ONLINE DATABASES

BY CAROL TENOPIR

The User–System Interface

TRADITIONALLY, online searchers have not had much choice in the way they interact with the system they search. When we select DIALOG, BRS, NEXIS, etc., to search we must follow the interface conventions that each system uses—whether we feel comfortable with them or not.

Notoriously unfriendly or at least complex, user-system interfaces have kept searching in the hands of professional searchers. With more end user searching, CD-ROM databases, front-end software, and availability of reference databases through OPACs, we've recently seen more options in user-system interfaces.

Many researchers from diverse fields such as cognitive science, computer science, linguistics, artificial intelligence, information science, and library science are exploring ways to design better interfaces. The May 1989 Mid-Year Meeting of the American Society for Information Science (ASIS) provided an in-depth look at the current state of user interfaces and what we can expect in the near future. Librarians are being called upon to compare, evaluate, and design better interfaces for a variety of users.

The interface

The human-computer interface allows the user to interact with the system to get something done. It serves as a kind of translator or layer between the capabilities of the system and the person who wants to exploit those capabilities. An interface can make it easier (or more difficult) to use a system, but the ultimate power and friendliness of a system depends on the capabilities available "underneath." A highly motivated user, such as a professional searcher, will persevere and use a system even if the interface is difficult; a less motivated user, such as many end users, may give up on a system if the interface is poorly designed or difficult to use.



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Interface types

Basic interface types in use today include: command, menu, form fill-in, function keys, or a combination. Researchers are trying to discover when each type is most effective or appropriate. Most intermediary online systems that we know use command interfaces. It may take many hours to learn all of the DIALOG or BRS commands. Once learned, the command interface allows the professional searcher to control the direction and speed of a search and to manipulate the systems quickly and efficiently to retrieve information.

Command interfaces are thought to be too complex for infrequent end users, so a menu-driven interface (such as that on BRS/After Dark) may be substituted on end user systems. The menu interface presents a list of choices of actions from which a user selects. The user doesn't need to know much about the system because searching is directed by the interface; in most database systems like BRS/After Dark, at some point the user must enter a term or terms for the subject they are seeking.

Other more limited systems present a continually narrowed-down list of subject headings or other search terms from which the user selects. This limits the capability of doing complex Boolean combinations. Several menus may be necessary before the user gets to the point of actually searching or displaying records; and menu interfaces can become tedious, especially for repeat users.

Function key systems have become more popular in the last few years as more people use standard IBM PC equipment. Online systems typically don't use them, but front-end software or CD-ROM systems might. A user invokes an action with the ten function keys (expanded to 40 when CONTROL, ALT, and SHIFT are used in combination with the function keys). Again, at some point, the user may have to input subject terms before an actual search will take place. Experienced PC users often feel comfortable with function key systems because many of the popular word processing and general applications software use function keys.

Form fill-in systems may begin with menus or function keys, but at the point of searching they provide a blank template for a user to fill in to start the search process. WILSEARCH is a well-known form fill-in system where a search template lists fields such as subject, author, title words, journal, etc., and the user fills in the values to be searched.

Many systems are offering a combination of interface styles or a choice of styles. A combination menu-command system allows the infrequent user to go through the array of menus, while the more experienced user can circumvent menus by issuing commands. DIALOG's Knowledge Index now allows a user to choose either command mode or menu mode. WILSONDISC provides a choice of menu, form fill-in, or command interfaces to its CD-ROM databases. Either function keys or commands will work in other systems, such as NEXIS or LEXIS. Some systems provide menu choices for some actions and require function keys for others.

Modes of communication

How the system communicates with the user and how the user is expected to communicate with the system are other choices an interface designer can make, no matter what type of interface is used. The most common modes of input in use now or expected to be in use in the near future are: keyboard, mouse, touch, and speech. Some are tied to the type of interface, others are an independent decision.

Online systems all require keyboard input and always have, whether the keyboard is used to type in commands, menu choices, or functions. OPACs and CD-ROM databases are showing more innovation, with some menu-driven systems using a mouse or touch screen and some systems using voice input for limited commands or menu choices.

How the system communicates with the user is the other side of the communication issue. Interface styles are beginning to vary, although the online systems of today all still use words in a written speech mode. Some system designers are advocating using spoken words instead of or in addition to the written words that appear on the screen.

Nicholas Negroponte of the MIT Media Laboratory described natural-language voice input/output systems as the ideal solution to retrieval system problems. (More than one attendee at the ASIS Mid-Year Meeting was heard to say "I don't want my database talking to me," but many of us hear our grocery store check-out terminal talking to us regularly and the younger generation is growing up thinking that is normal.) Whether it is verbalized or written on a screen, word-based communication modes require the same careful consideration of speech patterns and dialogue techniques.

Other ways systems might communicate with the user attempt to minimize the use of words. With the growing popularity of the Macintosh in the library, some system interfaces are beginning to rely more on icons. Icons are graphic representations of actions or functions, such as depicting a trash can to delete a record or a Sherlock Holmes–style magnifying glass to begin a search. (Icons seem to generate strong opinions; several speakers denounced the cutesy nature of icons and their inappropriate use in database system interfaces.)

Complete graphic interfaces are not yet in use with database systems, but they are under development. Graphic interfaces could be compared to what is now becoming popular at many of the large coffee shop chains found alongside freeways around the country. Their printed menus use large, brightly colored pictures of food choices instead of wordy descriptions, so presumably even an illiterate customer can select an appetizing entrée from a limited number of choices.

Choosing an interface

Faced with an increasing variety of interface styles and modes of communication, how can we select or design the interface that is best for users of our online systems, CD-ROM databases, or OPACs? Researchers have not reached definitive conclusions, but many people are forming opinions about what is the best interface style.

The experience and expertise of users will vary in at least two dimensions: their subject knowledge and their experience with databases. Good systems must be able to cope with everyone from novice to expert. The WILSONDISC CD-ROM system is especially good in its range of four interface choices, although users must specify which interface they wish to search at the beginning of the search session.

Future systems might allow adaptability as the user searches, so the interface would either offer more assistance as needed or let searchers take more control of the search process as they learn without being forced into the selection of a single interface style and being locked into that for an entire search session.

User preferences

In addition to variations of expertise, users will vary in their mental models of the information retrieval system and in their emotional preferences for a particular interface type. Every reader gets feelings and impressions along with the information and, sometimes, the feelings overwhelm the reader's ability to deal effectively with the retrieval system. Charles Hildreth of READ, Inc. expressed personal dislike of "WIMPs" (windows, icons, menus or mouse, and pointers). He likened icons to cave drawings or hieroglyphics and talked with disdain of predicted future tactile systems that would provide so-called "intimate computing."

Donald A. Norman, professor and chair of the Cognitive Science Department, University of California–San Diego, discussed how systems fail when they don't convey a clear and consistent mental model. Unlike a card catalog, most electronic systems have no visible signs of how things work and fail to convey a conceptual model as people search. From his research in cognitive science and experience with database systems, Norman advises interface designers to build in a system image that is understandable and is consistently conveyed as people learn to use the system.

Purpose of the search

Preferences and levels of expertise vary from user to user, and mental models can be conveyed by the system design. Even for a single user the purpose of a search may vary each time they approach the database system. Several speakers at the ASIS meeting discussed research that shows systems must be able to adapt to a variety of purposes from known-item searches through browsing.

Marcia Bates of UCLA described how most systems are patterned after the classic information retrieval model where a given user tries to retrieve the best possible set of documents to match a given query. She pointed out that much of the searching people do in real life is not like this—many times the information need itself evolves (not just the query) as the user searches and reviews some retrieved documents. Bates called this style "berry picking," as the user browses, they pick up a few good ones here, a few there. There is no real ending point other than the feeling of enough and the searcher may wander in different directions based on what is retrieved, how they react to it, and how their information need evolves.

Several sessions emphasized the need to get back to better browsing capabilities in database systems, and Norman called browsing "the secret" to successful systems. Browsing makes a system explorable and allows users to take their own information path. With the slow transmission speeds and connect-hour costs of online searching we have sacrificed database browsing.

An interface for all?

Is it possible to design a user computer interface that will appeal to every potential user and all of their uses of your database system? Probably not. One programmer for a large combination Mediline-OPAC system told me "we get it right for some, we miss for others." What is becoming obvious is there is no one interface that is appropriate for everyone; no single interface is likely to be praised by every user. Just as we all have our own opinions and our own information needs, a truly successful system should adapt and offer choices based on the preferences and needs of the individual user.

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