International Journal of Industrial Ergonomics 41 (2011) 305–316

Contents lists available at ScienceDirect

International Journal of Industrial Ergonomics

journal homepage: www.elsevier.com/locate/ergon

Complementary menus: Combining adaptable and adaptive approaches for menu interface

Jungchul Park [a], Sung H. Han [b,*]

[a] Department of Safety Engineering, Chungju National University, Daehak-ro, Chungju 380-702, South Korea
[b] Department of Industrial and Management Engineering, Pohang University of Science and Technology (Postech), San 31, Hyoja, Pohang 790-784, South Korea

ARTICLE INFO

Article history:
Received 25 August 2010
Received in revised form
4 December 2010
Accepted 25 January 2011
Available online 18 February 2011

Keywords:
Adaptable interface
Adaptive interface
Mobile phone
Menu selection
Usability evaluation

ABSTRACT

This study proposes a method of coupling adaptable and adaptive approaches to the design of menus. The proposed complementary menu types incorporate both adaptability and adaptivity by dividing and allocating menu adaptation roles to the user and the system. Four different types of interface adaptation (i.e., adaptable with/without system support and adaptive with/without user control) were defined. They were implemented in a hypothetical prototype mobile phone via a hotlist (an additional collection of quickly accessible items). A controlled lab experiment was conducted to compare the menu types and investigate the effects of the system support in the adaptable menus and the user control in the adaptive menus. Twenty subjects participated in the experiment and performed menu selection tasks. Both performance and user satisfaction measures were collected. The results showed that adaptable and adaptive menus were superior to the traditional one in terms of both performance and user satisfaction. Providing system support to the adaptable menu not only increased the users' perception of the efficiency of selection, but also reduced the menu adaptation time. Important implications for the design of menus are described and valuable insights into the menu interface adaptation were gained from the quantitative and qualitative analyses of the experimental results.

Relevance to industry: The evaluation experiment conducted in this study may provide valuable information to designers of adaptive or adaptable menus. Adding system support to adaptable menu would be an attractive option to consider. Also, the results of a user survey provide useful information to the practitioners in mobile phone industry on the features users accessed most frequently.

1. Introduction

As the development of information and communication technology accelerates, a growing number of people are using mobile information devices such as PDAs (Personal Digital Assistants), mobile phones, mp3 players, etc. However, mobile devices are inferior to desktop computers not only in their processing speed and memory capacity but also in their user interfaces (Chen et al., 2009; Yang et al., 2010). For instance, small screen size of these devices could pose serious problems in usability, which is one of the most important factors in the success of any consumer product (Dumas and Redish, 1994; Han et al., 2001). What makes the situation worse is increasing complexity in functionality and content. It is reminiscent of the so-called "creeping featurism" (Hsi and Potts, 2000; Norman, 1998) or "bloated software" (Kaufman and Weed, 1998; McGrenere et al., 2002) that many desktop software applications are suffering from.

Better usability can be obtained when the product design is compatible with user requirements. For the past decades, designers have tried to find a single design solution that meets the target users' needs best. This means they had to guess who would use the product, what the potential users' needs would be, and in which circumstances they would use it. Unfortunately, however, none of these questions about the context of use could be completely answered in the design stage (Fischer, 2001). Therefore, the designers have had to assume an "average user," who is expected to represent the entire population of users, and to make an effort to fit their product to this hypothetical user (McGrenere, 2002). However, as Fischer (2001) pointed out, the assumption of the average user is becoming more and more inappropriate due to the diversification of user population and usage context. As information appliances are used by a variety of users in various situations, "a product fit for all" is becoming an objective that is difficult to achieve. Many product designers are looking for a solution to this problem in customizable/personalizable interfaces. In addition to designing for potential users and usage context in the design stage,

* Corresponding author. Tel.: +82 54 279 2203; fax: +82 54 279 2870.
E-mail address: shan@postech.edu (S.H. Han).

0169-8141/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.ergon.2011.01.010