no opinion" responses were recorded (1.96%) and no feature received more than 3 "no opinion" responses. It is assumed that anyone who gave a "no opinion" response had implied, "I don't care". They could not have intended, "I don't know," since the responses were gathered over the telephone, and any questions participants had could be easily answered. Therefore, in this study, the "no opinion" responses were treated as 3's and assigned 0 points. They were not reflected in the bar graphs, since they were non-responses. The results were tabulated using the 98% responses which reflected opinions.

Table 9 lists the features in the order they are in the questionnaire. The score for each feature is in the right column.

The features were then assembled in descending order from highest score to lowest score. In this way, those features with the most responses in the upper end of the scale were weighted, and the scores for those features were highest, thus identifying them as the most desirable features to the participants of the study.

Table 10 lists the features in descending order. The score for each feature is the number in parentheses after the feature. A "Yes" is recorded in the column under an interface if the interface possesses the feature in that row. A "No" means the interface does not possess the feature in that row.

The presence or absence of features in each of the four interfaces compared in Table 10 was verified in conversation by telephone with Dr. Tamas Doszkocs (CITE),[22] Dr. Richard S. Marcus (ASSIST and CONIT)[23] and Dr. Gabriel Jakobson (FRED).[24]

TABLE 9

FEATURES AND SCORES

FEATURE NO.	FEATURE	SCORE
34	Minimum Amount of Keyboarding	36
35	Choice Between Commands or Menus	43
36	Command-Driven Only	-12
37	Menu-Driven Only	-14
38	Common Retrieval Language	37
39	Accepts User-Defined Commands	0
40	User Chooses Command Language	33
41	Choose Among Levels of Expertise	30
42	Accepts Natural English Language	7
43	Compensates for Spelling Errors	10
44	Questions to Formulate Search Strategy	-4
45	Suggests Related Terms	32
46	Gives Feedback on Search Strategy	19
47	System or User Selects Data Base	23
48	System Chooses the Data Base	-26
49	Displays Process it Followed	31
50	Ranks Retrieved Results for Relevancy	16
51	Explains User Errors	34
52	Includes a Help Feature	34
53	Stores Search Strategy	42
54	User Can Define Output Formats	52
55	Stores User-Defined Formats	38

TABLE 9--Continued

FEATURE NO.	FEATURE	SCORE
56	Has Menu of Canned Formats	35
57	Allows User to Create Charts	10
58	Allows User to Create Graphs	6
59	Allows User to Download Information	45
60	Allows User to Reformat Information	35

TABLE 10

FEATURES IN ORDER OF PREFERENCE BY THE
USERS AND COMPARED TO THE FOUR INTERFACES

NO.	FEATURE (SCORE)	ASSIST	CITE	CONIT	FRED
54.	Allows User to Define Output Formats (52)	Yes	No	Yes	No
59.	Allows User to Download Information (45)	Yes	No	Yes	No
35.	User Chooses Between Commands or Menus (43)	Yes - both at same time	No	No	Yes- Choice between natural language & menu
53.	Stores Search Strategy for Later Use (42)	Yes	No	Yes	Yes
55.	Allows Storage of User-Defined Formats (38)	No	No	No	No
38.	Common Retrieval Language (37)	Yes	No	Yes	No
34.	Minimum Amount of Keyboarding (36)	Yes	Yes	Yes	Yes
56.	Has a Menu of Canned Formats (35)	No	No	No	No
60.	Allows User to Reformat Information (35)	No	No	No	No
51.	Explains User Errors (34)	Yes	Yes - hard to make errors	Yes	Yes
52.	Includes a Help Feature (34)	Yes	Yes	Yes	Yes
40.	User Chooses Command Language (DROLS, DoE, NASA) (33)	Yes	No	Yes	No

TABLE 10--Continued

NO.	FEATURE (SCORE)	ASSIST	CITE	CONIT	FRED
45.	Suggests Related Terms (32)	No	Yes	No	Yes
49.	Displays Process it Followed to Obtain Results (31)	Yes	No	Yes	Yes
41.	User Chooses Among Levels of Searching Expertise (30)	No	No	No	Yes
47.	Choice Between System or User Selecting Data Base (23)	No	Yes	No	Yes
46.	Gives Feedback on Search Strategy to Improve It (19)	Yes	Yes-also accepts user feed-back	Moderately	Yes
50.	Ranks Retrieved Results According to Relevancy (16)	No	Yes	No	No
43.	Compensates for Spelling Errors (10)	No	No-detec-tion, not correction	No	Yes
57.	Allows the User to Create Charts (10)	No	No	No	No
42.	Accepts Natural English Language (7)	No	Yes	No	Yes
58.	Allows User to Create Graphs (6)	No	No	No	No
39.	User-Defined Commands (0)	No	No	No	No
44.	Questions User to Formulate Search Strategy (-4)	Yes	No	No	No
36.	Command-Driven Only (-12)	Yes	No	Yes	No
37.	Menu-Driven Only (-14)	Yes	Yes	No	No
48.	System Chooses the Data Base (-26)	No	No	No	No

TABLE 10--Continued

NO.	FEATURE (SCORE)	ASSIST	CITE	CONIT	FRED
45.	Suggests Related Terms (32)	No	Yes	No	Yes
49.	Displays Process it Followed to Obtain Results (31)	Yes	No	Yes	Yes
41.	User Chooses Among Levels of Searching Expertise (30)	No	No	No	Yes
47.	Choice Between System or User Selecting Data Base (23)	No	Yes	No	Yes
46.	Gives Feedback on Search Strategy to Improve It (19)	Yes	Yes-also accepts user feed-back	Moderately	Yes
50.	Ranks Retrieved Results According to Relevancy (16)	No	Yes	No	No
43.	Compensates for Spelling Errors (10)	No	No-detec-tion, not correction	No	Yes
57.	Allows the User to Create Charts (10)	No	No	No	No
42.	Accepts Natural English Language (7)	No	Yes	No	Yes
58.	Allows User to Create Graphs (6)	No	No	No	No
39.	User-Defined Commands (0)	No	No	No	No
44.	Questions User to Formulate Search Strategy (-4)	Yes	No	No	No
36.	Command-Driven Only (-12)	Yes	No	Yes	No
37.	Menu-Driven Only (-14)	Yes	Yes	No	No
48.	System Chooses the Data Base (-26)	No	No	No	No

CONCLUSIONS

Based on the participants' ranking of features and comparison to the four interfaces in Table 10, it was hoped that one of these four interfaces would stand out as being the most effective interface for searching the on-line version of the directory on the Gateway. The process followed to arrive at a conclusion is described here.

If a score of 30 is used as a cut-off point, a line can be drawn on Table 10 under Feature Number 41. This will distinguish the top 15 user-defined requirements for an interface for the directory on the Gateway. Next, all the yes responses are counted for each interface compared on Table 10 for these top 15 features; ASSIST has 10 yes responses, CITE has 4, CONIT has 9, and FRED has 8.

CITE is rejected first, because it has only 4 of the top 15 user-defined requirements for an interface. Also, only one of these four requirements can be considered unique to CITE, and that is Feature Number 45 - Suggests Related Terms.

The feature which is most unique to FRED is Feature Number 42 - Accepts Natural English Language. This feature received a score of 7, which places it fairly low in the ranking. Most of FRED's other features in the top 15 are also shared by some of the other interfaces. Therefore, FRED is rejected at this point.

CONIT and ASSIST have many features which are ranked high in the list of top 15 user-defined requirements. These features include: Feature Number 54 - Allows the User to Define Output Formats, Feature Number 59 - Allows the User to Download Information, Feature Number 53 - Stores Search Strategy for

Use, Feature Number 38 - Uses a Common Retrieval Language, Feature Number 34 - Minimum Amount of Keyboarding, Feature Number 51 - Explains User Errors, Feature Number 52 - Includes a Help Feature, Feature Number 40 - User Chooses a Command Language, and Feature Number 49 - Displays the Process It Followed to Obtain Results.

A requirement for an interface ranked highly by the users was a common retrieval language (Feature Number 38) or a command language chosen by the user (Feature Number 40). One of CONIT's unique characteristics is a simple, easy-to-learn command language that can be used to search all the data bases. ASSIST is an enhanced version of CONIT which allows the user to use commands and menus at the same time. (This requirement - Feature Number 35 - was ranked 3rd by the participants of the study with a score of 43.)

Both ASSIST and CONIT have been developed by Dr. Richard S. Marcus at the Massachusetts Institute of Technology (MIT). CONIT is a user-friendly on-line search assistance intermediary that allows for a minimum amount of keyboarding, extensive instructional dialogue, and uses a common command language to aid in searching a number of commercial on-line bibliographic data bases. ASSIST is a new version of CONIT "designed to integrate the best features of standard CONIT...as well as some newer ideas,"[25] which include leading a user through the entire search process by a question and answer dialogue with a menu format, an on-line tutorial to introduce the user to CONIT commands, and the option of ASSIST executing CONIT commands for the user or allowing the user to take more control of the search strategy.

RECOMMENDATIONS

As a result of this study, I recommend that the Defense Technical Information Center (DTIC) contract with Dr. Richard Marcus to develop a CONIT or ASSIST-like interface for the on-line Data Base of Data Bases on the Gateway. Such a custom-developed interface would possess the features that are perceived to be essential by the potential users of the on-line version of the directory (the top 15 requirements of Table 10). Those features of CONIT and ASSIST which the users did not rank highly in this study would not need to be included in the new interface.

The benefits of the development and incorporation of this interface into the Data Base of Data Bases on the Gateway would be as follows:

1. DTIC would be placed in the forefront of the developing technology in interfaces and human/computer interactions.
2. DTIC would gain experience from participating in the development of this interface, and the benefits of that experience could be applied elsewhere in DTIC.
3. A help feature and a feature to explain user errors on this interface would ease the burden of providing hotline assistance to users of the Data Base of Data Bases.
4. The "user-friendly" interface would somewhat mitigate the need for DTIC to provide costly training before a user could begin to search the Data Base of Data Bases.
5. The interface would reduce the difficulty of searching by allowing the user to make queries in a common language and receive results in the same language.

6. More data bases would be accessible to more users and thus more information would be available.

7. Through increased use of the Data Base of Data Bases, a duplication of effort by users could be lessened or avoided.

The custom-developed interface for the Data Base of Data Bases on the Gateway would contain features as specified by the users in this study. However, as Dr. Marcus has pointed out, "users may not be able to predict usage modes -- especially where new designs and functionality are desirable and likely."[26] The potential users in this study have indicated which features seem desirable to them, but they may have ranked a feature conservatively if it was one they had never heard of, or could not imagine, or did not believe that present technology would support. A comment often made by participants when a particularly sophisticated feature was mentioned was, "That would be great, if it worked." Many of the participants could not believe that all the features mentioned in questions number 34-60 of the questionnaire were possible in an interface or the host computer within which the interface would reside. Therefore, I recommend that the final decision on the type of interface that is used for the on-line version of the directory on the Gateway be made by those closely associated with the directory and the Gateway. But the wishes of the potential users, as represented in this study, should weigh heavily in that decision-making process.

As a methodology, this study was exploratory in nature. Due to the method employed-mailing out a standardized questionnaire and collecting responses over the telephone-a high number of responses were gathered in a limited period of time, and participants who had questions were more

likely to ask them than they would have been if they were not contacted directly. Therefore, the results of this study can be considered credible. I recommend this methodology for similar studies, however, a broader sample group, especially of end users, should be used when possible.

Appendix A - Questionnaire

1. Name of Respondent: _____

2. Name of Organization: _____

Hi! My name is Georgene Chastain, and I'm calling from the Defense Technical Information Center. I am working on a project to identify user requirements for searching a Directory of DoD-Sponsored R&D Data Bases on the Defense Gateway Computer System. You were suggested as a person likely to have an interest in the directory and the gateway.

3. Have you had an opportunity to look at the directory?

☐ NO ☐ YES (Go to 6)

4. Would you be willing to answer some questions about it at a future date?

☐ NO (Go to CLOSING) ☐ YES

5. The questions will take about 15 minutes of your time. When would be the best time to call you? _____

6. The questions will take about 15 minutes of your time. Is now a good time?

☐ NO (Go to 7) ☐ YES (Go to 8)

7. When would be a good time to call you? _____

8. Approximate number of people in organization: _____

9. Are you a member or supervisor of the library staff?

☐ NO (Go to 13) ☐ YES

10. How many individuals in the library do on-line searching of data bases? _____

11. Would you please name the data bases which you and/or your staff search.

_____ _____ _____

_____ _____ _____

_____ _____ _____

12. I am going to read a short list of hardware. Please indicate whether or not you have any of each type available to you and/or your staff.

Dedicated terminal (e.g. Uniscope-DROLS, Beehive-OCLC)

☐ NO ☐ YES How Many?_____

Dial-up terminal (e.g. TI Silent 700, HP, etc.)

☐ NO ☐ YES How Many?_____

Communicating microcomputers (NOTE: a microcomputer with a smart modem or an acoustic coupler and communications software.)

☐ NO ☐ YES How Many?_____

Dedicated microcomputers

☐ NO ☐ YES How Many?_____

(Go to 18)

13. I am going to read you a list of terms which can be used to describe professional functions. Please indicate whether or not each term describes your present work.

	N	Y
Planner	☐	☐
Marketer	☐	☐
Scientist or Engineer	☐	☐

Other_____

14. Do you do on-line searching of data bases?

☐ NO (Go to 17) ☐ YES

15. Would you please name the data bases which you search?

_____ _____ _____

_____ _____ _____

_____ _____ _____

16. I am going to read a short list of hardware. Please indicate whether or not you have any of each type available to you and/or your staff.

Dedicated terminal (e.g. Uniscope-DROLS, Beehive-OCLC)

☐ NO ☐ YES How Many?_____

Dial-up terminal (e.g. TI Silent 700, HP, etc.)

☐ NO ☐ YES How Many?_____

Communicating microcomputers (NOTE: a microcomputer with a smart modem or an acoustic coupler and communications software.)

☐ NO ☐ YES How Many?_____

Dedicated microcomputers

☐ NO ☐ YES How Many?_____

(Go to 18)

17. Who does on-line searching of data bases for you?

_____

18. The Directory of DoD-Sponsored R&D Data Bases is a listing of DoD's R&D data bases. Each entry contains information such as the data base name, dates of coverage, points of contact, hardware/software configuration, and a description of the data base. Agency, data base, and subject indices are provided. The subject coverage includes meteorology, weapon systems, hazardous materials, medicine, oceanography, antennas, survivability, reliability, and chemistry. Do you presently use the Directory of DoD-Sponsored R&D Data Bases?

☐ NO (Go to 20) ☐ YES

19. I am going to read you a list of the indices which are in the directory. Please indicate whether or not you have had occasion to use each index.

	N	Y
Data Base Index	☐	☐
Organization Index	☐	☐
Subject Index	☐	☐

20. Do you expect to be using the directory in the future?

☐ NO (Go to 22) ☐ YES

21. If the directory were available on-line, would you still need the hard copy directory?

☐ NO ☐ YES

22. If the directory were available on-line and accessible through dial-up terminals, would your organization use it?

☐ NO ☐ YES

The Defense Gateway Computer System is being developed to make it easier to access, reformat, and analyze information from data bases of interest to the DoD community. At the present time, a capability has been developed to automatically access, reformat, and analyze information in the Defense RDT&E On-Line System (DROLS), NASA/RECON, and DOE/RECON. The Directory of DoD-Sponsored R&D Data Bases will eventually be made available on-line on the gateway. This on-line version will be called the data base of data bases. Some of the data bases described in the directory will be accessible through the gateway.

23. When the directory is available on-line through the gateway, will you be the one searching it?

☐ NO ☐ YES (Go to 25)

24. (a) Would you want someone to search it for you?

☐ NO (Go to CLOSING) ☐ YES

(b) Please give me the name of the person who will be searching it. _____

25. (If the respondent is a member or supervisor of the library staff go to 26, else go to 27.) [see 9]

26. If the on-line directory were easy to use, do you think your library users and/or researchers would use it?

☐ NO ☐ YES

27. I am going to read a list of the fields in the directory. After I have read each field name, please indicate whether or not you would be likely to search that field.

	N	Y
Data Base Name:	☐	☐
Acronym:	☐	☐
Update frequency:	☐	☐
Beginning date:	☐	☐
Ending date:	☐	☐
Size:	☐	☐
Data Base Producer Name:	☐	☐
Data Base Producer Address:	☐	☐
Data Base Producer Contact:	☐	☐

	N	Y
Data Base Distributor Name:	☐	☐
Data Base Distributor Address:	☐	☐
Data Base Distributor Contact:	☐	☐
Data Base Generator Name:	☐	☐
Data Base Generator Address:	☐	☐
Data Base Generator Contact:	☐	☐
Availability of the data base:	☐	☐
Descriptors:	☐	☐
Data Base Type:	☐	☐
Code Character Set:	☐	☐
Density:	☐	☐
Number of Tracks:	☐	☐
Labeled:	☐	☐
Programming Language:	☐	☐
Computer:	☐	☐
Storage Media:	☐	☐
Input Media:	☐	☐

	N	Y
Output Media:	☐	☐
Documentation:	☐	☐
Classification Restrictions:	☐	☐
Abstract:	☐	☐

28. Are there any additional fields which you would like to see included in the on-line version?

☐ NO (Go to 30) ☐ YES

29. Please describe those additional fields.

_____

_____

_____

30. (a) Are there any fields in the directory which you would not want to display?

☐ NO (Go to 31) ☐ YES

(b) Which ones?

Data Base Name: ☐

Acronym: ☐

Update frequency: ☐

Beginning date: ☐

Ending date: ☐

Size: ☐

Data Base Producer Name: ☐

Data Base Producer Address: ☐

Data Base Producer Contact: ☐

Data Base Distributor Name: ☐

Data Base Distributor Address: ☐

Data Base Distributor Contact: ☐

Data Base Generator Name: ☐

Data Base Generator Address: ☐

Data Base Generator Contact: ☐

Availability of the data base: ☐

Descriptors: ☐

Data Base Type: ☐

Code Character Set: ☐

Density: ☐

Number of Tracks: ☐

Labeled: ☐

Programming Language: ☐

Computer: ☐

Storage Media: ☐

Input Media: ☐

Output Media: ☐

Documentation: ☐

Classification Restrictions: ☐

Abstract: ☐

31. Are there any additional fields which you would like to see included in the on-line version?

☐ NO (Go to 33) ☐ YES

32. Please describe those additional fields.

_____

_____

_____

33. I am going to read a list of features which could be included in the on-line version of the directory. I would like you to rank each feature on a scale of one to five, one meaning that the feature would not be useful for you and five meaning that the feature would be essential for you.

34. a system which requires a minimum amount of keyboarding.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

35. a system that allows the user to use either commands or menus.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

36. a system that is command-driven only.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

37. a system that is menu-driven only.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

38. a system with a common retrieval language using simple commands.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

39. a system that accepts user-defined commands.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

40. a system that allows the user to choose among command languages. Thus the user could use the command language of DOE/RECON, NASA/RECON, DIALOG, DROLS, etc. to search the directory.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

41. a system that allows the user to choose among levels of searching expertise, for example, beginner, intermediate, expert.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

42. a system that accepts unstructured natural English language queries and gives natural English language replies.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

43. a system that compensates for spelling errors.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

44. a system which poses questions to the user and uses the responses to formulate the search strategy.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

45. a system that can suggest related terms for your search strategy.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

46. a system that gives feedback on the search strategy, suggesting ways to improve it.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

47. a system which allows the user to choose between the system selecting the data base or the user selecting the data base to search.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

48. a system that automatically decides which data base to search.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

49. a system that displays the process it followed in order to obtain the search results.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

50. a system which ranks retrieved items according to their relevancy.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

51. a system which explains user errors.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

52. a system which includes a help feature.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

53. a system which stores the search strategy for later use.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

54. a system which allows the user to define output formats.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

55. a system which allows the storage of user-defined formats.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

56. a system which has a menu of canned formats.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

57. a system which allows the user to create charts.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

58. a system which allows the user to create graphs.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

59. a system which allows the user to download information.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

60. a system which allows the user to reformat the information.

1	2	3	4	5	No Opinion
☐	☐	☐	☐	☐	☐

61. Are there any additional requirements which you would like to see included in the on-line version?

☐ NO (Go to CLOSING) ☐ YES

62. Please describe those additional requirements.

_____

_____

_____

_____

_____

That's all the questions I have to ask you. You have been very helpful. Thank you very much. Good-bye!

Appendix B
List of Users Questioned

Mr. H. Eugene Thompson
Office of the Director
Defense Test and Evaluation
The Pentagon, Room 3D973
Washington, DC 20301

Mr. H.F. Hege
Chemical Propulsion Information Agency
Johns Hopkins University
Applied Physics Laboratory
Johns Hopkins Road
Laurel, MD 20707

Marilyn Harned and Pat Prentice
Naval Air Systems Command Library
Attn: AIR-7226
Washington, DC 20361

Betsy L. Fox
Defense Nuclear Agency
Attn: STTI
Washington, DC 20305

Mary B. Vick
USASCAF
The Pentagon Library
The Pentagon, Room 1A518
Washington, DC 20310

John Petrone
Army Industrial Base Engineering Activity
Rock Island Arsenal
Rock Island, IL 61299

Andrej Bevec
Harry Diamond Laboratories
Attn: Branch 21100
2800 Powder Mill Road
Adelphi, MD 20783

Frank Hamden
DLSIE-Defense Logistics Studies Information Exchange
Army Logistics Management Center
DRXMC-D
Fort Lee, VA 23801

Linda Evans
Rome Air Development Center
Technical Services
Griffiss Air Force Base
Rome, NY 13441

Sarah Happel
Naval Surface Weapons Center
Technical Library
White Oak
Silver Spring, MD 20910

Sandy Rose
Naval Surface Weapons Center
Technical Library
Dahlgren Laboratory
Dahlgren, VA 22448

Mary R. Weston
U.S. Air Force
Technical Library AFATL/DLODL
Eglin Air Force Base
Eglin, FL 32542

Burt Newlin
Defense Material Specifications &
Standards Office
5203 Leesburg Pike, Suite 1403
Falls Church, VA 22041-3466

Frank Jones
U.S. Air Force
Wright Aeronautical Laboratory
Wright-Patterson Air Force Base
Dayton, OH 45433

Linda Cheung
U.S. Army Foreign Science &
Technology Center
Information Services Division
AMSXT-IS3
220 Seventh Street, NE
Charlottesville, VA 22901

Charles Maiorana
Info/tek
4318 Fessenden St., NW
Washington, DC 20016

Paul Hogan
Office of the Secretary of Defense
Manpower Planning and Analysis
The Pentagon
Washington, DC 20310

Allan Reynolds
Armed Forces Medical Intelligence Center
(AFMIC)
Fort Detrick
Frederick, MD 21701-5004

Raymond D. Kee
U.S. Naval Intelligence Support Center
4301 Suitland Road
Suitland, MD 20390

Randall Newman
DTIC Boston On-Line Service Facility
AFGL Research Library/SULL
Bldg. 1103, Hanscom AFB
Bedford, MA 01731

Kathy Wright
Naval Ocean Systems Center
ATTN: Technical Library, Code 234B
San Diego, CA 92152

Leona Laughlin
MIT Lincoln Laboratory
244 Wood Street
Lexington, MA 02173

Sherril Hisaw
Hughes Aircraft Company
Building R-1/MS D405
P.O. Box 92426
Los Angeles, CA 90009

Joyce A. vanBerkel
Sandia National Labs
Technical Library-3144
Albuquerque, NM 87185

Louise Letendre
U.S. Army Ballistic Research Lab.
ATTN: AMXBR-OD-ST
Aberdeen Proving Ground, MD 21005

Ellen Dobi
Air Force Geophysics Laboratory
ATTN: AFGL/SULLR
Hanscom AFB, MA 01731

Donna Hurley
U.S. Naval Academy
Nimitz Library
Annapolis, MD 20402

William Issler
DARPA/DAO
1400 Wilson Blvd.
Arlington, VA 22209

Linda Louchnane
Defense Technical Information Center
MATRIS Office, San Diego
ATTN: DTIC-R
San Diego, CA 92152

Robert Seidel
Army Materials and Mechanics Research Center
ATTN: AMXMR-PL
Building 36
Watertown, MA 02172-0001

Roberta Babbitt
U.S. Army Signal Center
ATTN: ATZH-SEL
Fort Gordon, GA 30905-5153

Lea Hughes
Applied Technology Laboratory
ATTN: USARTL (AVSCOM)
Building 401
Fort Eustis, VA 23604

Claudia Norwood
Naval Sea Systems Command
Technical Library
ATTN: SEA 09B31
NC #3, Room 1515
Washington, DC 20362

Annie Davis
Air Weather Service
Technical Library
ATTN: USAFETAC/LDD
Scott AFB, IL 62225

Delfina C. Galloway
USAADASCH Library
ATTN: ATSA-SEL
Bldg. 3, Wing E, Room 181
Fort Bliss, TX 79916

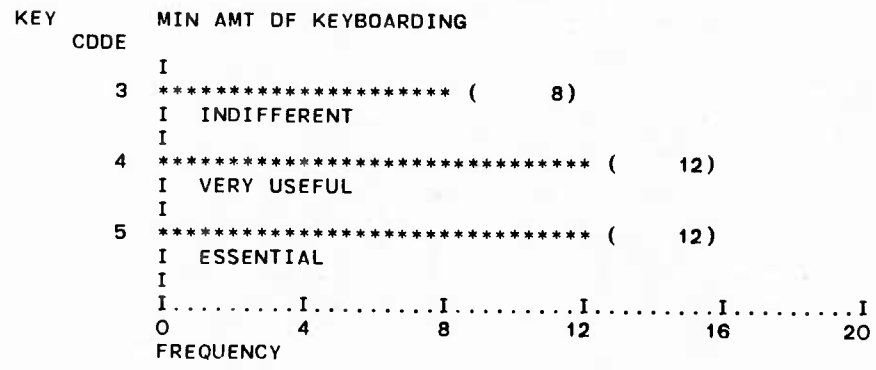
Martha Boshell
U.S. Army Chemical School
Fisher Library
ATTN: ATZN-CM-MLB, Building 2262
Fort McClellan, AL 36205-5020

Julie Gibson
USA TRASANA Technical Library
ATTN: ATOR-TSL
White Sands Missile Range, NM 88002-5502

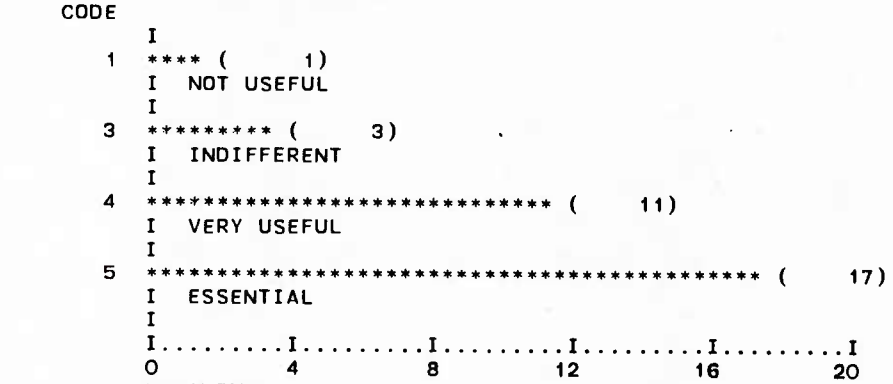
Susan Ewing
Air Force Human Resources Lab
AFHRL/LRS-TDC
Wright-Patterson AFB, OH 45433-5000

Margy Bowman
David W. Taylor Naval Ship R&D Center
Code 5220
Bethesda, MD 20084

Appendix C - Histograms



MEAN	4.125	STD ERR	.140	MEDIAN	4.167
MODE	4.000	STD DEV	.793	VARIANCE	.629
KURTOSIS	-1.349	SKEWNESS	-.233	RANGE	2.000
MINIMUM	3.000	MAXIMUM	5.000		
VALID CASES	32	MISSING CASES	0		



MEAN	4.344	STD ERR	.159	MEDIAN	4.559
MODE	5.000	STD DEV	.902	VARIANCE	.814
KURTOSIS	4.856	SKEWNESS	-1.890	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	32	MISSING CASES	0		

```
COM          CDMMAND DNLY
     CDDE
             I
        1    **************** (       6)
             I  NOT USEFUL
             I
        2    ***************************** (      11)
             I  SDMEWHAT USEFUL
             I
        3    ************************ (       9)
             I  INDIFFERENT
             I
        4    **** (       1)
             I  VERY USEFUL
             I
        5    ************** (       5)
             I  ESSENTIAL
             I
             I.........I.........I.........I.........I.........I
             0         4         8        12        16        20
             FREQUENCY

MEAN            2.625      STD ERR        .228      MEDIAN          2.409
MDDE            2.000      STD DEV       1.289      VARIANCE        1.661
KURTDSIS        -.386      SKEWNESS       .669      RANGE           4.000
MINIMUM         1.000      MAXIMUM       5.000

VALID CASES        32      MISSING CASES     0
```

```
MENU         MENU DNLY
     CODE
             I
        1    ***************************************** (       8)
             I  NOT USEFUL
             I
        2    *************************************************** (      10)
             I  SOMEWHAT USEFUL
             I
        3    ************************** (       5)
             I  INDIFFERENT
             I
        4    ******************************* (       6)
             I  VERY USEFUL
             I
        5    **************** (       3)
             I  ESSENTIAL
             I
             I.........I.........I.........I.........I.........I
             0         2         4         6         8        10
             FREQUENCY

MEAN            2.563      STD ERR        .233      MEDIAN          2.300
MODE            2.000      STD DEV       1.318      VARIANCE        1.738
KURTDSIS        -.975      SKEWNESS       .441      RANGE           4.000
MINIMUM         1.000      MAXIMUM       5.000

VALID CASES        32      MISSING CASES     0
```

```
COMRET     COMMON RETRIEVAL LANG
    CODE
           I
       1   ******  (     2)
           I  NOT USEFUL
           I
       3   **********  (     4)
           I  INOIFFERENT
           I
       4   ***************************  (    11)
           I  VERY USEFUL
           I
       5   ************************************  (    15)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN          4.156      STD ERR         .191      MEDIAN        4.409
MODE          5.000      STD DEV        1.081      VARIANCE      1.168
KURTOSIS      2.803      SKEWNESS      -1.637      RANGE         4.000
MINIMUM       1.000      MAXIMUM        5.000

VALID CASES      32      MISSING CASES     0
```

```
USRCOM     USER-DEFINED                COMMANDS
    CODE
           I
       1   ************************  (     5)
           I  NDT USEFUL
           I
       2   ******************************  (     6)
           I  SOMEWHAT USEFUL
           I
       3   ******************************************  (     9)
           I  INDIFFERENT
           I
       4   ****************************************  (     8)
           I  VERY USEFUL
           I
       5   ********************  (     4)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY

MEAN          3.000      STD ERR         .225      MEDIAN        3.056
MODE          3.000      STD DEV        1.270      VARIANCE      1.613
KURTOSIS      -.936      SKEWNESS       -.101      RANGE         4.000
MINIMUM       1.000      MAXIMUM        5.000

VALID CASES      32      MISSING CASES     0
```

```
CHOCOM     USER CHOOSES COM LANG
    CODE
           I
       1   **** (      1)
           I  NOT USEFUL
           I
       2   **** (      1)
           I  SOMEWHAT USEFUL
           I
       3   ***************** (      6)
           I  INDIFFERENT
           I
       4   ******************************** (     12)
           I  VERY USEFUL
           I
       5   ******************************** (     12)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8         12        16        20
           FREQUENCY

MEAN          4.031      STD ERR         .177      MEDIAN        4.167
MODE          4.000      STD DEV         .999      VARIANCE       .999
KURTOSIS      1.347      SKEWNESS      -1.099      RANGE         4.000
MINIMUM       1.000      MAXIMUM        5.000

VALID CASES      32      MISSING CASES      0
```

```
LEVEL      USER CHOOSE LEVEL OF EXP
    CODE
           I
       2   ****** (      2)
           I  SOMEWHAT USEFUL
           I
       3   ********************* (      8)
           I  INDIFFERENT
           I
       4   ******************************** (     12)
           I  VERY USEFUL
           I
       5   ************************* (     10)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8         12        16        20
           FREQUENCY

MEAN          3.938      STD ERR         .162      MEDIAN        4.000
MODE          4.000      STD DEV         .914      VARIANCE       .835
KURTOSIS      -.666      SKEWNESS       -.412      RANGE         3.000
MINIMUM       2.000      MAXIMUM        5.000

VALID CASES      32      MISSING CASES      0
```

```
NATLAN     NATURAL LANGUAGE
    CODE
           I
       1   ************************* (      5)
           I  NOT USEFUL
           I
       2   ******************** (      4)
           I  SOMEWHAT USEFUL
           I
       3   **************************************** (      8)
           I  INDIFFERENT
           I
       4   ********************************************* (      9)
           I  VERY USEFUL
           I
       5   ****************************** (      6)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY

MEAN            3.219      STD ERR        .236      MEDIAN       3.375
MODE            4.000      STD DEV       1.338      VARIANCE     1.789
KURTOSIS        -.944      SKEWNESS      -.341      RANGE        4.000
MINIMUM         1.000      MAXIMUM       5.000

VALID CASES        32      MISSING CASES     0
```

```
SPLERR     SPELLING ERRORS
    CODE
           I
       1   ****************************** (      6)
           I  NOT USEFUL
           I
       2   ************************* (      5)
           I  SOMEWHAT USEFUL
           I
       3   ******************** (      4)
           I  INDIFFERENT
           I
       4   *********************************** (      7)
           I  VERY USEFUL
           I
       5   ************************************************** (     10)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY

MEAN            3.313      STD ERR        .271      MEDIAN       3.643
MODE            5.000      STD DEV       1.533      VARIANCE     2.351
KURTOSIS       -1.407      SKEWNESS      -.337      RANGE        4.000
MINIMUM         1.000      MAXIMUM       5.000

VALID CASES        32      MISSING CASES     0
```

```
QUEST     QUEST FOR SEARCH STRAT
    CODE
          I
       1  ********************************************** (     9)
          I  NOT USEFUL
          I
       2  ************************ (     5)
          I  SOMEWHAT USEFUL
          I
       3  ************************ (     5)
          I  INDIFFERENT
          I
       4  ********************************** (     7)
          I  VERY USEFUL
          I
       5  ***************************** (     6)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         2         4         6         8         10
          FREQUENCY

MEAN          2.875      STD ERR        .268      MEDIAN        2.900
MODE          1.000      STD DEV       1.519      VARIANCE      2.306
KURTOSIS     -1.490      SKEWNESS       .048      RANGE         4.000
MINIMUM       1.000      MAXIMUM       5.000

VALID CASES      32      MISSING CASES     0
```

```
RELTER    RELATED TERMS
    CODE
          I
       1  ****** (     2)
          I  NOT USEFUL
          I
       2  **** (     1)
          I  SOMEWHAT USEFUL
          I
       3  ************** (     5)
          I  INDIFFERENT
          I
       4  ***************************** (    11)
          I  VERY USEFUL
          I
       5  ********************************** (    13)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         4         8         12        16        20
          FREQUENCY

MEAN          4.000      STD ERR        .201      MEDIAN        4.227
MODE          5.000      STD DEV       1.136      VARIANCE      1.290
KURTOSIS      1.296      SKEWNESS     -1.268      RANGE         4.000
MINIMUM       1.000      MAXIMUM       5.000

VALID CASES      32      MISSING CASES     0
```

```
FEEDBK     FEEDBK DN SEAR STRAT
  CODE
           I
       1   ********* (     3)
           I  NDT USEFUL
           I
       2   ********* (     3)
           I  SDMEWHAT USEFUL
           I
       3   ********** (     6)
           I  INDIFFERENT
           I
       4   ******************************** (     12)
           I  VERY USEFUL
           I
       5   ********************* (     8)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8         12        16        20
           FREQUENCY

MEAN          3.594     STD ERR        .219     MEDIAN        3.833
MODE          4.000     STD DEV       1.241     VARIANCE      1.539
KURTOSIS      -.216     SKEWNESS      -.769     RANGE         4.000
MINIMUM       1.000     MAXIMUM       5.000

VALID CASES      32     MISSING CASES     0
```

```
SELECT     SYS DR USER SELECTS DB
  CODE
           I
       1   ********** (     2)
           I  NOT USEFUL
           I
       2   ********** (     2)
           I  SDMEWHAT USEFUL
           I
       3   ********************************************* (     9)
           I  INDIFFERENT
           I
       4   ********************************************* (     9)
           I  VERY USEFUL
           I
       5   ************************************************** (     10)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY

MEAN          3.719     STD ERR        .207     MEDIAN        3.833
MODE          5.000     STD DEV       1.170     VARIANCE      1.370
KURTOSIS      -.056     SKEWNESS      -.696     RANGE         4.000
MINIMUM       1.000     MAXIMUM       5.000

VALID CASES      32     MISSING CASES     0
```

```
SYSSEL    SYSTEM SELECTS             DB
    CODE
          I
      1   ******************************************** (     17)
          I  NOT USEFUL
          I
      2   ****** (     2)
          I  SOMEWHAT USEFUL
          I
      3   ************** (     5)
          I  INOIFFERENT
          I
      4   **************** (     6)
          I  VERY USEFUL
          I
      5   ****** (     2)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         4         8         12        16        20
          FREQUENCY

MEAN          2.188     STD ERR        .252     MEDIAN       1.441
MOOE          1.000     STD OEV       1.424     VARIANCE     2.028
KURTOSIS     -1.164     SKEWNESS       .648     RANGE        4.000
MINIMUM       1.000     MAXIMUM       5.000

VALIO CASES      32     MISSING CASES     0
```

```
PROCES    DISPLAYS PROCESS
    CODE
          I
      1   ********* (     3)
          I  NOT USEFUL
          I
      2   **** (     1)
          I  SOMEWHAT USEFUL
          I
      3   ************** (     5)
          I  INOIFFERENT
          I
      4   ******************** (     8)
          I  VERY USEFUL
          I
      5   ************************************** (     15)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         4         8         12        16        20
          FREQUENCY

MEAN          3.969     STO ERR        .227     MEDIAN       4.375
MODE          5.000     STD DEV       1.282     VARIANCE     1.644
KURTOSIS       .589     SKEWNESS     -1.211     RANGE        4.000
MINIMUM       1.000     MAXIMUM       5.000

VALID CASES      32     MISSING CASES     0
```

```
RANKS      RANKS BY RELEVANCY
    CODE
           I
       1   ******************************* (      6)
           I  NOT USEFUL
           I
       2   ****** (      1)
           I  SOMEWHAT USEFUL
           I
       3   ******************************* (      6)
           I  INDIFFERENT
           I
       4   ********************************************** (      9)
           I  VERY USEFUL
           I
       5   *************************************************** (     10)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY

MEAN            3.500      STD ERR          .258      MEDIAN          3.833
MODE            5.000      STD DEV         1.459      VARIANCE        2.129
KURTDSIS        -.800      SKEWNESS        -.698      RANGE           4.000
MINIMUM         1.000      MAXIMUM         5.000

VALID CASES        32      MISSING CASES       0
```

```
EXPERR     EXPLAINS ERRORS
    CDDE
           I
       1   **** (      1)
           I  NDT USEFUL
           I
       2   **** (      1)
           I  SDMEWHAT USEFUL
           I
       3   ************** (      5)
           I  INDIFFERENT
           I
       4   ******************************* (     12)
           I  VERY USEFUL
           I
       5   ********************************** (     13)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN            4.094      STD ERR          .176      MEDIAN          4.250
MDDE            5.000      STD DEV          .995      VARIANCE         .991
KURTDSIS        1.740      SKEWNESS       -1.244      RANGE           4.000
MINIMUM         1.000      MAXIMUM         5.000

VALID CASES        32      MISSING CASES       0
```

```
HELP        HELP FEATURE
    CODE
                I
          1     **** (      1)
                I  NDT USEFUL
                I
          2     **** (      1)
                I  SDMEWHAT USEFUL
                I
          3     *********** (      4)
                I  INDIFFERENT
                I
          4     ************************************ (     15)
                I  VERY USEFUL
                I
          5     ***************************** (     11)
                I  ESSENTIAL
                I
                I.........I.........I.........I.........I.........I
                0         4         8         12        16        20
                FREQUENCY

MEAN            4.063       STD ERR          .168       MEDIAN         4.167
MODE            4.000       STD DEV          .948       VARIANCE        .899
KURTOSIS        2.481       SKEWNESS       -1.341       RANGE          4.000
MINIMUM         1.000       MAXIMUM         5.000

VALID CASES       32        MISSING CASES      0
```

```
STORE       STORES SEARCH STRATEGY
    CODE
                I
          1     **** (      1)
                I  NOT USEFUL
                I
          2     **** (      1)
                I  SOMEWHAT USEFUL
                I
          3     *********** (      4)
                I  INDIFFERENT
                I
          4     ****************** (      7)
                I  VERY USEFUL
                I
          5     ************************************************ (     19)
                I  ESSENTIAL
                I
                I.........I.........I.........I.........I.........I
                0         4         8         12        16        20
                FREQUENCY

MEAN            4.313       STD ERR          .182       MEDIAN         4.658
MODE            5.000       STD DEV         1.030       VARIANCE       1.060
KURTOSIS        2.437       SKEWNESS       -1.632       RANGE          4.000
MINIMUM         1.000       MAXIMUM         5.000

VALID CASES       32        MISSING CASES      0
```

```
FDRMAT    USR DEF DUTPUT FDRMATS
    CODE
          I
       3  *** (     2)
          I  INDIFFERENT
          I
       4  ******** (     8)
          I  VERY USEFUL
          I
       5  ********************** (    22)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         10        20        30        40        50
          FREQUENCY

MEAN          4.625      STD ERR        .108      MEDIAN        4.773
MDDE          5.000      STD DEV        .609      VARIANCE       .371
KURTOSIS      1.125      SKEWNESS     -1.428      RANGE         2.000
MINIMUM       3.000      MAXIMUM       5.000

VALID CASES      32      MISSING CASES     0
```

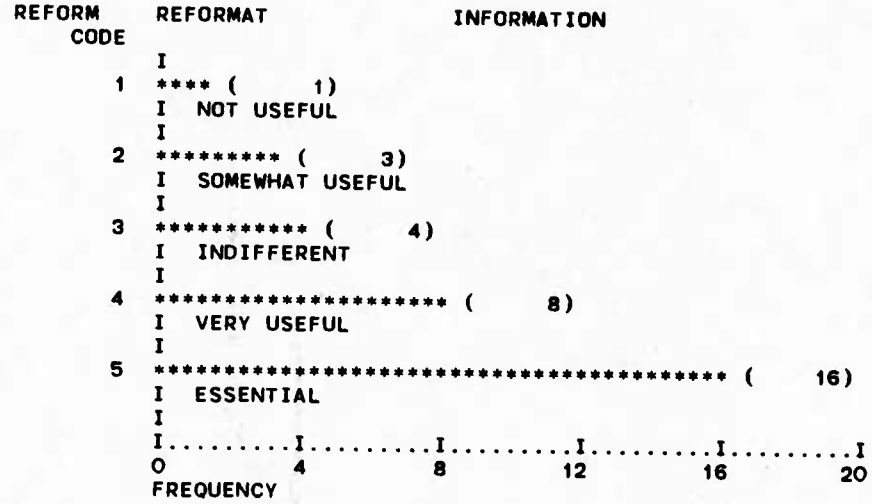
```
STOFDR    STDRE USR DEF FDRMATS
    CDDE
          I
       2  ****** (     2)
          I  SDMEWHAT USEFUL
          I
       3  ****** (     2)
          I  INDIFFERENT
          I
       4  ************************************** (    16)
          I  VERY USEFUL
          I
       5  ***************************** (    12)
          I  ESSENTIAL
          I
          I.........I.........I.........I.........I.........I
          0         4         8         12        16        20
          FREQUENCY

MEAN          4.188      STD ERR        .145      MEDIAN        4.250
MODE          4.000      STD DEV        .821      VARIANCE       .673
KURTDSIS      1.437      SKEWNESS     -1.118      RANGE         3.000
MINIMUM       2.000      MAXIMUM       5.000

VALID CASES      32      MISSING CASES     0
```

```
MENFOR     MENU OF CANNED                  FORMATS
    COOE
           I
       1   **** (        1)
           I  NOT USEFUL
           I
       2   **** (        1)
           I  SOMEWHAT USEFUL
           I
       3   ************** (        5)
           I  INOIFFERENT
           I
       4   ******************************** (       12)
           I  VERY USEFUL
           I
       5   *********************************** (       13)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN             4.094      STD ERR         .176      MEOIAN         4.250
MODE             5.000      STO OEV         .995      VARIANCE        .991
KURTOSIS         1.740      SKEWNESS      -1.244      RANGE          4.000
MINIMUM          1.000      MAXIMUM        5.000

VALIO CASES         32      MISSING CASES      0
```

```
CHARTS     USER CREATE CHARTS
    COOE
           I
       1   ****** (        2)
           I  NOT USEFUL
           I
       2   **************** (        6)
           I  SOMEWHAT USEFUL
           I
       3   ****************************** (       11)
           I  INDIFFERENT
           I
       4   **************** (        6)
           I  VERY USEFUL
           I
       5   ****************** (        7)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN             3.313      STO ERR         .213      MEDIAN         3.227
MODE             3.000      STD OEV        1.203      VARIANCE       1.448
KURTOSIS         -.825      SKEWNESS       -.060      RANGE          4.000
MINIMUM          1.000      MAXIMUM        5.000

VALIO CASES         32      MISSING CASES      0
```

```
GRAPHS     USER CREATE              GRAPHS
    CDDE
           I
       1   ****** (       2)
           I  NDT USEFUL
           I
       2   ******************** (       8)
           I  SOMEWHAT USEFUL
           I
       3   **************************** (      11)
           I  INDIFFERENT
           I
       4   *********** (       4)
           I  VERY USEFUL
           I
       5   ****************** (       7)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN            3.188      STD ERR         .217      MEDIAN         3.045
MODE            3.000      STD DEV        1.230      VARIANCE       1.512
KURTDSIS        -.933      SKEWNESS        .174      RANGE          4.000
MINIMUM         1.000      MAXIMUM        5.000

VALID CASES        32      MISSING CASES      0
```

```
DOWNLD     DOWNLDAD INFDRMATIDN
    CDDE
           I
       2   **** (       1)
           I  SOMEWHAT USEFUL
           I
       3   *********** (       4)
           I  INDIFFERENT
           I
       4   ******************** (       8)
           I  VERY USEFUL
           I
       5   ************************************************ (      19)
           I  ESSENTIAL
           I
           I.........I.........I.........I.........I.........I
           0         4         8        12        16        20
           FREQUENCY

MEAN            4.406      STD ERR         .148      MEDIAN         4.658
MDDE            5.000      STD DEV         .837      VARIANCE        .701
KURTDSIS         .814      SKEWNESS      -1.268      RANGE          3.000
MINIMUM         2.000      MAXIMUM        5.000

VALID CASES        32      MISSING CASES      0
```



MEAN	4.094	STD ERR	.203	MEDIAN	4.500
MODE	5.000	STD DEV	1.146	VARIANCE	1.314
KURTOSIS	.448	SKEWNESS	-1.154	RANGE	4.000
MINIMUM	1.000	MAXIMUM	5.000		
VALID CASES	32	MISSING CASES	0		

```
* * * * * * * * * * * * * * * * * * *  C R D S S T A B U L A T I D N   O F  * * * * * * * * * * * * * * * * * *
   KEY       MIN AMT DF KEYBDAROING                                    BY  USER      USER TYPE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1

                       USER
           CDUNT   I
          RDW PCT  IINTERMED END-USER   RDW
          CDL PCT  IIARY                TOTAL
          TOT PCT  I     1  I      2  I
KEY       --------I--------I--------I
               3  I     6  I      2  I     8
  INOIFFERENT     I  75.0  I   25.0  I  25.0
                  I  26.1  I   22.2  I
                  I  18.8  I    6.3  I
                 -I--------I--------I
               4  I     9  I      3  I    12
  VERY USEFUL     I  75.0  I   25.0  I  37.5
                  I  39.1  I   33.3  I
                  I  28.1  I    9.4  I
                 -I--------I--------I
               5  I     8  I      4  I    12
  ESSENTIAL       I  66.7  I   33.3  I  37.5
                  I  34.8  I   44.4  I
                  I  25.0  I   12.5  I
                 -I--------I--------I
          CDLUMN       23         9      32
           TDTAL      71.9      28.1   100.0

    3 DUT DF     6 ( 50.0%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY =  2.250
RAW CHI SQUARE =          .25765 WITH     2 DEGREES DF FREEDDM.  SIGNIFICANCE =   .8791
CRAMER'S V =    .08973
CONTINGENCY COEFFICIENT =   .08937
LAMBDA (ASYMMETRIC) =   .05000 WITH KEY      DEPENDENT.          =   .00000 WITH USER     DEPENOENT.
LAMBOA (SYMMETRIC) =   .03448
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) =   .00368 WITH KEY      DEPENDENT.          =   .00670 WITH USER     DEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) =   .00475
KENOALL'S TAU B =   .07584.    SIGNIFICANCE =   .3275
KENDALL'S TAU C =   .07813.    SIGNIFICANCE =   .3275
GAMMA =    .14706
SOMERS'S D (ASYMMETRIC) =   .09662 WITH KEY      DEPENDENT.          =   .05952 WITH USER     DEPENOENT.
SDMERS'S D (SYMMETRIC) =   .07366
ETA =    .07791 WITH KEY      DEPENDENT.          =   .08973 WITH USER     DEPENOENT.
PEARSDN'S R =  .07791  SIGNIFICANCE =   .3358
```

```
* * * * * * * * * * * * * * * * * *   C R O S S T A B U L A T I O N   O F   * * * * * * * * * * * * * * * * * *
   CDMENU     COMMANDS OR MENUS                                  BY  USER       USER TYPE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE   1 OF   1
```

CDMENU	USER	INTERMEDIARY 1	END-USER 2	ROW TOTAL
NOT USEFUL 1	COUNT	1	0	1
	ROW PCT	100.0	.0	3.1
	COL PCT	4.3	.0	
	TOT PCT	3.1	.0	
INDIFFERENT 3	COUNT	0	3	3
	ROW PCT	.0	100.0	9.4
	COL PCT	.0	33.3	
	TOT PCT	.0	9.4	
VERY USEFUL 4	COUNT	10	1	11
	ROW PCT	90.9	9.1	34.4
	COL PCT	43.5	11.1	
	TOT PCT	31.3	3.1	
ESSENTIAL 5	COUNT	12	5	17
	ROW PCT	70.6	29.4	53.1
	COL PCT	52.2	55.6	
	TOT PCT	37.5	15.6	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

```
    6 OUT OF      8 ( 75.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY =    .281
RAW CHI SQUARE =      10.04335 WITH      3 DEGREES OF FREEDOM.  SIGNIFICANCE =    .0182
CRAMER'S V =    .56023
CONTINGENCY COEFFICIENT =    .48875
LAMBDA (ASYMMETRIC) =    .00000 WITH CDMENU   DEPENDENT.          =    .33333 WITH USER     DEPENDENT.
LAMBDA (SYMMETRIC) =    .12500
UNCERTAINTY COEFFICIENT (ASYMMETRIC) =   .16218 WITH CDMENU   DEPENDENT.          =   .28206 WITH USER     DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) =   .20594
KENDALL'S TAU B =  -.07599.    SIGNIFICANCE =    .3290
KENDALL'S TAU C =  -.07422.    SIGNIFICANCE =    .3290
GAMMA =  -.13869
SOMERS'S D (ASYMMETRIC) =   -.09179 WITH CDMENU   DEPENDENT.          =  -.06291 WITH USER     DEPENDENT.
SOMERS'S D (SYMMETRIC) =  -.07466
ETA =    .08563 WITH CDMENU   DEPENDENT.          =    .56023 WITH USER     DEPENDENT.
PEARSON'S R = -.08563  SIGNIFICANCE =    .3206
```

COM		USER: INTERMEDIARY	USER: END-USER	ROW TOTAL
NOT USEFUL	1	4	2	6
	ROW PCT	66.7	33.3	18.8
	COL PCT	17.4	22.2	
	TOT PCT	12.5	6.3	
SOMEWHAT USEFUL	2	7	4	11
	ROW PCT	63.6	36.4	34.4
	COL PCT	30.4	44.4	
	TOT PCT	21.9	12.5	
INDIFFERENT	3	8	1	9
	ROW PCT	88.9	11.1	28.1
	COL PCT	34.8	11.1	
	TOT PCT	25.0	3.1	
VERY USEFUL	4	1	0	1
	ROW PCT	100.0	.0	3.1
	COL PCT	4.3	.0	
	TOT PCT	3.1	.0	
ESSENTIAL	5	3	2	5
	ROW PCT	60.0	40.0	15.6
	COL PCT	13.0	22.2	
	TOT PCT	9.4	6.3	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 2.47874 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6484
CRAMER'S V = .27832
CONTINGENCY COEFFICIENT = .26813
LAMBDA (ASYMMETRIC) = .04762 WITH COM DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .03217 WITH COM DEPENDENT. = .07775 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .04551
KENDALL'S TAU B = -.08201. SIGNIFICANCE = .3084
KENDALL'S TAU C = -.08984. SIGNIFICANCE = .3084
GAMMA = -.14650
SOMERS'S D (ASYMMETRIC) = -.11111 WITH COM DEPENDENT. = -.06053 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.07836
ETA = .03424 WITH COM DEPENDENT. = .27832 WITH USER DEPENDENT.
PEARSON'S R = -.03424 SIGNIFICANCE = .4262

* * * * * * * * * * * * * * * * * * C R D S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * *
MENU MENU ONLY BY USER USER TYPE
* PAGE 1 OF 1

MENU	COUNT / RDW PCT / COL PCT / TDT PCT	USER: INTERMEOIARY 1	ENO-USER 2	ROW TDTAL
NOT USEFUL	1	6 75.0 26.1 18.8	2 25.0 22.2 6.3	8 25.0
SDMEWHAT USEFUL	2	7 70.0 30.4 21.9	3 30.0 33.3 9.4	10 31.3
INDIFFERENT	3	5 100.0 21.7 15.6	0 .0 .0 .0	5 15.6
VERY USEFUL	4	4 66.7 17.4 12.5	2 33.3 22.2 6.3	6 18.8
ESSENTIAL	5	1 33.3 4.3 3.1	2 66.7 22.2 6.3	3 9.4
COLUMN TOTAL		23 71.9	9 28.1	32 100.0

8 OUT OF 10 (80.0%) OF THE VALIO CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTEO CELL FREQUENCY = .844
RAW CHI SQUARE = 4.29758 WITH 4 OEGREES OF FREEOOM. SIGNIFICANCE = .3672
CRAMER'S V = .36647
CONTINGENCY COEFFICIENT = .34409
LAMBOA (ASYMMETRIC) = .00000 WITH MENU DEPENOENT. = .11111 WITH USER OEPENDENT.
LAMBDA (SYMMETRIC) = .03226
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .05445 WITH MENU OEPENOENT. = .14076 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .07853
KENOALL'S TAU B = .11191. SIGNIFICANCE = .2450
KENOALL'S TAU C = .12500. SIGNIFICANCE = .2450
GAMMA = .19512
SDMERS'S O (ASYMMETRIC) = .15459 WITH MENU OEPENOENT. = .08101 WITH USER DEPENDENT.
SDMERS'S O (SYMMETRIC) = .10631
ETA = .15735 WITH MENU OEPENOENT. = .36647 WITH USER OEPENOENT.
PEARSDN'S R = .15735 SIGNIFICANCE = .1949

COUNT / ROW PCT / COL PCT / TOT PCT	USER INTERMEDIARY 1	USER END-USER 2	ROW TOTAL
COMRET 1 NOT USEFUL	0	2	2
	.0	100.0	6.3
	.0	22.2	
	.0	6.3	
3 INDIFFERENT	2	2	4
	50.0	50.0	12.5
	8.7	22.2	
	6.3	6.3	
4 VERY USEFUL	8	3	11
	72.7	27.3	34.4
	34.8	33.3	
	25.0	9.4	
5 ESSENTIAL	13	2	15
	86.7	13.3	46.9
	56.5	22.2	
	40.6	6.3	
COLUMN TOTAL	23	9	32
	71.9	28.1	100.0

6 OUT OF 8 (75.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 7.68543 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = .0530
CRAMER'S V = .49007
CONTINGENCY COEFFICIENT = .44007
LAMBDA (ASYMMETRIC) = .05882 WITH CDMRET DEPENDENT. = .22222 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .11538
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .10559 WITH CDMRET DEPENDENT. = .20534 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .13946
KENDALL'S TAU B = -.38702. SIGNIFICANCE = .0110
KENDALL'S TAU C = -.39453. SIGNIFICANCE = .0110
GAMMA = -.66013
SOMERS'S D (ASYMMETRIC) = -.48792 WITH COMRET DEPENDENT. = -.30699 WITH USER DEPENDENT.
SDMERS'S D (SYMMETRIC) = -.37687
ETA = .48386 WITH COMRET DEPENDENT. = .49007 WITH USER DEPENDENT.
PEARSON'S R = -.48386 SIGNIFICANCE = .0025

USRCOM	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	END-USER 2	ROW TOTAL
NOT USEFUL	1	5	0	5
		100.0	.0	15.6
		21.7	.0	
		15.6	.0	
SOMEWHAT USEFUL	2	3	3	6
		50.0	50.0	18.8
		13.0	33.3	
		9.4	9.4	
INDIFFERENT	3	7	2	9
		77.8	22.2	28.1
		30.4	22.2	
		21.9	6.3	
VERY USEFUL	4	6	2	8
		75.0	25.0	25.0
		26.1	22.2	
		18.8	6.3	
ESSENTIAL	5	2	2	4
		50.0	50.0	12.5
		8.7	22.2	
		6.3	6.3	
	COLUMN TOTAL	23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = 1.125
RAW CHI SQUARE = 4.51744 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3405
CRAMER'S V = .37573
CONTINGENCY COEFFICIENT = .35172
LAMBDA (ASYMMETRIC) = .04348 WITH USRCOM DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03125
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .05612 WITH USRCOM DEPENDENT. = .14804 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .08139
KENDALL'S TAU B = .13189. SIGNIFICANCE = .2070
KENDALL'S TAU C = .14844. SIGNIFICANCE = .2070
GAMMA = .22619
SOMERS'S D (ASYMMETRIC) = .18357 WITH USRCOM DEPENDENT. = .09476 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .12500
ETA = .16681 WITH USRCOM DEPENDENT. = .37573 WITH USER DEPENDENT.
PEARSON'S R = .16681 SIGNIFICANCE = .1808

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * *
CHOCOM USER CHOOSES COM LANG BY USER USER TYPE
* PAGE 1 OF 1

CHOCOM	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	END-USER 2	ROW TOTAL
1 NOT USEFUL	COUNT	0	1	1
	ROW PCT	.0	100.0	3.1
	COL PCT	.0	11.1	
	TOT PCT	.0	3.1	
2 SOMEWHAT USEFUL	COUNT	1	0	1
	ROW PCT	100.0	.0	3.1
	COL PCT	4.3	.0	
	TOT PCT	3.1	.0	
3 INDIFFERENT	COUNT	0	6	6
	ROW PCT	.0	100.0	18.8
	COL PCT	.0	66.7	
	TOT PCT	.0	18.8	
4 VERY USEFUL	COUNT	11	1	12
	ROW PCT	91.7	8.3	37.5
	COL PCT	47.8	11.1	
	TOT PCT	34.4	3.1	
5 ESSENTIAL	COUNT	11	1	12
	ROW PCT	91.7	8.3	37.5
	COL PCT	47.8	11.1	
	TOT PCT	34.4	3.1	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 22.93076 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0001
CRAMER'S V = .84651
CONTINGENCY COEFFICIENT = .64610
LAMBDA (ASYMMETRIC) = .25000 WITH CHOCOM DEPENDENT. = .77778 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .41379
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .29935 WITH CHOCOM DEPENDENT. = .63791 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .40748
KENDALL'S TAU B = -.54691. SIGNIFICANCE = .0005
KENDALL'S TAU C = -.57422. SIGNIFICANCE = .0005
GAMMA = -.79459
SOMERS'S D (ASYMMETRIC) = -.71014 WITH CHOCOM DEPENDENT. = -.42120 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.52878
ETA = .58509 WITH CHOCOM DEPENDENT. = .84651 WITH USER DEPENDENT.
PEARSON'S R = -.58509 SIGNIFICANCE = .0002

LEVEL	CDUNT / RDW PCT / CDL PCT / TOT PCT	USER: INTERMEDIARY (1)	USER: END-USER (2)	RDW TOTAL
2 SDMEWHAT USEFUL		2	0	2
		100.0	.0	6.3
		8.7	.0	
		6.3	.0	
3 INDIFFERENT		5	3	8
		62.5	37.5	25.0
		21.7	33.3	
		15.6	9.4	
4 VERY USEFUL		11	1	12
		91.7	8.3	37.5
		47.8	11.1	
		34.4	3.1	
5 ESSENTIAL		5	5	10
		50.0	50.0	31.3
		21.7	55.6	
		15.6	15.6	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

5 OUT OF 8 (62.5%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 5.82287 WITH 3 DEGREES OF FREEDDM. SIGNIFICANCE = .1206
CRAMER'S V = .42657
CONTINGENCY CDEFFICIENT = .39237
LAMBDA (ASYMMETRIC) = .20000 WITH LEVEL DEPENDENT. = .00000 WITH USER OEPENDENT.
LAMBOA (SYMMETRIC) = .13793
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .08358 WITH LEVEL DEPENDENT. = .17600 WITH USER OEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .11333
KENDALL'S TAU B = .18419. SIGNIFICANCE = .1349
KENDALL'S TAU C = .19531. SIGNIFICANCE = .1349
GAMMA = .32051
SDMERS'S D (ASYMMETRIC) = .24155 WITH LEVEL DEPENDENT. = .14045 WITH USER DEPENOENT.
SOMERS'S D (SYMMETRIC) = .17762
ETA = .19807 WITH LEVEL DEPENDENT. = .42657 WITH USER DEPENOENT.
PEARSDN'S R = .19807 SIGNIFICANCE = .1386

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

NATLAN NATURAL LANGUAGE BY USER USER TYPE

* PAGE 1 OF 1

NATLAN	USER CDUNT RDW PCT CDL PCT TDT PCT	INTERMEDIARY 1	END-USER 2	RDW TDTAL
NDT USEFUL	1	3 60.0 13.0 9.4	2 40.0 22.2 6.3	5 15.6
SDMEWHAT USEFUL	2	3 75.0 13.0 9.4	1 25.0 11.1 3.1	4 12.5
INDIFFERENT	3	6 75.0 26.1 18.8	2 25.0 22.2 6.3	8 25.0
VERY USEFUL	4	8 88.9 34.8 25.0	1 11.1 11.1 3.1	9 28.1
ESSENTIAL	5	3 50.0 13.0 9.4	3 50.0 33.3 9.4	6 18.8
	CDLUMN TDTAL	23 71.9	9 28.1	32 100.0

8 DUT DF 10 (80.0%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = 1.125
RAW CHI SQUARE = 3.11583 WITH 4 DEGREES DF FREEDDM. SIGNIFICANCE = .5386
CRAMER'S V = .31204
CDNTINGENCY CDEFFICIENT = .29788
LAMBDA (ASYMMETRIC) = .08696 WITH NATLAN DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .06250
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .03192 WITH NATLAN DEPENDENT. = .08419 WITH USER DEPENDENT.
UNCERTAINTY CDEFFICIENT (SYMMETRIC) = .04629
KENDALL'S TAU B = .01735. SIGNIFICANCE = .4572
KENDALL'S TAU C = .01953. SIGNIFICANCE = .4572
GAMMA = .02959
SDMERS'S D (ASYMMETRIC) = .02415 WITH NATLAN DEPENDENT. = .01247 WITH USER DEPENDENT.
SDMERS'S D (SYMMETRIC) = .01645
ETA = .00164 WITH NATLAN DEPENDENT. = .31204 WITH USER DEPENDENT.
PEARSDN'S R = .00165 SIGNIFICANCE = .4964

SPLERR	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY (1)	USER: END-USER (2)	ROW TOTAL
1		3	3	6
NDT USEFUL		50.0	50.0	18.8
		13.0	33.3	
		9.4	9.4	
2		4	1	5
SOMEWHAT USEFUL		80.0	20.0	15.6
		17.4	11.1	
		12.5	3.1	
3		3	1	4
INDIFFERENT		75.0	25.0	12.5
		13.0	11.1	
		9.4	3.1	
4		6	1	7
VERY USEFUL		85.7	14.3	21.9
		26.1	11.1	
		18.8	3.1	
5		7	3	10
ESSENTIAL		70.0	30.0	31.3
		30.4	33.3	
		21.9	9.4	
COLUMN TOTAL		23 / 71.9	9 / 28.1	32 / 100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = 1.125
RAW CHI SQUARE = 2.28351 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6838
CRAMER'S V = .26713
CONTINGENCY COEFFICIENT = .25808
LAMBDA (ASYMMETRIC) = .00000 WITH SPLERR DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .00000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .02249 WITH SPLERR DEPENDENT. = .05904 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .03257
KENDALL'S TAU B = -.09743. SIGNIFICANCE = .2733
KENDALL'S TAU C = -.10938. SIGNIFICANCE = .2733
GAMMA = -.17073
SOMERS'S D (ASYMMETRIC) = -.13527 WITH SPLERR DEPENDENT. = -.07018 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.09241
ETA = .12954 WITH SPLERR DEPENDENT. = .26713 WITH USER DEPENDENT.
PEARSON'S R = -.12954 SIGNIFICANCE = .2399

QUEST		USER: INTERMEDIARY	USER: END-USER	ROW TOTAL
	COUNT	1	2	
	ROW PCT	77.8	22.2	28.1
	COL PCT	30.4	22.2	
	TOT PCT	21.9	6.3	
1 NOT USEFUL		7	2	9
	ROW PCT	60.0	40.0	15.6
	COL PCT	13.0	22.2	
	TOT PCT	9.4	6.3	
2 SOMEWHAT USEFUL		4	1	5
	ROW PCT	80.0	20.0	15.6
	COL PCT	17.4	11.1	
	TOT PCT	12.5	3.1	
3 INDIFFERENT		6	1	7
	ROW PCT	85.7	14.3	21.9
	COL PCT	26.1	11.1	
	TOT PCT	18.8	3.1	
4 VERY USEFUL		3	3	6
	ROW PCT	50.0	50.0	18.8
	COL PCT	13.0	33.3	
	TOT PCT	9.4	9.4	
5 ESSENTIAL				
COLUMN TOTAL		23 71.9	9 28.1	32 100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = 1.406
RAW CHI SQUARE = 2.75071 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6004
CRAMER'S V = .29319
CONTINGENCY COEFFICIENT = .28135
LAMBDA (ASYMMETRIC) = .04348 WITH QUEST DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03125
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .02661 WITH QUEST DEPENDENT. = .07090 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .03870
KENDALL'S TAU B = .09682. SIGNIFICANCE = .2740
KENDALL'S TAU C = .10938. SIGNIFICANCE = .2740
GAMMA = .16667
SOMERS'S D (ASYMMETRIC) = .13527 WITH QUEST DEPENDENT. = .06931 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .09165
ETA = .09881 WITH QUEST DEPENDENT. = .29319 WITH USER DEPENDENT.
PEARSON'S R = .09881 SIGNIFICANCE = .2953

RELTER	USER: INTERMEDIARY (1)	USER: END-USER (2)	ROW TOTAL
1 NDT USEFUL	1	1	2
	50.0	50.0	6.3
	4.3	11.1	
	3.1	3.1	
2 SOMEWHAT USEFUL	0	1	1
	.0	100.0	3.1
	.0	11.1	
	.0	3.1	
3 INDIFFERENT	3	2	5
	60.0	40.0	15.6
	13.0	22.2	
	9.4	6.3	
4 VERY USEFUL	9	2	11
	81.8	18.2	34.4
	39.1	22.2	
	28.1	6.3	
5 ESSENTIAL	10	3	13
	76.9	23.1	40.6
	43.5	33.3	
	31.3	9.4	
COLUMN TOTAL	23	9	32
	71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 4.07965 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3953
CRAMER'S V = .35706
CONTINGENCY COEFFICIENT = .33626
LAMBDA (ASYMMETRIC) = .00000 WITH RELTER DEPENDENT. = .11111 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03571
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .04845 WITH RELTER DEPENDENT. = .10639 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .06658
KENDALL'S TAU B = -.19264. SIGNIFICANCE = .1239
KENDALL'S TAU C = -.20313. SIGNIFICANCE = .1239
GAMMA = -.34211
SOMERS'S D (ASYMMETRIC) = -.25121 WITH RELTER DEPENDENT. = -.14773 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.18605
ETA = .24867 WITH RELTER DEPENDENT. = .35706 WITH USER DEPENDENT.
PEARSON'S R = -.24867 SIGNIFICANCE = .0850

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

FEEDBK FEEDBK ON SEAR STRAT BY USER USER TYPE

* PAGE 1 OF 1

FEEDBK	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	USER: END-USER 2	ROW TOTAL
1 NOT USEFUL	COUNT	2	1	3
	ROW PCT	66.7	33.3	9.4
	COL PCT	8.7	11.1	
	TOT PCT	6.3	3.1	
2 SOMEWHAT USEFUL	COUNT	3	0	3
	ROW PCT	100.0	.0	9.4
	COL PCT	13.0	.0	
	TOT PCT	9.4	.0	
3 INDIFFERENT	COUNT	2	4	6
	ROW PCT	33.3	66.7	18.8
	COL PCT	8.7	44.4	
	TOT PCT	6.3	12.5	
4 VERY USEFUL	COUNT	10	2	12
	ROW PCT	83.3	16.7	37.5
	COL PCT	43.5	22.2	
	TOT PCT	31.3	6.3	
5 ESSENTIAL	COUNT	6	2	8
	ROW PCT	75.0	25.0	25.0
	COL PCT	26.1	22.2	
	TOT PCT	18.8	6.3	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .844
RAW CHI SQUARE = 6.44122 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1685
CRAMER'S V = .44865
CONTINGENCY COEFFICIENT = .40934
LAMBDA (ASYMMETRIC) = .10000 WITH FEEDBK DEPENDENT. = .22222 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .13793
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .07171 WITH FEEDBK DEPENDENT. = .17768 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .10218
KENDALL'S TAU B = -.10326. SIGNIFICANCE = .2636
KENDALL'S TAU C = -.11328. SIGNIFICANCE = .2636
GAMMA = -.17576
SOMERS'S D (ASYMMETRIC) = -.14010 WITH FEEDBK DEPENDENT. = -.07612 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.09864
ETA = .07648 WITH FEEDBK DEPENDENT. = .44865 WITH USER DEPENDENT.
PEARSON'S R = -.07648 SIGNIFICANCE = .3387

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

SELECT   SYS DR USER SELECTS DB   BY USER   USER TYPE

* PAGE 1 DF 1

SELECT	USER: CDUNT / RDW PCT / CDL PCT / TDT PCT	INTERMEDIARY 1	END-USER 2	RDW TDTAL
1 NDT USEFUL	CDUNT	1	1	2
	RDW PCT	50.0	50.0	6.3
	CDL PCT	4.3	11.1	
	TDT PCT	3.1	3.1	
2 SDMEWHAT USEFUL	CDUNT	2	0	2
	RDW PCT	100.0	.0	6.3
	CDL PCT	8.7	.0	
	TDT PCT	6.3	.0	
3 INDIFFERENT	CDUNT	6	3	9
	RDW PCT	66.7	33.3	28.1
	CDL PCT	26.1	33.3	
	TDT PCT	18.8	9.4	
4 VERY USEFUL	CDUNT	7	2	9
	RDW PCT	77.8	22.2	28.1
	CDL PCT	30.4	22.2	
	TDT PCT	21.9	6.3	
5 ESSENTIAL	CDUNT	7	3	10
	RDW PCT	70.0	30.0	31.3
	CDL PCT	30.4	33.3	
	TDT PCT	21.9	9.4	
CDLUMN TOTAL		23	9	32
		71.9	28.1	100.0

7 DUT DF 10 (70.0%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 1.54933 WITH 4 DEGREES DF FREEDDM. SIGNIFICANCE = .8179
CRAMER'S V = .22004
CDNTINGENCY CDEFFICIENT = .21490
LAMBDA (ASYMMETRIC) = .00000 WITH SELECT DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .00000
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .02242 WITH SELECT DEPENDENT. = .05372 WITH USER DEPENDENT.
UNCERTAINTY CDEFFICIENT (SYMMETRIC) = .03163
KENDALL'S TAU B = -.01074. SIGNIFICANCE = .4739
KENDALL'S TAU C = -.01172. SIGNIFICANCE = .4739
GAMMA = -.01961
SDMERS'S D (ASYMMETRIC) = -.01449 WITH SELECT DEPENDENT. = -.00796 WITH USER DEPENDENT.
SDMERS'S D (SYMMETRIC) = -.01027
ETA = .02828 WITH SELECT DEPENDENT. = .22004 WITH USER DEPENDENT.
PEARSDN'S R = -.02828 SIGNIFICANCE = .4389

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * *
SYSSEL SYSTEM SELECTS DB BY USER USER TYPE
* PAGE 1 DF 1

SYSSEL	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	USER: END-USER 2	ROW TOTAL
1 NOT USEFUL	COUNT	12	5	17
	ROW PCT	70.6	29.4	53.1
	COL PCT	52.2	55.6	
	TOT PCT	37.5	15.6	
2 SDMEWHAT USEFUL	COUNT	1	1	2
	ROW PCT	50.0	50.0	6.3
	COL PCT	4.3	11.1	
	TOT PCT	3.1	3.1	
3 INDIFFERENT	COUNT	4	1	5
	ROW PCT	80.0	20.0	15.6
	COL PCT	17.4	11.1	
	TOT PCT	12.5	3.1	
4 VERY USEFUL	COUNT	5	1	6
	ROW PCT	83.3	16.7	18.8
	COL PCT	21.7	11.1	
	TOT PCT	15.6	3.1	
5 ESSENTIAL	COUNT	1	1	2
	ROW PCT	50.0	50.0	6.3
	COL PCT	4.3	11.1	
	TOT PCT	3.1	3.1	
COLUMN TDTAL		23	9	32
		71.9	28.1	100.0

9 DUT OF 10 (90.0%) OF THE VALIO CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTEO CELL FREQUENCY = .563
RAW CHI SQUARE = 1.51376 WITH 4 DEGREES OF FREEDDM. SIGNIFICANCE = .8242
CRAMER'S V = .21750
CDNTINGENCY CDEFFICIENT = .21253
LAMBOA (ASYMMETRIC) = .00000 WITH SYSSEL OEPENDENT. = .00000 WITH USER OEPENOENT.
LAMBDA (SYMMETRIC) = .00000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .01787 WITH SYSSEL OEPENDENT. = .03869 WITH USER OEPENOENT.
UNCERTAINTY CDEFFICIENT (SYMMETRIC) = .02445
KENDALL'S TAU B = -.03047. SIGNIFICANCE = .4274
KENOALL'S TAU C = -.03125. SIGNIFICANCE = .4274
GAMMA = -.05882
SOMERS'S O (ASYMMETRIC) = -.03865 WITH SYSSEL DEPENDENT. = -.02402 WITH USER OEPENOENT.
SOMERS'S D (SYMMETRIC) = -.02963
ETA = .03409 WITH SYSSEL OEPENDENT. = .21750 WITH USER DEPENDENT.
PEARSON'S R = -.03409 SIGNIFICANCE = .4265

```
* * * * * * * * * * * * * * * * * *   C R D S S T A B U L A T I D N   D F   * * * * * * * * * * * * * * * * * *
   PROCES    DISPLAYS PRDCESS                                        BY  USER      USER TYPE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1

                      USER
              CDUNT  I
            ROW PCT IINTERMED END-USER   RDW
            CDL PCT IIARY                TOTAL
            TDT PCT I     1  I     2  I
PROCES      --------I--------I--------I
                1   I     2  I     1  I     3
  NDT USEFUL        I  66.7  I  33.3  I   9.4
                    I   8.7  I  11.1  I
                    I   6.3  I   3.1  I
                   -I--------I--------I
                2   I     1  I     0  I     1
  SOMEWHAT USEFUL   I 100.0  I    .0  I   3.1
                    I   4.3  I    .0  I
                    I   3.1  I    .0  I
                   -I--------I--------I
                3   I     3  I     2  I     5
  INDIFFERENT       I  60.0  I  40.0  I  15.6
                    I  13.0  I  22.2  I
                    I   9.4  I   6.3  I
                   -I--------I--------I
                4   I     6  I     2  I     8
  VERY USEFUL       I  75.0  I  25.0  I  25.0
                    I  26.1  I  22.2  I
                    I  18.8  I   6.3  I
                   -I--------I--------I
                5   I    11  I     4  I    15
  ESSENTIAL         I  73.3  I  26.7  I  46.9
                    I  47.8  I  44.4  I
                    I  34.4  I  12.5  I
                   -I--------I--------I
             CDLUMN       23        9       32
              TDTAL     71.9     28.1    100.0

    8 DUT DF    10 ( 80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY =    .281
RAW CHI SQUARE =       .83478 WITH      4 OEGREES OF FREEOOM.  SIGNIFICANCE =    .9337
CRAMER'S V =    .16151
CONTINGENCY CDEFFICIENT =    .15945
LAMBDA (ASYMMETRIC) =    .00000 WITH PRDCES   OEPENDENT.           =   .00000 WITH USER     DEPENOENT.
LAMBOA (SYMMETRIC) =    .00000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) =    .01277 WITH PRDCES   DEPENOENT.           =   .02841 WITH USER     DEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) =    .01762
KENDALL'S TAU B =   -.04087.    SIGNIFICANCE =    .4028
KENOALL'S TAU C =   -.04297.    SIGNIFICANCE =    .4028
GAMMA =   -.07692
SOMERS'S D (ASYMMETRIC) =   -.05314 WITH PROCES   OEPENDENT.           =  -.03143 WITH USER     OEPENOENT.
SDMERS'S D (SYMMETRIC) =   -.03950
ETA =    .03958 WITH PRDCES   DEPENDENT.           =    .16151 WITH USER     DEPENDENT.
PEARSDN'S R = -.03958  SIGNIFICANCE =    .4148
```

RANKS	USER: INTERMEDIARY	USER: END-USER	ROW TOTAL
1 NDT USEFUL	2	4	6
	33.3	66.7	18.8
	8.7	44.4	
	6.3	12.5	
2 SOMEWHAT USEFUL	1	0	1
	100.0	.0	3.1
	4.3	.0	
	3.1	.0	
3 INDIFFERENT	5	1	6
	83.3	16.7	18.8
	21.7	11.1	
	15.6	3.1	
4 VERY USEFUL	8	1	9
	88.9	11.1	28.1
	34.8	11.1	
	25.0	3.1	
5 ESSENTIAL	7	3	10
	70.0	30.0	31.3
	30.4	33.3	
	21.9	9.4	
COLUMN TOTAL	23	9	32
	71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 6.49619 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1650
CRAMER'S V = .45056
CONTINGENCY COEFFICIENT = .41079
LAMBDA (ASYMMETRIC) = .09091 WITH RANKS DEPENDENT. = .22222 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .12903
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .06956 WITH RANKS DEPENDENT. = .17050 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .09881
KENDALL'S TAU B = -.16649. SIGNIFICANCE = .1542
KENDALL'S TAU C = -.18359. SIGNIFICANCE = .1542
GAMMA = -.28485
SOMERS'S D (ASYMMETRIC) = -.22705 WITH RANKS DEPENDENT. = -.12208 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.15878
ETA = .26618 WITH RANKS DEPENDENT. = .45056 WITH USER DEPENDENT.
PEARSON'S R = -.26618 SIGNIFICANCE = .0704

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * *
EXPERR EXPLAINS ERRORS BY USER USER TYPE
* PAGE 1 OF 1

EXPERR	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	USER: END-USER 2	ROW TOTAL
1 NOT USEFUL	COUNT	1	0	1
	ROW PCT	100.0	.0	3.1
	COL PCT	4.3	.0	
	TOT PCT	3.1	.0	
2 SOMEWHAT USEFUL	COUNT	1	0	1
	ROW PCT	100.0	.0	3.1
	COL PCT	4.3	.0	
	TOT PCT	3.1	.0	
3 INDIFFERENT	COUNT	4	1	5
	ROW PCT	80.0	20.0	15.6
	COL PCT	17.4	11.1	
	TOT PCT	12.5	3.1	
4 VERY USEFUL	COUNT	10	2	12
	ROW PCT	83.3	16.7	37.5
	COL PCT	43.5	22.2	
	TOT PCT	31.3	6.3	
5 ESSENTIAL	COUNT	7	6	13
	ROW PCT	53.8	46.2	40.6
	COL PCT	30.4	66.7	
	TOT PCT	21.9	18.8	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 3.81558 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .4315
CRAMER'S V = .34531
CONTINGENCY COEFFICIENT = .32640
LAMBDA (ASYMMETRIC) = .15789 WITH EXPERR DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .10714
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .05369 WITH EXPERR DEPENDENT. = .11209 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .07260
KENDALL'S TAU B = .29691. SIGNIFICANCE = .0386
KENDALL'S TAU C = .30859. SIGNIFICANCE = .0386
GAMMA = .56028
SOMERS'S D (ASYMMETRIC) = .38164 WITH EXPERR DEPENDENT. = .23099 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .28780
ETA = .29484 WITH EXPERR DEPENDENT. = .34531 WITH USER DEPENDENT.
PEARSON'S R = .29484 SIGNIFICANCE = .0507

HELP		COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	USER: END-USER 2	ROW TOTAL
NOT USEFUL	1	COUNT	1	0	1
		ROW PCT	100.0	.0	3.1
		COL PCT	4.3	.0	
		TOT PCT	3.1	.0	
SOMEWHAT USEFUL	2	COUNT	1	0	1
		ROW PCT	100.0	.0	3.1
		COL PCT	4.3	.0	
		TOT PCT	3.1	.0	
INDIFFERENT	3	COUNT	3	1	4
		ROW PCT	75.0	25.0	12.5
		COL PCT	13.0	11.1	
		TOT PCT	9.4	3.1	
VERY USEFUL	4	COUNT	13	2	15
		ROW PCT	86.7	13.3	46.9
		COL PCT	56.5	22.2	
		TOT PCT	40.6	6.3	
ESSENTIAL	5	COUNT	5	6	11
		ROW PCT	45.5	54.5	34.4
		COL PCT	21.7	66.7	
		TOT PCT	15.6	18.8	
COLUMN TOTAL			23	9	32
			71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 6.22386 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1830
CRAMER'S V = .44102
CONTINGENCY COEFFICIENT = .40352
LAMBDA (ASYMMETRIC) = .23529 WITH HELP DEPENDENT. = .11111 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .19231
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .08586 WITH HELP DEPENDENT. = .17324 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .11481
KENDALL'S TAU B = .35200. SIGNIFICANCE = .0185
KENDALL'S TAU C = .35938. SIGNIFICANCE = .0185
GAMMA = .62162
SOMERS'S D (ASYMMETRIC) = .44444 WITH HELP DEPENDENT. = .27879 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .34264
ETA = .33046 WITH HELP DEPENDENT. = .44102 WITH USER DEPENDENT.
PEARSON'S R = .33046 SIGNIFICANCE = .0324

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

STORE STORES SEARCH STRATEGY BY USER USER TYPE

* PAGE 1 OF 1

STORE	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY 1	END-USER 2	ROW TOTAL
NOT USEFUL	1	0	1	1
		.0	100.0	3.1
		.0	11.1	
		.0	3.1	
SOMEWHAT USEFUL	2	1	0	1
		100.0	.0	3.1
		4.3	.0	
		3.1	.0	
INDIFFERENT	3	2	2	4
		50.0	50.0	12.5
		8.7	22.2	
		6.3	6.3	
VERY USEFUL	4	5	2	7
		71.4	28.6	21.9
		21.7	22.2	
		15.6	6.3	
ESSENTIAL	5	15	4	19
		78.9	21.1	59.4
		65.2	44.4	
		46.9	12.5	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

7 OUT OF 10 (70.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 4.36453 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3589
CRAMER'S V = .36931
CONTINGENCY COEFFICIENT = .34644
LAMBDA (ASYMMETRIC) = .00000 WITH STORE DEPENDENT. = .11111 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .04545
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .06351 WITH STORE DEPENDENT. = .11957 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .08296
KENDALL'S TAU B = -.21339. SIGNIFICANCE = .1041
KENDALL'S TAU C = -.20703. SIGNIFICANCE = .1041
GAMMA = -.39850
SOMERS'S D (ASYMMETRIC) = -.25604 WITH STORE DEPENDENT. = -.17785 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = -.20990
ETA = .26144 WITH STORE DEPENDENT. = .36931 WITH USER DEPENDENT.
PEARSON'S R = -.26144 SIGNIFICANCE = .0742

* * * * * * * * * * * * * * * * * * C R D S S T A B U L A T I D N O F * * * * * * * * * * * * * * * * * *
FDRMAT USR DEF DUTPUT FDRMATS BY USER USER TYPE

FDRMAT	USER: CDUNT / RDW PCT / CDL PCT / TDT PCT	INTERMEDIARY 1	END-USER 2	RDW TDTAL
INDIFFERENT	3	2 100.0 8.7 6.3	0 .0 .0 .0	2 6.3
VERY USEFUL	4	4 50.0 17.4 12.5	4 50.0 44.4 12.5	8 25.0
ESSENTIAL	5	17 77.3 73.9 53.1	5 22.7 55.6 15.6	22 68.8
COLUMN TDTAL		23 71.9	9 28.1	32 100.0

3 DUT DF 6 (50.0%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 2.99341 WITH 2 DEGREES DF FREEDDM. SIGNIFICANCE = .2239
CRAMER'S V = .30585
CDNTINGENCY CDEFFICIENT = .29248
LAMBDA (ASYMMETRIC) = .00000 WITH FDRMAT DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .00000
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .06736 WITH FDRMAT DEPENDENT. = .08815 WITH USER DEPENDENT.
UNCERTAINTY CDEFFICIENT (SYMMETRIC) = .07636
KENDALL'S TAU B = -.13573. SIGNIFICANCE = .2195
KENDALL'S TAU C = -.11719. SIGNIFICANCE = .2195
GAMMA = -.28302
SDMERS'S D (ASYMMETRIC) = -.14493 WITH FDRMAT DEPENDENT. = -.12712 WITH USER DEPENDENT.
SDMERS'S D (SYMMETRIC) = -.13544
ETA = .07246 WITH FDRMAT DEPENDENT. = .30585 WITH USER DEPENDENT.
PEARSDN'S R = -.07246 SIGNIFICANCE = .3467

```
* * * * * * * * * * * * * * * * *   C R O S S T A B U L A T I O N   O F   * * * * * * * * * * * * * * * * *
   STDFOR     STDRE USR OEF FORMATS                                     BY  USER       USER TYPE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1

                  USER
         COUNT   I
        ROW PCT  IINTERMED END-USER   ROW
        COL PCT  IIARY                TOTAL
        TOT PCT  I      1  I      2  I
STDFOR   --------I--------I--------I
             2   I      2  I      0  I     2
  SOMEWHAT USEFUL I 100.0  I     .0  I   6.3
                 I    8.7  I     .0  I
                 I    6.3  I     .0  I
                -I--------I--------I
             3   I      1  I      1  I     2
  INDIFFERENT    I   50.0  I   50.0  I   6.3
                 I    4.3  I   11.1  I
                 I    3.1  I    3.1  I
                -I--------I--------I
             4   I     11  I      5  I    16
  VERY USEFUL    I   68.8  I   31.3  I  50.0
                 I   47.8  I   55.6  I
                 I   34.4  I   15.6  I
                -I--------I--------I
             5   I      9  I      3  I    12
  ESSENTIAL      I   75.0  I   25.0  I  37.5
                 I   39.1  I   33.3  I
                 I   28.1  I    9.4  I
                -I--------I--------I
        COLUMN         23         9        32
         TOTAL       71.9      28.1     100.0

   6 OUT OF     8 ( 75.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY =    .563
RAW CHI SQUARE =     1.39130 WITH     3 DEGREES OF FREEDOM.  SIGNIFICANCE =   .7076
CRAMER'S V =    .20851
CONTINGENCY COEFFICIENT =    .20412
LAMBDA (ASYMMETRIC) =    .00000 WITH STOFOR   DEPENDENT.           =   .00000 WITH USER     DEPENDENT.
LAMBDA (SYMMETRIC) =   .00000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) =   .02770 WITH STDFOR   DEPENDENT.           =   .04947 WITH USER     DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) =   .03551
KENDALL'S TAU B =  -.02376.    SIGNIFICANCE =   .4449
KENDALL'S TAU C =  -.02344.    SIGNIFICANCE =   .4449
GAMMA =  -.04839
SOMERS'S D (ASYMMETRIC) =  -.02899 WITH STOFOR   DEPENDENT.           =  -.01948 WITH USER     DEPENDENT.
SOMERS'S D (SYMMETRIC) =  -.02330
ETA =   .02689 WITH STDFOR   DEPENDENT.           =   .20851 WITH USER     DEPENDENT.
PEARSON'S R =  .02689  SIGNIFICANCE =   .4419
```

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

MENFDR MENU OF CANNEO FDRMATS BY USER USER TYPE

* PAGE 1 DF 1

MENFOR	USER COUNT ROW PCT COL PCT TDT PCT	INTERMEO IARY 1	ENO-USER 2	ROW TOTAL
NOT USEFUL	1	1 100.0 4.3 3.1	0 .0 .0 .0	1 3.1
SOMEWHAT USEFUL	2	1 100.0 4.3 3.1	0 .0 .0 .0	1 3.1
INOIFFERENT	3	3 60.0 13.0 9.4	2 40.0 22.2 6.3	5 15.6
VERY USEFUL	4	10 83.3 43.5 31.3	2 16.7 22.2 6.3	12 37.5
ESSENTIAL	5	8 61.5 34.8 25.0	5 38.5 55.6 15.6	13 40.6
	COLUMN TOTAL	23 71.9	9 28.1	32 100.0

8 OUT DF 10 (80.0%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 2.59789 WITH 4 OEGREES OF FREEOOM. SIGNIFICANCE = .6272
CRAMER'S V = .28493
CONTINGENCY COEFFICIENT = .27402
LAMBDA (ASYMMETRIC) = .10526 WITH MENFDR DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .07143
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .03977 WITH MENFDR OEPENDENT. = .08304 WITH USER OEPENOENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .05379
KENDALL'S TAU B = .13906. SIGNIFICANCE = .2039
KENDALL'S TAU C = .14453. SIGNIFICANCE = .2039
GAMMA = .26241
SDMERS'S O (ASYMMETRIC) = .17874 WITH MENFOR OEPENOENT. = .10819 WITH USER OEPENOENT.
SDMERS'S O (SYMMETRIC) = .13479
ETA = .15296 WITH MENFOR OEPENOENT. = .28493 WITH USER OEPENOENT.
PEARSON'S R = .15296 SIGNIFICANCE = .2016

CHARTS	CDUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMED ARY (1)	USER: END-USER (2)	RDW TDTAL
1		1	1	2
NOT USEFUL		50.0	50.0	6.3
		4.3	11.1	
		3.1	3.1	
2		5	1	6
SOMEWHAT USEFUL		83.3	16.7	18.8
		21.7	11.1	
		15.6	3.1	
3		9	2	11
INDIFFERENT		81.8	18.2	34.4
		39.1	22.2	
		28.1	6.3	
4		4	2	6
VERY USEFUL		66.7	33.3	18.8
		17.4	22.2	
		12.5	6.3	
5		4	3	7
ESSENTIAL		57.1	42.9	21.9
		17.4	33.3	
		12.5	9.4	
COLUMN TDTAL		23 / 71.9	9 / 28.1	32 / 100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 2.23318 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6930
CRAMER'S V = .26417
CONTINGENCY COEFFICIENT = .25541
LAMBDA (ASYMMETRIC) = .04762 WITH CHARTS DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .02306 WITH CHARTS DEPENDENT. = .05825 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .03305
KENDALL'S TAU B = .13039. SIGNIFICANCE = .2115
KENDALL'S TAU C = .14453. SIGNIFICANCE = .2115
GAMMA = .22699
SOMERS'S D (ASYMMETRIC) = .17874 WITH CHARTS DEPENDENT. = .09512 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .12416
ETA = .12839 WITH CHARTS DEPENDENT. = .26417 WITH USER DEPENDENT.
PEARSON'S R = .12839 SIGNIFICANCE = .2419

GRAPHS	USER: INTERMED ARY (1)	USER: END-USER (2)	RDW TOTAL
1 NOT USEFUL	1	1	2
	50.0	50.0	6.3
	4.3	11.1	
	3.1	3.1	
2 SOMEWHAT USEFUL	6	2	8
	75.0	25.0	25.0
	26.1	22.2	
	18.8	6.3	
3 INDIFFERENT	9	2	11
	81.8	18.2	34.4
	39.1	22.2	
	28.1	6.3	
4 VERY USEFUL	3	1	4
	75.0	25.0	12.5
	13.0	11.1	
	9.4	3.1	
5 ESSENTIAL	4	3	7
	57.1	42.9	21.9
	17.4	33.3	
	12.5	9.4	
COLUMN TOTAL	23	9	32
	71.9	28.1	100.0

7 OUT OF 10 (70.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .563
RAW CHI SQUARE = 1.82094 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .7686
CRAMER'S V = .23855
CONTINGENCY COEFFICIENT = .23204
LAMBDA (ASYMMETRIC) = .04762 WITH GRAPHS DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .03333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .01863 WITH GRAPHS DEPENDENT. = .04639 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .02658
KENDALL'S TAU B = .06022. SIGNIFICANCE = .3561
KENDALL'S TAU C = .06641. SIGNIFICANCE = .3561
GAMMA = .10559
SDMERS'S D (ASYMMETRIC) = .08213 WITH GRAPHS DEPENDENT. = .04416 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .05743
ETA = .07537 WITH GRAPHS DEPENDENT. = .23855 WITH USER DEPENDENT.
PEARSON'S R = .07537 SIGNIFICANCE = .3409

* * * * * * * * * * * * * * * * * * C R D S S T A B U L A T I D N D F * * * * * * * * * * * * * * * * * * *
DDWNLD DDWNLDAD INFDRMATIDN BY USER USER TYPE
* PAGE 1 DF 1

DDWNLD	USER: CDUNT / RDW PCT / CDL PCT / TDT PCT	INTERMEDIARY 1	END-USER 2	RDW TDTAL
SDMEWHAT USEFUL	2	1	0	1
		100.0	.0	3.1
		4.3	.0	
		3.1	.0	
INDIFFERENT	3	4	0	4
		100.0	.0	12.5
		17.4	.0	
		12.5	.0	
VERY USEFUL	4	6	2	8
		75.0	25.0	25.0
		26.1	22.2	
		18.8	6.3	
ESSENTIAL	5	12	7	19
		63.2	36.8	59.4
		52.2	77.8	
		37.5	21.9	
CDLUMN TDTAL		23	9	32
		71.9	28.1	100.0

5 DUT DF 8 (62.5%) DF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 2.70938 WITH 3 DEGREES DF FREEDDM. SIGNIFICANCE = .4386
CRAMER'S V = .29098
CDNTINGENCY CDEFFICIENT = .27939
LAMBDA (ASYMMETRIC) = .00000 WITH DDWNLD DEPENDENT. = .00000 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .00000
UNCERTAINTY CDEFFICIENT (ASYMMETRIC) = .06130 WITH DDWNLD DEPENDENT. = .10569 WITH USER DEPENDENT.
UNCERTAINTY CDEFFICIENT (SYMMETRIC) = .07760
KENDALL'S TAU B = .25669. SIGNIFICANCE = .0667
KENDALL'S TAU C = .24609. SIGNIFICANCE = .0667
GAMMA = .56757
SDMERS'S D (ASYMMETRIC) = .30435 WITH DDWNLD DEPENDENT. = .21649 WITH USER DEPENDENT.
SDMERS'S D (SYMMETRIC) = .25301
ETA = .28210 WITH DDWNLD DEPENDENT. = .29098 WITH USER DEPENDENT.
PEARSDN'S R = .28210 SIGNIFICANCE = .0589

REFORM	COUNT / ROW PCT / COL PCT / TOT PCT	USER: INTERMEDIARY (1)	USER: END-USER (2)	ROW TOTAL
1 NOT USEFUL		0	1	1
		.0	100.0	3.1
		.0	11.1	
		.0	3.1	
2 SOMEWHAT USEFUL		2	1	3
		66.7	33.3	9.4
		8.7	11.1	
		6.3	3.1	
3 INDIFFERENT		4	0	4
		100.0	.0	12.5
		17.4	.0	
		12.5	.0	
4 VERY USEFUL		7	1	8
		87.5	12.5	25.0
		30.4	11.1	
		21.9	3.1	
5 ESSENTIAL		10	6	16
		62.5	37.5	50.0
		43.5	66.7	
		31.3	18.8	
COLUMN TOTAL		23	9	32
		71.9	28.1	100.0

8 OUT OF 10 (80.0%) OF THE VALID CELLS HAVE EXPECTED CELL FREQUENCY LESS THAN 5.0.
MINIMUM EXPECTED CELL FREQUENCY = .281
RAW CHI SQUARE = 5.82287 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .2128
CRAMER'S V = .42657
CONTINGENCY COEFFICIENT = .39237
LAMBDA (ASYMMETRIC) = .00000 WITH REFORM DEPENDENT. = .11111 WITH USER DEPENDENT.
LAMBDA (SYMMETRIC) = .04000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .08531 WITH REFORM DEPENDENT. = .18427 WITH USER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = .11663
KENDALL'S TAU B = .11325. SIGNIFICANCE = .2486
KENDALL'S TAU C = .11719. SIGNIFICANCE = .2486
GAMMA = .21739
SOMERS'S D (ASYMMETRIC) = .14493 WITH REFORM DEPENDENT. = .08850 WITH USER DEPENDENT.
SOMERS'S D (SYMMETRIC) = .10989
ETA = .00963 WITH REFORM DEPENDENT. = .42657 WITH USER DEPENDENT.
PEARSON'S R = .00963 SIGNIFICANCE = .4791

FOOTNOTES

[1]Maurice I. Crystal and Gabriel E. Jakobson," FRED, A Front End for Databases," On-line 6 (Sept., 1982):27.

[2]Abstract, DD Form 1473, AD-B085 600 Directory of DoD-Sponsored R&D Data Bases (Sept., 1984).

[3]F. Wilfred Lancaster and Linda C. Smith, Compatibility Issues Affecting Information Systems and Services (Paris: UNESCO, 1983):87.

[4]C. M. Goldstein and W. H. Ford, "The User-Cordial Interface," Online Review 2 (1978):270.

[5]Richard S. Marcus and J. Francis Reintjes, "A Translating Computer Interface for End-User Operation of Heterogenous Retrieval Systems. I. Design," Journal of the American Society for Information Science 32 (1981):287-303.

[6]Richard S. Marcus and J. Francis Reintjes, "A Translating Computer Interface for End-User Operation of Heterogenous Retrieval Systems. II. Evaluations," Journal of the American Society for Information Science 32 (1981):304-317.

[7]Maurice I. Crystal and Gabriel E. Jakobson, "FRED, A Front End for Databases," On-line 6 (Sept., 1982):27-30.

[8]Tamas E. Doszkocs and Barbara A. Rapp, "Searching MEDLINE in English: A Prototype User Interface with Natural Language Query, Ranked Output, and Relevance Feedback," Proceedings of the 42nd ASIS Annual Meeting (1979):131-139.

[9]Richard S. Marcus, "Computer-Assisted Search Planning and Evaluation," Proceedings of the 46th ASIS Annual Meeting (1983):19-21.

[10]Linda C. Smith, "Implications of Artificial Intelligence for End User Use of Online Systems," Online Review 4 (1980):383-391.

[11]G. DeJong, "Artificial Intelligence Implications for Information Retrieval," Proceedings of the 6th Annual International ACM SIGIR Conference on Research & Development in Information Retrieval (Bethesda, MD: 1983). pp. 10-17.

[12]K. K. Obermeier and L. E. Cooper, "Information Network Organizing System (INFOS) - An Expert System for Information Retrieval," Proceedings of the 47th ASIS Annual Meeting (1984):95-98.

[13]A. S. Pollitt, "An Expert System as an Online Search Intermediary," 5th International Online Meeting (Oxford & NJ: Learned Information, 1980). pp. 25-32.

[14]G. Walker and J. W. Janes, "Expert Systems as Search Intermediaries," Proceedings of the 47th ASIS Annual Meeting (1984):103-105.

[15]N. S. Yaghmai and J. A. Maxin, "Expert Systems: A Tutorial," Journal of the American Society for Information Science 35 (1984):297-305.

[16]Crystal and Jakobson, "FRED, A Front End for Databases," p. 27.

[17]Doszkocs and Rapp, "Searching MEDLINE in English: A Prototype User Interface with Natural Language Query, Ranked Output, and Relevance Feedback," p. 135.

[18]The McGraw-Hill Computer Handbook (NY: McGraw-Hill, 1983):21-3.

[19]Marcus, "Computer-Assisted Search Planning and Evaluation," p. 20.

[20]Ibid.

[21]Those participants who responded Yes to question number 9 of the questionnaire are assumed to be intermediaries. Those participants who responded No to question number 9 are assumed to be end users.

[22]Dr. Tamas Doszkocs, interview by telephone, 11 January 1985.

[23]Dr. Richard S. Marcus, interview by telephone, 10 January 1985.

[24]Dr. Gabriel Jakobson, interview by telephone, 25 January 1985.

[25]Richard S. Marcus, correspondence (electronic mail), 26 December 1984.

[26]Richard S. Marcus, correspondence (electronic mail), 8 January 1985.

SELECTIVE BIBLIOGRAPHY

Crystal, M. I. and Jakobson, G. E. "FRED, a front end for databases." Online 6 (September 1982):27-30.

DeJong, G. "Artificial intelligence implications for information retrieval." Procedings of the 6th Annual International ACM SIGIR Conference on Research & Development in Information Retrieval. Bethesda, MD: pp.10-17, Summer 1983.

Doszkocs, Tamas. National Library of Medicine, Bethesda, Maryland. Interview, 11 Jan 1985.

Doszkocs, T. E. "CITE NLM: Natural language searching in an online catalog." Information Technology & Libraries 2 (December 1983):364-380.

Doszkocs, T. E. and Rapp, B. A. "Searching MEDLINE in English: A prototype user interface with natural language query, ranked output, and relevance feedback." Proceedings of the 42nd ASIS Annual Meeting. pp. 131-139, 1979.

Doszkocs, T. E.; Rapp, B. A.; and Schoolman, H. M. "Automated information retrieval in science and technology." Science, 4 April 1980, pp. 25-30.

Ercegovac, Z. "Knowledge-based expert systems: A profile and implications." Proceedings of the 5th National Online Meeting. New York, NY: pp. 39-45, April 10-12, 1984.

Futrelle, R. P. and Smith, L. C. "Expert systems using semantic representations of full text for question answering." Proceedings of the 45th ASIS Annual Meeting. pp. 103-106, 1982.

Goldstein, C. M. and Ford, W. H. "The user-cordial interface." Online Review 2 (1978):269-275.

Hayes-Roth, F. "Knowledge-based expert systems." IEEE Computer 17 (October 1984):263-273.

----- "The machine as partner of the new professional." IEEE Spectrum 21 (June 1984):28-31.

Jakobson, Gabriel. GTE, Waltham, Massachusetts. Interview, 25 Jan 1985.

Jakobson, G.; Shaked, V.; Rowley, S.; and Crystal, M. "An intelligent communication assistant for databases." Proceedings of the 7th International Computer and Applications Conference. pp. 162-165, 1983.

Kahn, R. E. "A new generation in computing." IEEE Spectrum 20 (November 1983):36-41.

Kinnucan, P. "Computers that think like experts." High Technology 4 (January 1984):30-42.

Lancaster, F. W. and Smith, L. C. Compatibility issues affecting information systems and services. Paris: UNESCO, 1983.

McCalla, G. and Cercone, N. "Approaches to knowledge representation." IEEE Computer 16 (October 1983):12-18.

Marcus, Richard S. Massachusetts Institute of Technology, Cambridge, Massachusetts. Interview, 10 Jan 1985.

Marcus, R. S. "An automated expert assistant for information retrieval." Proceedings of the 44th ASIS Annual Meeting. pp. 270-273, 1981.

----- "Computer-assisted search planning and evaluation." Proceedings of the 46th ASIS Annual Meeting. pp. 19-21, 1983.

----- "Computers versus humans as search intermediaries." Proceedings of the 45th ASIS Annual Meeting. pp. 182-185, 1982.

----- "An experimental comparison of the effectiveness of computers and humans as search intermediaries." Journal of the American Society of Information Science 34 (1983):381-404.

Marcus, R. S. and CONIT Project Staff. The CONIT Manual. CONIT Version 6. Cambridge, MA: 5-2-84.

Marcus, R. S. and Reintjes, J. F. "A translating computer interface for end-user operation of heterogeneous retrieval systems. I. Design." Journal of the American Society for Information Science 32 (1981): 287-303.

----- "A translating computer interface for end-user operation of heterogeneous retrieval systems. II. Evaluations." Journal of the American Society for Information Science 32 (1981):304-317.

Meadow, C. T.; Hewett, T. T.; and Aversa, E. S. "A computer intermediary for interactive data base searching." Journal of the American Society for Information Science 33 (1982):357-364.

Obermeier, K. K. "Expert systems--Enhancement of productivity?" Proceedings of the 46th ASIS Annual Meeting. pp. 9-13, 1983.

Obermeier, K. K. and Cooper, L. E. "Information Network Facility Organizing System (INFOS) - An expert system for information retrieval." Proceedings of the 47th ASIS Annual Meeting. pp. 95-98, 1984.

Pollitt, A. S. "An expert system as an online search intermediary." 5th International Online Meeting. pp. 25-32, Dec. 8-10, 1981. (Oxford & NJ: Learned Information, 1980).

Smith, L. C. "Implications of artificial intelligence for end user use of online systems." Online Review 4 (1980):383-391.

Toliver, D. E. "OL'SAM: An intelligent front-end for bibliographic information retrieval." Information Technology & Libraries 1 (1982):317-326.

Waldrop, M. M. "Artificial intelligence (I): Into the world." Science, 24 Feb. 1984, pp. 802-805.

_____ "The necessity of knowledge." Science, 23 March 1984, pp. 1279-1282.

Walker, G. and Janes, J. W. "Expert systems as search intermediaries." Proceedings of the 47th ASIS Annual Meeting. pp. 103-105, 1984.

Yaghmai, N. S. and Maxin, J. A. "Expert systems: a tutorial." Journal of the American Society for Information Science 35 (1984):297-305.

ACKNOWLEDGMENTS

The author would like to thank the following people for useful discussions:

Ms. Roberta Cohen, DTIC
Ms. Gladys Cotter, DTIC
Dr. Tamas Doszkocs, National Library of Medicine
Ms. Patricia Gaynor, DTIC
Mr. Walter P. Hamilton, III, Logistics Management Institute
Ms. Marcia Hanna, DTIC
Mr. Richard W. Hartt, Logistics Management Institute
Ms. Carol Jacobson, DTIC
Dr. Gabriel Jakobson, GTE Laboratories, Inc.
Ms. Barbara Lesser, DTIC
Ms. Laurie Lubsen, DTIC
Dr. Richard S. Marcus, Massachusetts Institute of Technology
Ms. Marjorie Powell, DTIC
Mr. John W. Saunders, DTIC
Ms. Linda C. Smith, University of Illinois
Mr. William Thompson, DTIC
Mr. Richard Thornett, DTIC