EVALUATING PREFERENCES FOR MOBILE PHONE FEATURES

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Mobile (or cellular) phone usage has grown substantially over recent years. Products continue to become smaller while the number of features that they contain increases. Recently, manufacturers have begun to market products toward specific demographic groups, like children or older adults. However, there is relatively little research concerning individual differences in feature preferences, particularly with respect to age. The present research explores self-reported preferences for 24 mobile phone features. Participants (N = 194) rated each feature on a scale indicating their likelihood to use the feature if it was available in their mobile phone. Mean ratings indicated that Phonebook, Voicemail, Caller ID, and Call History were the features individuals reported most likely to be used. Approximately half of the features had mean ratings that indicated that they were *not* likely to be used. Pearson correlation coefficients between age and feature ratings resulted in 18 (out of 24) negative and significant correlations, indicating that most features are reportedly less likely to be used with increasing age. This notion was further confirmed by a positive correlation between age and the number of features rated as unlikely to be used. Analysis of variance also revealed effects of gender, age category, student status, and parental status on preference ratings. Implications for the design of mobile phones for different users are discussed.

INTRODUCTION

Mobile (or cellular) phone usage has grown substantially over recent years. According to recent statistics from CTIA – The Wireless Association (formerly known as the Cellular Telecommunications & Internet Association), there are approximately 194 million wireless subscribers in the United States, resulting in a penetration of over 65% of the total population (CTIA, 2006). In some countries (e.g., Finland), the penetration is even greater. Products have evolved to include more and more features in smaller and smaller packages. Most products that emerge in the mobile phone market appear to reflect a belief among manufacturers that more features are required in order to be competitive. Some users, e.g., early adopters, may want many features in the products that they purchase. However, attention should also be placed on those market segments having different patterns of preferences. For example, populations that might have preferences for phones with fewer features and simplification include young children, older adults, the mentally or physically disabled, individuals with low socio-economic status, and rural populations with less access to today's technology.

Recent product introductions, advertisements, and accompanying claims might indicate that some mobile phone manufacturers are beginning to realize the need to address some of these target populations in their product designs. For example, mobile phones explicitly designed for children are starting to appear (Firefly Mobile, Inc., 2006). According to the manufacturer's claims, the Firefly phone is "small, sturdy, … shaped to fit a kid's hand," and has a "kid-friendly keypad." The keypad contains five keys. Two of the keys are intended to be programmed to dial the child's mother and father. These are indicated by corresponding icons on the keys. Another key opens a phonebook that can be programmed and controlled by the parents to store up to 20 numbers that the child is allowed to call or receive calls from. The phone can also be personalized in other ways with lights, sounds, animation, and colored face plates.

Some manufacturers are producing mobile phones that they or other organizations claim in some way serve the needs of older adults. It is not clear whether the claims are based on actual data or speculation. AARP (formerly known as the American Association for Retired Persons) states on its website that today's mobile phones take pictures, play songs, give scores and stock quotes, and "are as thin as a matchbook," but they are not considered more user friendly than phones of the past by "many older adults who would like a simpler cell phone" (AARP, 2006). However, AARP also claims on its website that "many innovative mobile phone manufacturers are catering to this new demand for easier-to-operate phones." AARP gives examples of some emerging products that include potentially useful technology for older adults: (1) a product that "slows down the caller's voice to make it easier for older adults to discern what is being said" and has a pedometer and panic button; (2) a product that incorporates Global Positioning System (GPS) technology and "contains only one button that when pressed connects the user to an operator who gives directions, connects the caller to friends and family-members, and provides directory assistance;" and (3) one product that has "wide screens, easy to discern text and symbols, and large buttons." This last manufacturer's website presents the hopeful claim that the products in this line of "mobile phones are uniquely and intuitively designed to provide only the functions you really need" (Vodafone Group, 2006).

The problem with the above-mentioned claims about potentially useful features is that they have not been accompanied by data citations to support them. Therefore, the products and associated features do not necessarily reflect

what individuals want or need. The claims may seem reasonable, but the assertions may be incorrect if they are not driven by actual data. The consequences of speculation or unsupported claims could not only result in marketed products that do not sell but could also leave certain classes of the public unserved. Actual data collection could strengthen recommendations and reveal better features.

These issues (e.g., increasing number of features in mobile phones, unsupported claims related to emerging products, etc.) relate directly to the research questions that motivated this study. The main question is what features of mobile phones do individuals report that they are likely to use. A second main question is whether age of individuals relates to preferences for mobile phone features. Additional questions surround whether there are other demographic characteristics that affect preferences. The purpose of the present study was to explore self-reported preferences for various features found in mobile phone products today and to explore the relationships with age that might show different patterns of preferences. The relationships between several other demographic characteristics (e.g., gender, race, student status, parental status) and preference ratings were also examined.

METHOD

Participants

The research reported here was conducted in 2004 as part of a larger survey-based study. A total of 194 individuals participated by completing the questionnaire administered in written form. Demographics of the participants was as follows: 100 were female and 94 were male, 156 were Caucasian and 38 were not Caucasian, 87 were students and 107 were not students, 64 were parents and 130 were not parents. The participants ranged in age from 18 to 81 ($M =$ 32.2, $SD = 14.9$). The median age was 24. There were 57 participants age 40 or older, who were baby boomer age and older (U.S. Census Bureau, 2006). Of these, 19 were 55 or older. Participants were recruited as part of a college course assignment where students administered the questionnaires to individuals in the surrounding community of Raleigh, North Carolina.

Materials and procedure

Data was collected using a questionnaire that was included within a larger multi-item written instrument constructed in the Cognitive Ergonomics Laboratory at North Carolina State University. The survey contained questions that related to demographics and numerous topics including beliefs about the internet, word processors, warning signs, and mobile phone features. Those items associated with beliefs about mobile phone features are reported here. Preferences were operationalized through use of a rating scale addressing likelihood to use. Participants were asked to rate 24 features in response to the following: *How likely would you be to use each of the following features if they were available on your cell phone?* They reported their ratings on an 8-point scale

with the following anchors: 1-Extremely Unlikely to Use, 2-Very Unlikely to Use, 3-Unlikely to Use, 4-Somewhat Unlikely to Use, 5-Somewhat Likely to Use, 6-Likely to Use, 7-Very Likely to Use, and 8-Extremely Likely to Use. The list of features that were rated can be found in Table 1. Two versions of the survey were administered with the features listed in different order on the surveys.

Experimental Design

This experiment was conducted using a cross-sectional design. Participant age was used as a continuous predictor variable. Nominal independent variables included participant gender, race (Caucasian or non-Caucasian), student status (student or non-student), and parental status (parent or non-parent). Participant age was used to create an additional nominal age category variable ("40 or older" or "under 40").

The dependent variables for each participant were likely-to-use ratings for 24 mobile phone features and two separate overall measures computed from these ratings. The latter two measures were (a) an average likely-to-use rating across features for each individual and (b) a count of the number of features that the individual rated as unlikely to use as indicated by a rating of 4 or less.

RESULTS

Ratings were averaged across participants to form mean likely-to-use ratings for each feature. Mean ratings ordered from highest to lowest are provided in Table 1. Phonebook, Voicemail, Caller ID, and Call History were rated as the features most likely to be used. Calorie Counter and Golf Scorecard were the features rated as most unlikely to be used.

The overall mean value of the average rating was 4.43 ($SD = 1.12$). The overall mean value for the number of features rated as unlikely to use (as indicated with a rating of 4 or less on the rating scale) was 11.76 ($SD = 4.46$) out of 24.

Pearson correlation coefficients were computed between participant age and feature ratings. Age was significantly correlated with 18 of the 24 feature ratings. Results are provided in Table 2. The features with the highest negative correlations with age were Alarm Clock, Caller ID, Download Music/Ringers, Games, Phonebook, Voicemail, Call History, Camera, Scorekeeper, Text Messaging, and Web/Internet Browser. Pearson correlation coefficients were also computed between participant age and the two overall measures. The correlation between age and the individual's average rating across features was -.47 ($p<.0001$). The correlation between age and the number of features the individual rated as unlikely to use was .41 ($p<.0001$). All of the correlations between age and the feature ratings as well as the average rating across features were negative indicating that as age increases, the reported likelihood to use them decreases. The correlation between age and the number of features rated as unlikely to use was positive indicating that as participant age increases, the fewer the number of features they would report being likely to use.

Table 1. Mean likely-to-use ratings of mobile phone features ordered from most to least likely to use (*N*=194)

Feature	Mean	SD
Phonebook	7.39	1.26
Voicemail	7.28	1.54
Caller ID	7.26	1.41
Call History	7.01	1.63
Alarm Clock	5.26	2.52
Shortcut Button	5.18	2.35
Voice Dial	4.93	2.23
Weather Reporter	4.55	2.24
Speakerphone	4.54	2.47
Headset	4.53	2.34
Text Messaging	4.50	2.51
Calendar	4.50	2.14
Camera	4.35	2.22
Download Music/Ringers	4.15	2.51
Email	4.09	2.32
Web/Internet Browser	3.82	2.24
2-way Push to Talk	3.81	2.50
Games	3.45	2.36
Tip Calculator	3.27	2.37
Notepad	3.04	1.97
Expense Tracker	2.84	2.14
Scorekeeper	2.75	2.19
Calorie Counter	2.23	1.89
Golf Scorecard	1.69	1.56

Table 2. Pearson correlation coefficients between age and mobile phone feature likely-to-use ratings ordered from highest to lowest absolute magnitude of correlation

Feature	Pearson r	
Alarm Clock	-.50	†
Caller ID	-.41	†
Download Music/Ringers	-.41	†
Games	-.39	†
Phonebook	-.38	†
Voicemail	-.38	†
Call History	-.35	†
Camera	-.34	†
Scorekeeper	-.34	†
Text Messaging	-.33	†
Web/Internet Browser	-.28	†
Weather Reporter	-.26	***
Tip Calculator	-.24	**
Shortcut Button	-.20	**
Speakerphone	-.18	*
Expense Tracker	-.17	*
2-way Push to Talk	-.16	*
Notepad	-.15	*
Calendar	-.13	ns
Golf Scorecard	-.12	ns
Calorie Counter	-.12	ns
Email	-.09	ns
Voice Dial	-.09	ns
Headset	.02	ns

*$p < .05$, ** $p < .01$, *** $p < .001$, † $p < .0001$
ns = not significant

A series of one-way analysis of variance procedures was conducted to examine whether there was a significant relationship between the demographic variables and the average rating across features. The means and findings from this analysis are shown in Figure 1. A similar analysis was performed for the number of features rated as unlikely to use. These results are shown in Figure 2.

Figure 1 shows several significant findings: (a) participants age 40 or older provided lower likely-to-use ratings than those under 40, (b) females provided lower likely-to-use ratings than males, (c) non-students provided lower likely-to-use ratings than students, and (d) parents provided lower likely-to-use ratings than non-parents. Figure 2 shows that (a) participants age 40 or older rated more features as unlikely to use than those under 40, (b) non-students rated more features as unlikely to use than students, and (c) parents rated more features as unlikely to use than non-parents. The analysis with race did not show any significant differences.

DISCUSSION

The results indicate that feature-rich mobile phones may not match with what individuals want. About half of the 24 features that were rated yielded mean likely-to-use ratings of around 4 or less (unlikely to use), indicating that they were not perceived as being important to most users. This is also reflected in the mean average likely-to-use rating of 4.43 and

the mean number of features rated by individuals as unlikely to use. This value was 11.76, approximately half of the number of features that were rated. These results appear to be magnified when participant age is considered. None of the individual feature likely-to-use ratings were positively correlated with age. Most features' likely-to-use ratings (18 of 24) were negatively (and significantly) correlated with age. The results also revealed that other demographic characteristics, such as gender, student status, and parental status, are important contributors to feature preference ratings.

Mobile phone products continue to be introduced with more and more features added. Even if usability is stressed as a design goal, ease-of-use is difficult to achieve with the addition of more and more features into smaller and smaller devices. This "feature-itis" may offer the benefits of greater functionality, but it also yields smaller keys that are close together, complex menu hierarchies, hard-to-read text on displays and hardware, and abbreviated language used to define functionality or offer help. This study has illustrated that users may prefer fewer features in mobile phones, particularly as age increases. Though some mobile phone manufacturers have begun to advertise their products as targeted for older adults, these claims do not appear to be supported by research citations. Therefore, it is unclear whether the features in these mobile phone products are actually what older adults want or need.
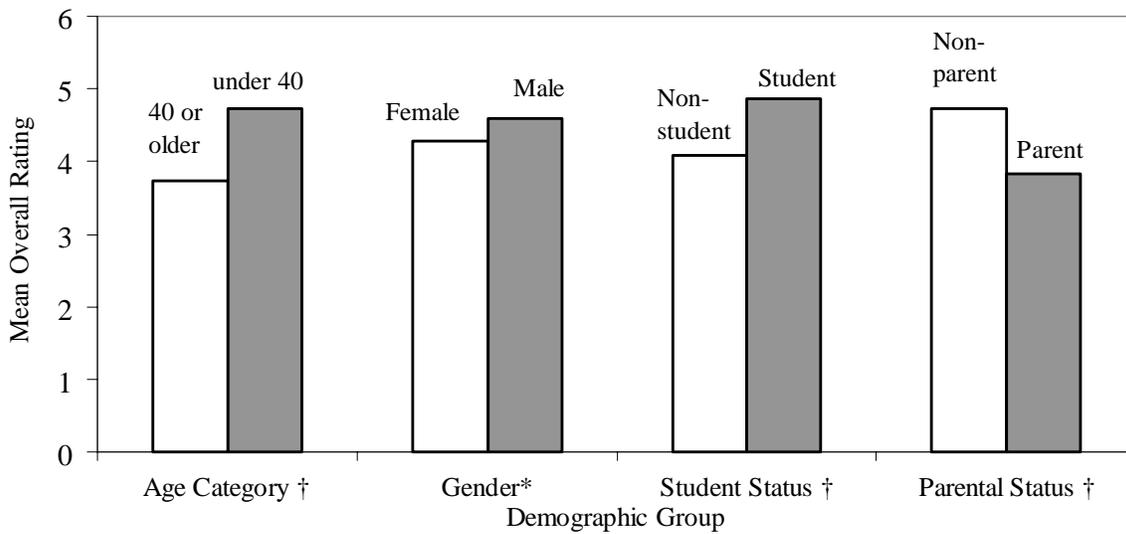
Figure 1. Mean Overall Likely-to-Use Ratings across Features as a Function of Demographic Group
(* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .0001$)
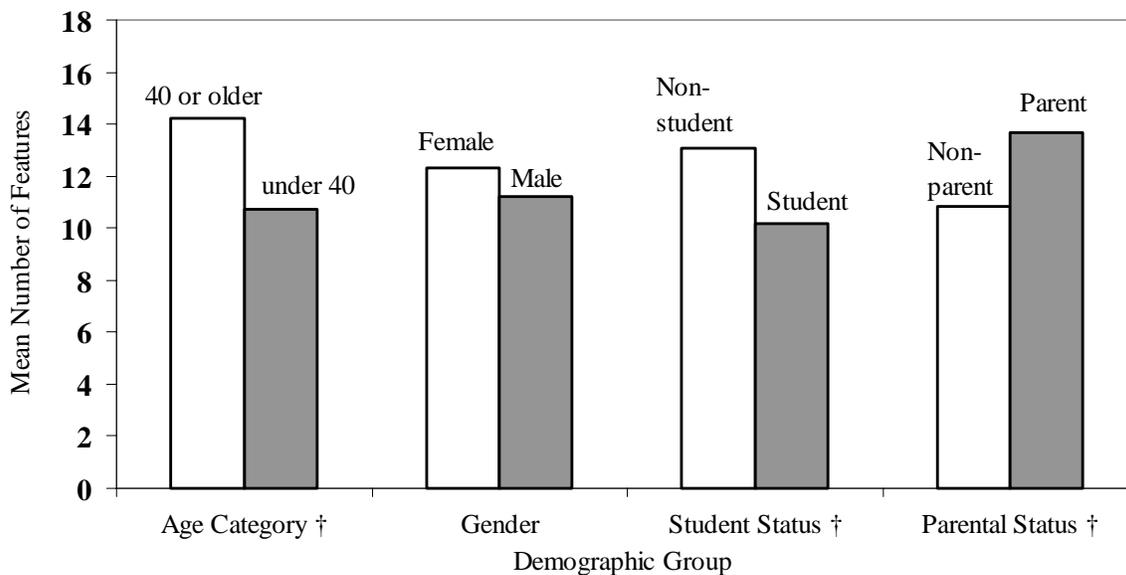

Figure 2. Mean Number of Features Rated as Unlikely to Use as a Function of Demographic Group
(* $p < .05$, ** $p < .01$, *** $p < .001$, † $p < .0001$)

Individual differences in physical and mental characteristics need to be considered to adequately serve different populations. For example, the aging population faces issues such as diminishing tactual acuity (e.g., Mendat, Bell, & Wogalter, 2004), declining spatial abilities (e.g., Pak, Sharit, Czaja, & Rogers, 2003), reduced visual acuity, slower reaction times, and reduced memory capacity (e.g, Salthouse & Coon, 1993) that need to be considered when designing products intended to be used by this population. A recent expert panel discussion on design for older populations (Laux et al., 2003, p. 227) has indicated that there is considerable data-driven knowledge about limitations in older populations, but practitioners have not been "particularly effective in designing

to accommodate the older population in general, as indicated by the resistance of older adults to adopt many new technologies that have the potential to assist them to maintain independence (e.g., cellular phones, computers, and the internet/WWW) (Laux, 2001)."

Mobile phones can provide substantial benefits to users in many ways, including aspects of safety and security. However, these beneficial aspects are reduced or eliminated if the products are unused or difficult to use, especially when safety is a concern. Though more basic research and better design guidelines are needed to make designs that are usable for a variety of target users (Nam, Kim, Smith-Jackson, & Nussbaum, 2003), this might only be accomplished by

designing separate unique products for individual populations of users. For example, there appears to be a need to address what people of different ages actually want and need in their mobile phones. Products designed as simple enough for children to use may not meet the needs of the aging population as children's products are likely to focus on fun and thus be brightly colored, entertaining in visual and auditory appeal, and contain features like games. The older population might be better supported with designs that follow life-learned archetypes and mental models. For example, a design that matches the expected behavior of land-line devices with a similar keypad and similar features might serve as a baseline metaphor for designing mobile phones targeted for older adults. The results of this study indicate that younger adults (e.g., college-age) want more features while older individuals want fewer features.

This study shows that users with different demographic characteristics have preferences for different numbers of features in mobile phones. Older adults prefer fewer features. Future product designs should be based on sound user-centered design principles and research to ensure that actual user needs and preferences are understood and incorporated into the designs. Manufacturers need to consider that phones with fewer features might better serve certain markets of users and thus increase market share in those markets that are not yet fully penetrated. It will likely take a pioneer among manufacturers to change the direction of mobile phone design toward radical simplification.

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