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## Menu Design: To Adapt, or Not to Adapt?

By [Paula Selvidge](#)

Computer software applications are typically designed for a broad range of users and tasks. Flexibility through adaptation has become more popular in the design of user interfaces in order to accommodate specific users and their mental models. It is proposed that a flexible system decreases cognitive workload, enhances productivity, and improves task efficiency. The potential drawbacks of adaptation include reduced learning time and lack of learning transfer to new applications, if the system is constantly changing. Users also may not be able to develop a coherent model of the system if the system changes and may experience a loss of control when using a changing system. In addition, adaptation may require more development time than static systems. The costs and benefits must be carefully considered when deciding whether or not to incorporate adaptation in a user interface.

### Types of Adaptation

Two main areas in which adaptation can be applied to the user interface are functionality and the design of the interface. With regard to functionality, the behavior of specific features of the system can be modified. The system could adapt the functionality in the user interface available to each user. Accessibility to functionality, such as menus, can be restructured based on specified criteria for adaptation. When considering the interface design adaptations, the use of screen layout could be modified. Screen layout in the user interface could be changed to suit aesthetic and design preferences, such as the use of color, frames, or forms in an application.

### Research on Menu Adaptation

An examination of the current research on menu adaptation reveals conflicting findings. One study examined performance of static and adaptive menus in a word processing program (Mitchell & Shniederman, 1989). For the adaptive menus, the most frequently selected items were reorganized to the top of the menu list. The hypothesis was that performance would be better with static than adaptive menus. Seventy-three participants completed 12 tasks in two separate sessions with both menu types, static and adaptive. The results indicated that participants required significantly more time to complete tasks in the first session using adaptive menus than static menus, although the number of errors did not differ for menu style. After a small amount of practice, there was no performance difference between menu styles, but 81% of users preferred static over adaptive menus in the study. This study supports the use of static menus over adaptive menus due to increased training time and user preference, but alternative studies have supported the use of adaptive menus.

Another study investigated performance for locating items in an adaptive versus a static telephone menu directory (Greenberg & Witten, 1985). The authors hypothesized that personalization of the menu directory would affect selection speed and error rate. Twenty-six participants completed 30 trials of locating names in both adaptive and static telephone menu directories. The menu items in the adaptive menu directory were reorganized by frequency of use, with the more frequent items appearing at the

top of the menu. The authors found that users of the adaptive directory had a significantly faster completion time and significantly fewer errors than the static directory. Subjective measures favored the adaptive menu directory, but the actual number of participants who favored the adaptive menu was not stated. Sears and Shneiderman (1992) investigated performance with different menu organizations in a word processing program: split menus, alphabetical menus, and frequency menus (see Figure 1). Split menus were created by splitting a menu into two sections, with a few of the most frequently selected items at the top of the menu and an alphabetical list of menu items below the frequently selected items. Alphabetical menus included alphabetically organized menu items, and frequency menus were reorganized by frequency of item use. Thirty-eight participants completed 100 menu selections with each of the three menu types. The results indicated that split menus provided significantly faster access than both alphabetical and frequency menus, but no differences were found for error rates. Users preferred the split menus, followed by alphabetical and frequency menus. The authors concluded that split menus incorporated the ease of access for frequently selected items and the alphabetical ordering that is useful for low frequency items (Sears & Shneiderman, 1992)



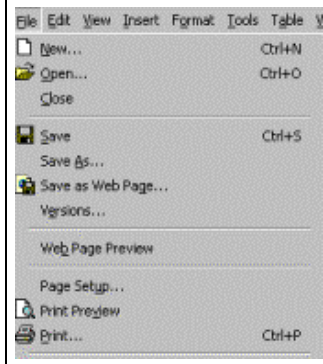
		
Split Menu	Alphabetical Menu	Frequency/Adaptive Menu

Figure 1. Menu Types

## CONCLUSION

Some research on adaptive menus suggests that cognitive workload will be increased initially with the use of adaptive menus, since menu items will be reorganized with frequency of use. Mitchell and Shneiderman (1989) found that performance was about the same after practice with static and adaptive menus but 81% of users preferred the static menus. It is important to note the strong preference for static menus when deciding whether to incorporate adaptation in a user interface. If users are not satisfied with the interaction, they may not want to use the application regardless of performance considerations. Alternatively, other studies have indicated that performance is better and preference favors adaptive menus (Greenberg & Witten, 1985; Sears & Shneiderman, 1992). The limitation of most of the studies reviewed was that the time period was short or limited to one brief experimental setting. Observation periods should be extended to examine the user benefits over time, since most users are not familiar with adaptable/adaptive features.

When determining whether or not to incorporate adaptation in the user interface of an application, it is important to consider who will be the intended users. Based on the literature reviewed, incorporation of adaptation for applications targeting novice users should be cautioned, since changing the placement of toolbar icons or menu items may increase learning time and transfer knowledge to similar systems would be limited. In addition, if the system is designed for multiple users, adaptation should be avoided unless personalized settings could be saved.

Adaptation is an important area in interface design, especially with the introduction of adaptive menus in Microsoft Office 2000<sup>TM</sup>. Future research should investigate when and how often adaptation should

be applied to the user interface, so adaptation does not hinder usability and performance.

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