10. BOOK HOUSE EVALUATION

The BOOK HOUSE were evaluated at a public library in the town of Hjortespring over a six month period during 1988. The experimental subjects were the normal everyday users of the library and consisted of both children from 7 to 16 years and adults from 17 to over 50. The evaluation program was carefully planned and consisted of both an analytical and an empirical phase. The analytical portion concentrated on the functionality of the system and could build on the earlier studies of user-librarian negotiations which uncovered the search strategies employed and consequently the information required to support these strategies. This work had laid the basis for making decisions about the content of the computerized displays which thus could be verified analytically. The empirical validation was then necessary e.g., to see how/whether users would accept the form of the displayed information as supportive of their efforts to retrieve relevant fiction.

Thus the evaluation cycle for the system consisted of a thorough verification of functionality, a set of queries to users and librarians before the system was installed, system installation and training, detailed queries and logging during/just after system use and, finally, later feedback on user satisfaction with the retrieved books.

More specifically, some examples of the items for evaluation included:

A) Subject indexing - e.g. the degree to which:

-the dimensions in the classification scheme corresponded to users needs.
-the searchable terms were specific and exhaustive.
-the indexers' representation of content was relevant and understandable.
-users and indexers agreed on the correspondance between index words and book contents.

B) The user interface - e.g. the degree to which:

-users utilized one or more of the provided search strategies.
-users had difficulties understanding the system.
-users considered the system pleasurable to use.
-the provided "help" facilities were utilized.

-there is a preference for "writing" search profiles via command language or "selecting" options with a mouse.

-age and sex affect user reactions.

-the chosen metaphor is understood and accepted.

-icons support book searches, can be used to describe book contents

-and, in general, serve as a catalyst for finding interesting and relevant literature.

Evaluation techniques included on-line logging, an on-line questionnaire, traditional paper questionnaires, observation and interviews. In general terms, it can be said that the two systems received an overwhelmingly positive response with regard to both indexing and the user-interface.

Some Evaluation Results

A lack of space prevents any detailed presentation of results from the BOOK HOUSE evaluation. A report including this information has been published (Goodstein and Pejtersen) 1989. In general terms, it can be said that the BOOK HOUSE received an overwhelmingly positive response with regard to both the classification scheme and the icon-based user interface. The following more general conclusions can be made:

A) subject indexing:

- The functionality of the *classification system* was validated; users appreciated the many alternative ways of choosing among search terms. In general, the many alternatives together with the optional possibility for combinations from these alternatives enhanced the usefulness of the classification system. The BOOK HOUSE experiment has demonstrated that a highly structured and selective access to content keywords divided into thirteen dimensions/facets helps the user to formulate his/her need more precisely and therefore leads to a better search result.

- The different dimensions and their related keywords were judged to be in good agreement, and the dimensions were judged to be relevant to users. The classification system was the most popular aspect of the system. All dimensions of the classification scheme were used, but with varied frequency.- just as it was the case in the investigation of user-librarian negotiations. In the investigation of adult users' formulation in manual searches the most frequently used dimensions are *subject matter,*

Operations within categories
(% of users who chose the category)

Place
lookup	53%
find more	4%
see books	43%

Time
lookup	35%
find more	11%
see books	37%

Setting
lookup	28%
find more	10%
see books	35%

Intention
lookup	11%
find more	3%
see books	24%

Impression
find more	10%
see books	49%

Author
lookup	75%
find more	07%
see books	42%

Title
lookup	83%
find more	10%
see books	38%

Theme
lookup	55%
find more	13%
see books	24%

Plot
lookup	73%
find more	11%
see books	60%

Readability
read self	37%
type size	3%
readability	5%
read aloud	25%
Illustrated	15%
find more	5%
see books	33%

Main character
name	10%
age	10%
lookup	58%
find more	9%
see books	35%

Front cover
subject	22%
color	24%
lookup	28%
find more	12%
see books	38%

Genre
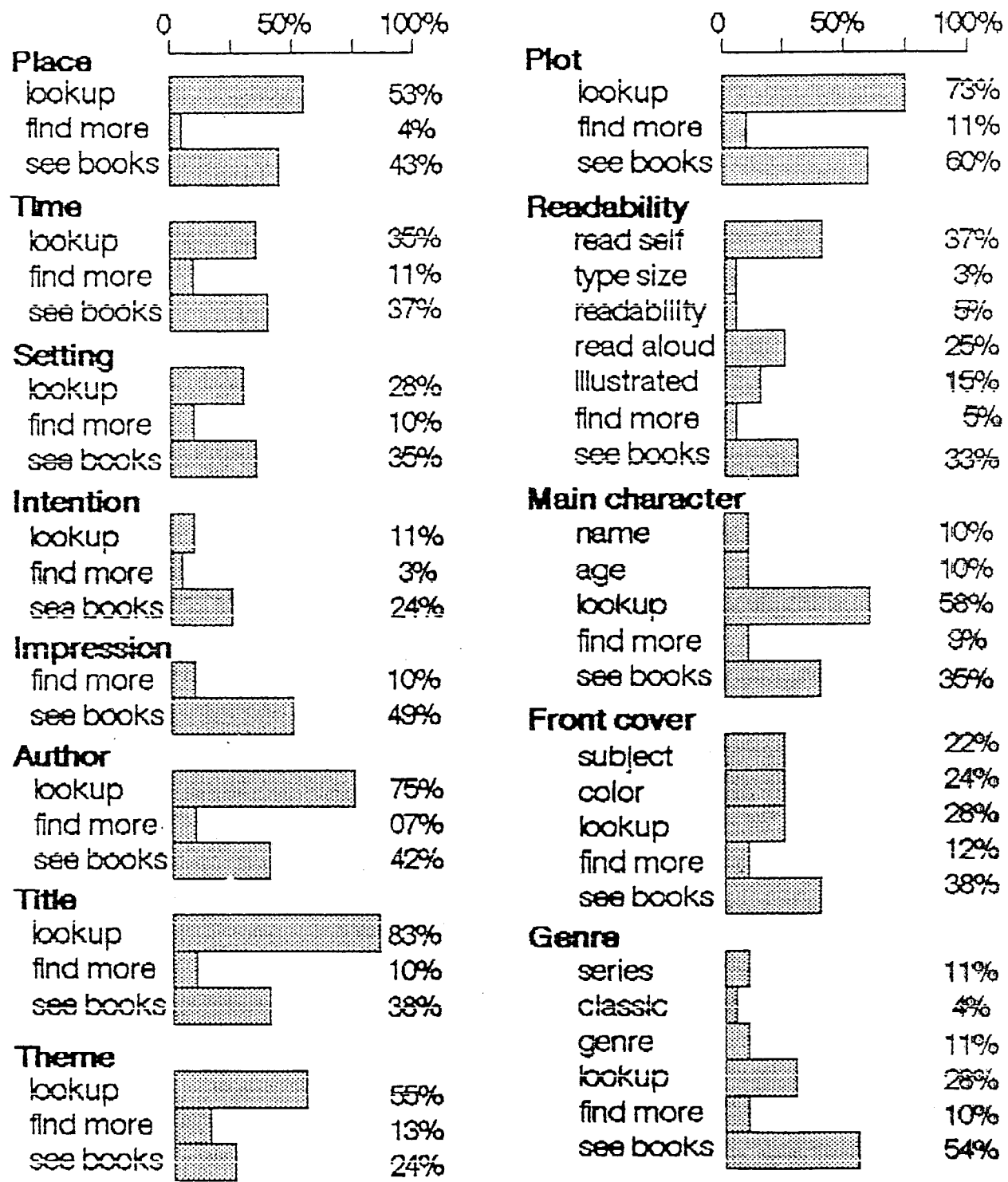|	
series	11%
classic	4%
genre	11%
lookup	28%
find more	10%
see books	54%

FIGURE 27

emotional experience and accessibility, almost equally frequent. In the investigation of children user formulations the *accessibility* dimension far the most frequently used, followed by *emotional experience,cognition/information* (often overlapping subject matter) and *subject matter.* The first two of the last three mentioned were equally important. In the BOOK HOUSE datalogging no distinction was made between adults and children. The frequency analysis of the use of the different dimensions includes both adults and children. The most popular was the *subject matter* dimension, followed by *theme, place, readability, time, setting, front cover,* and then the three categories of *cognition/information, emotional experience* and *genre and main character,* which were equally little used. Thus there was a significant change of choice of dimensions in the BOOK HOUSE compared to manual searches, except for the subject matter dimension. This again might indicate that except for subject matter, the usual popular ways of talking about books by means of genres and emotions were substituted by new and more unusual aspects, which the system gave acces to. See figure 27, where subject matter is called "plot", cognition/information is called "intention" and emotional experience is called "impression".

The indexing of 3.500 books resulted in about 6.000 different keywords. The users' use of keywords were widely spread, including very specific terms as well as more broad terms. There was no significant peaked choice of keywords.

The conclusion is, that the classification system based on users' formulations in negotiations with librarians worked as a model of the users' needs displayed explicitly in the interface and as a means for devising principles for concept analysis of documents.

- The *indexing* principles and rules used for concept analysis of documents were effectively matching the users' perception of the contents of the books. 116 users took home a print of the book description in the database together with the book they borrowed. After having read the book, they compared the print with their own perception of the book. 85% of these users found that the description matched the book content. 84% were satified with the search result. Disagreement was seen mostly with respect to the emotional experience and whether a book was exciting or not. Figure 28.

- A group of teen age users were followed five days over a five weeks period. The project leader watched their way of using the system from novice to expert users. Their development of search methods, their preferences and understanding of the system were investigated. They preferred the system to browsing the shelves- their

USERS' RESPONSE AFTER READING THE FOUND BOOKS
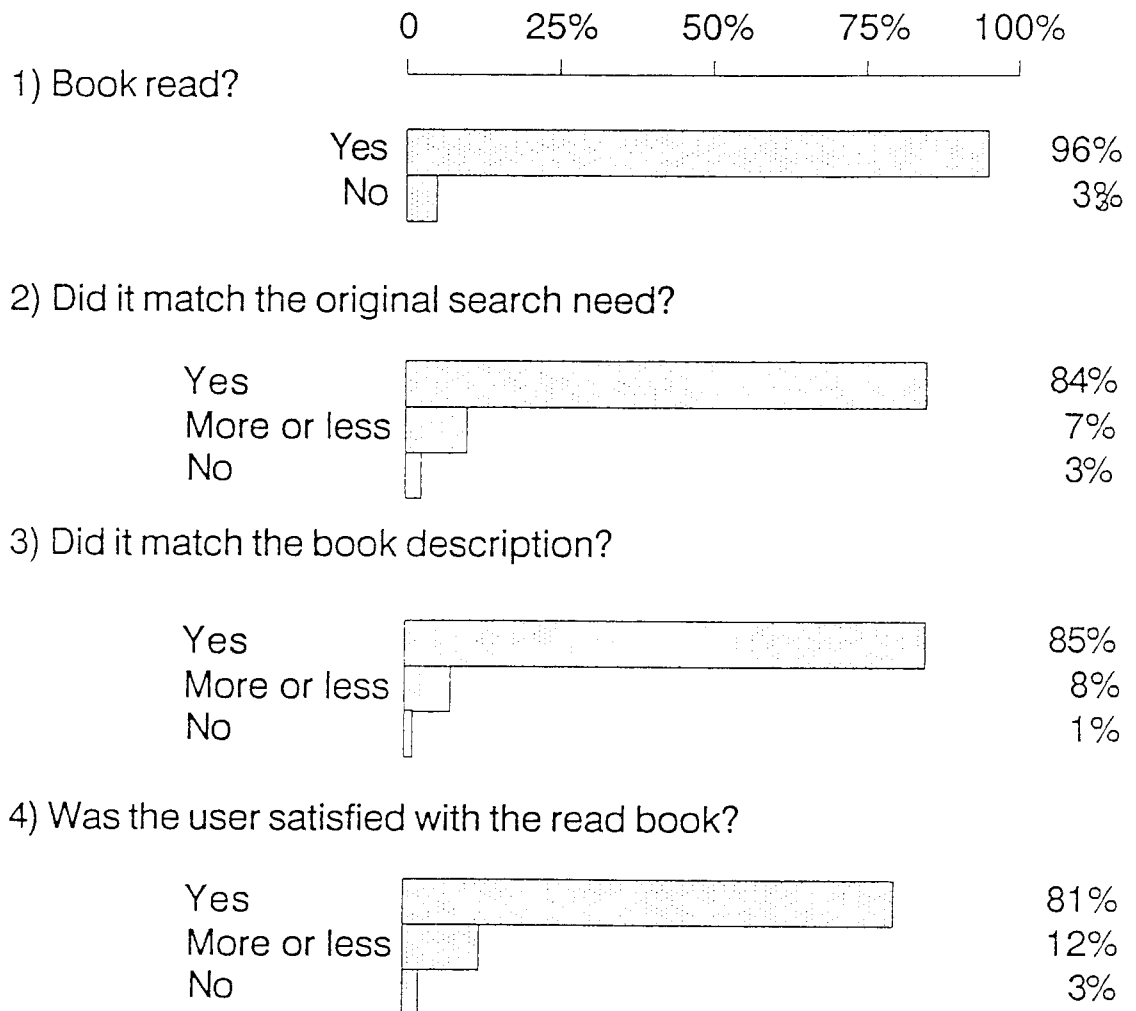
(based on 116 questionnaires)

	0	25%	50%	75%	100%

1) Book read?

Yes	96%
No	3%‰

2) Did it match the original search need?

Yes	84%
More or less	7%
No	3%

3) Did it match the book description?

Yes	85%
More or less	8%
No	1%

4) Was the user satisfied with the read book?

Yes	81%
More or less	12%
No	3%

FIGURE 28

usual way of searching. They were a bit reluctant to the browsing pictures option, but at the end of the period, when they were skilled in the revise search tactics, it became one of their favorite search method, both for browsing, subject searches, author searches etc.. Teen age users told that they learned to understand books better by the description of the books in the database. The classification system widened their perspective on the books, helped them to understand the books and gave them new ideas for making quiries and for searching for new topics.

- Librarians arranged succesful book exhibitions based on lists of keywords searched in the database.

B) the user interface:

- All four *strategies* as well as all dimensions of the classification system were used by both children and adults. Giving the user a choice among four different routes to exploring the contents of the data base made the users feel that the system was flexible. The option of choice and shift between different strategies made help texts superfluous: When stuck in the search, users found it easier to shift to another strategy than to consult the help texts. Shift of strategy substituted help texts. The analytical search strategy was the most popular. Compared to our investigation of manual searches before the BOOK HOUSE was introduced, the analytical search was the least popular and the most difficult to conduct. An important finding of this evaluation is thus that users like to be able to perform analytical subject searches, if the system gives the user support enough. Which happened in the case of the BOOKHOUSE, - where analytical searches were supported by icons in the interface.

Classification Search	31%
Browse Pictures	27%
Search by Analogy	23%
Browse Books	20%

Figure 29

Frequency of Choice of Search Strategy based on 6000 online logged searches.

Other changes were seen in preference of strategies: Browsing books were the least popular strategy in the BOOK HOUSE and the search by analogy the second least popular- in opposition to the manual searches, where these strategies were among the most frequently used strategies. See figure 29.

The *browsing pictures* were the second most popular and cannot be compared to manual searches. In manual searches, the use of pictures on the cover of the book is close to the browsing picture option- but this use was not investigated in details. But the browsing pictures strategy in the BOOK HOUSE was used for a variety of purposes: For browsing and getting new ideas for reading, as was the purpose of the design, but also for analytical subject searches and for bibliographical searches. i.e. a search for a specific author or title. In the same way, the search by analogy was also used to find a specific author/title. The conclusion is that users do not destinguish formally between strategies, but perceive them as alternative options or routes for any type of information need. Each strategy option was designed to be the optimal way of solving different needs, but users subjective preferences for ways of searching influenced their choice of strategy a great deal. Users were inventive and used the flexibility of the system to create individual shortcuts to satisfy their needs. Finally computer support will change users preferences for choice of strategy

- The *iconic* approach was successful when used in combination with text: alternate search techniques such as browsing through icons can give unexpected (and gratifying) results. The iconic representation of the classification system worked according to the designers' intentions. It helped the users recognize facets of their need instead of forcing them to recall them by introspection and reformulation in order to match the data base contents. The associated text descriptors supported the first-time users and satisfied the designers' intentions of easing users' acceptance and ultimate recognition of icon meanings.

- Most users prefer the "direct manipulation" interaction provided by the BOOK HOUSE to writing their search requirements in a command language. Librarians preferred this search way for mainly two reasons:

1. Unsuccessful searches caused by the librarian did not occur. Mistakes were difficult to identify, and the answer 0 books did not occur like in a command searches after writing a term. All selectable keywords were displayed on the screen, and at least

one book was available, when a keyword was selected. The usual error with writing a non existing term, which was not in the database at all, or was represented by a synonym, was avoided-and misspelling errors never occurred. Unsuccessful searches were only due to lack of the proper term/book on the screen- and the librarian was not responsible for the content of the database.

2. Once the BOOK HOUSE dialogue was learned, the librarian had developed a sensory motor skills for searching the system- with very little demands on mental skills for manipulating the system. For expert users all icons will, when learned, be perceived as signs, i.e. cues for action. Hence resources were left for a more thorough dialogue with the user, analyzing the user's need, while displaying keywords and book descriptions on the screen.

- This approach was succesful. 95% liked to use the BOOK HOUSE. All the boolean search techniques were done automatically by the system. The boolean NOT was the only operator, the user had to select as an icon showing a minus. '

C) Implications for the library:

- Other than the normally most popular books began to be borrowed. Before the BOOK HOUSE, when shelf browsing was necessary, these books were not borrowed "because they looked boring". The bookstock was used more efficiently and in accordance with the librarians` acquisition criteria. This has economic implication for a library`s costs for book acquisition.

It is relevant to point out that, in common with non-fiction areas, it is impossible for librarians to be acquainted with the full scope of literature in fiction which eventually could match users' needs. Today no special tools exist to support the librarian with the task of fiction retrieval. In addition, users have sometimes difficulties in formulating these needs for librarians. This strengthens the requirement that databases make it possible to find sets of books on the basis of alternate formulations of need. Thereafter librarians and users can make their selections. In this way, as named above, the many thousands of books, which either are not read by librarians or, which from their external appearance, do not appeal to readers, suddenly become as equally relevant as all the "best sellers". This leads to a better utilization of the collection as well as an introduction of readers to a broader spectrum of writers and their viewpoints, opinions,

facts, fantasy, etc. The ultimate institutional goal for public libraries is to promote education and cultural values. THE BOOK HOUSE enchances this goal.

- In the long run, book reservations and other functions should be incorporated in an integrated search and delivery system to achieve an optimal automated tool.

- Users suggested that fact literature should be incorporated in the BOOK HOUSE as well. They saw no difference between fact and fiction retrieval in this kind of system.

11. CONCLUSION

The general conclusion - based on the results of the evaluation is that the BOOK HOUSE was accepted by a large majority of users (both adults and children, old and young users and librarians as well) as a helpful and pleasurable aid for finding good fiction. In addition, librarians found the system quite useful when dealing with many of the daily queries from users. The AMP classification scheme, annotations and keywords representing books matched user/librarian information needs. The search dialogue, including strategies and their iconic representation matched user/librarian search preferences. So to speak, the BOOK HOUSE changed and improved the user/task performance and influenced promotion of previously ignored books. Thus the cognitive task analysis of the domain as described in this report worked; the cognitive approach to uncovering the basic information processing underlying user-librarian negotiations gave the necessary foundation for specifying the system functionality and its pictorial representation and carrying out the subsequent evaluation.

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APPENDIX A

LIBRARIANS' EXPERIENCE WITH THE BOOK HOUSE

A group interview was conducted with the librarians at Hjortespring Library after a six months period of daily use. The issues discussed are summarized in the following.

Effect of system on work

Librarians used the system to answer questions about fiction and to arrange book exhibitions. They searched on behalf of users, both while these were present and could participate and when the library was closed for the public. The system was used heavily in periods by the users of the library, in other periods it was less heavily used. When used busily by the end users, the librarians postponed their searches to periods, when the library was closed for users. Their most characteristic use of the system was in these three situations, in which the system was most helpful:

1) When users asked particularly difficult questions, i.e. rare or very specific topics.

2) Or when users asked particularly broad and common place subjects, and it was predictable that there would be many books -even in the small data base of the BOOK HOUSE - and they would be easily searched.

3) It was a good tool for making exhibitions: It gave ideas for exhibitions of novels on topics which were not known by librarians as well as for novels on popular topics. It was further an advantage that all books in the data base were in their own library. In genre catalogues too many books are listed which are not in their own library.

The librarians felt that they learned about books. They became aware of the existance of books about all these different subjects. The BOOK HOUSE extended and widened their knowledge about the book stock. Secondly, it represented a new way of thinking, and they learned about subject retrieval with a controlled vocabulary.

Some librarians had used the BOOK HOUSE to get good ideas and to retrieve books for their private reading with a succesful result.

Three clear effects on user patterns were visible:

1) Both for adults and children, all the boring looking books began to be borrowed. Because of the description of book contents in the new data base system, the cover of books no longer had the same significance in relevance judgements as before, when users browsed the shelves.

2) More reservations of novels were made after the BOOK HOUSE was introduced.

3) More users searched subjects themselves. Some users regularly, some every time they came to the library to search for books. All the same, librarians had not performed less subject searches than usual during this period. The BOOK HOUSE had no general effect on the time they spent to help users find books, although many users searched subjects themselves in the BOOK HOUSE. This means that there was a general increase of activity in subject searches of fiction. Many users became very good users of the system, who could then guide first time users. Users asked for fact literature in the BOOK HOUSE, because they would like to search on fact literature in the same way as they searched fiction.

Use and evaluation of system features

Indexing of books

The librarians found the indexing of books to be very good. The *specificity* of choice of keywords was adequate. Specificity in a search could easily be increased due to the many combinatorial possibilities displyed through the classification system. The *exhaustivity* of book description was approppiate, more information was not needed on minor aspects of the topic, although a problem might occur, if a user has a very particular and individual point of view. For instance, a user's quiry on novels about sports which analyze how people explore the physical limits of their body. However, librarians felt that more particular and individual points of view will be historically dependent and thus have less general value than the present indexing.

Search strategies

The librarians had a clear criteria for choice of strategy: The most effective solution had the highest priority: the fastest and easiest way to solve a search problem was always chosen. The following use was observed:

The *analytical strategy* was most used. The combination of several dimensions selected from the work room with the classification scheme was the preferred method. Red

keywords displayed in an open book were not used very often, because the user's question and need was usually well known, when the librarians searched on behalf of the user, and the red search words in the book are designed primarily for recognition of a muddy need when browsing book descriptions.

Secondly *search by anology* was used, primarily when users asked the librarian to find something similar to a good book . However, this option was even more frequently used in combination with an analytical subject search. When browsing descriptions of books retrieved by an analytical classification subject search, users would often select one book as exactly the book they wanted, and hence the librarian used this book as a model for seaching something similar.

Browsing pictures was used for explorative reasons. Browsing pictures would be used more, if they were organised systematically in groups of topics.

Browsing books was almost never used by librarians, because it was too unstructured a method, and too time consuming.

All additional search options (delete search terms, put aside books, look up alphabetically etc.) were used in the BOOK HOUSE , and they were all deemed as relevant. There was no need to give a search history as a new feature, because it was easy and fast just to start a new search. "Not very many things can be done wrong", as the librarians said.

The *author's intention* dimension which was devised particularly for the librarians in order to enable them to search and perform cultural mediation at the same time, was not used very often. The other subject dimensions were used more.

The option of choice of *command searches* in the BOOK HOUSE was not used. It demands too much training, and it was a problem to remember all the commands. It was not enough that they can be looked up easily in the printed guide, because this was felt to be a difficult and ackward way of working. Even in bibliographical author/title searches the graphical interface of the BOOK HOUSE was preferred, although it was slower than just writing the name of the author or title.

It was experienced to be much easier to use the graphical, direct manipulation interface for many reasons : It always gave a more succesful search result, since only existing subjects could be selected and searched. Librarians would not begin a command search, when a user was standing by. The user will interfere and ask questions in order to know and understand the writing of the librarian, which complicated the search. With the graphical interface, everything was displayed on the screen and transparent to both users and librarians, and therefore there was no need to explain.

BOOK HOUSE compared with BASIS

There was no doubt that the BOOK HOUSE was prefered compared to today's command searches of the BASIS data base system. It was used for searches for which BASIS will never be used. "BASIS is not fit for this kind of searches, it is difficult because the indexing is not useful for this purpose, the search method is more complicated" were the comments on the present library tool.

In BASIS librarians primarily searched on author and title, not subject searchesIf they searched for subjects, they used decimal classification search and free text search, because only few books have keywords - in fact literature as well as well as in fiction.

Problems and suggestions

The usefulness of the BOOK HOUSE for librarians was limited by the small size of the data base with only 3.500 books. Therefore, not all search questions can be answered succesfully in the system. For instance, the user's quiry mentioned previously on novels about sports which analyze how people explore the physical limits of their body. Due to the limited size of the data base there are only six novels on sports, and they do not treat this particular aspect. Therefore, when users asked questions about topics with which the librarians are familiar and know will exist in the genre catalogue, it was often easier and faster to follow the old habit to look up the topic in the catalogue in order to memorize the list of titles. Due to the limited size of the data base it was still difficult to find books for those users, who are very narrowly reading a specific topic and who have read extremely many books, and therefore already know all the books in the data base.

Another problem was that all the popular books were on loan and not availabe on the shelves, when retrieved in the system. This admininistrative information about availability of books should be part of the information in the system about books.

Finally, librarians would like a shortcut through the menues, i. e. the rooms of the house. As they became experts, they would like to speed up their searches through an abbreviated menu. The writing option would be a nice additional feature, if it was more easy to use, for example as a writing window within the BOOK HOUSE, which could be activated at any stage of a direct manipulation search with a mouse. As time progressed, more and more users became familiar with the system and tried to write, but they could not manage it.

There was a general agreement that a system like the BOOK HOUSE is a useful tool for the daily work with information retrieval tasks in fiction.