

The Effectiveness of Symbol and Color Coding in Mobile Phone Keys

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ABSTRACT

The effectiveness of color-coded symbology in mobile phone answering keys is studied using dual-task paradigm and phones with different kinds of keypad layouts. Results show that color-coded symbology is highly effective, though it does not always automatically draw attention to the correct answering key when the user encounters a new kind of mobile phone.

Keywords

Mobile phone, SEND and END keys, symbol and color coding, attention

1 INTRODUCTION

This study concentrated on the mobile phone keys used for answering and ending calls (the SEND and END keys). These keys should indicate their function unambiguously so that fatal errors, like accidentally terminating a call instead of answering it, could be avoided. The de facto standard (DFS) of these keys in Finland is a layout where the SEND key is located on the left and the END key on the right side in the upper part of a mobile phone. Symbol and color coding are usually used simultaneously (green indicating SEND and red END).

In visual search tasks the detection of a target that can be distinguished from distractors on the basis of a single visual feature, for example color, is found to require little or no attentional resources (Treisman & Gelade 1980). The search process of a certain color also becomes facilitated and automatic when that color is searched for repeatedly (Maljkovic & Nakayama 1994). Benefits of color-coded symbology over monochrome symbology (Post & Geiselman 1999) and redundant

color coding (Luder & Barber 1984) in displays have been found.

This study examined the benefits of color-coded symbology in mobile phone keys. The goal was to find out if it is sufficient for eliminating errors in mobile phone answering situations where the location of the SEND and END keys is varied.

2 METHOD

2.1 Participants

Eleven students (4 male, 7 female) participated in the study. Their age ranged from 19 to 30 years, with an average of 23 years. Two participants were left-handed and the rest right-handed. Everyone answered the phone with their right hand. All participants had a mobile phone and their average mobile phone experience was about two years. The data concerning the model of their current and previous mobile phones was also gathered. Five out of the 11 participants had a mobile phone corresponding to the DFS and six participants had a phone which has only a single key for SEND and END operations located in the middle of

the phone. None of the participants was familiar with the mobile phone model used in the study.

2.2 Task

A dual-task requiring attentional resources was used in the study. The participant's task was to answer a mobile phone while playing a PlayStation game in order to get simple instructions concerning the game. Three kinds of Benefon Twin GSM 900 phones were used and all participants answered six calls with each. Everyone used first a phone which had no codes on its keys and the SEND function was located in a DFS manner. Then participants were divided in two groups and both groups used two kinds of phones which had color and symbol codes on their answering keys. The two phones were otherwise identical except that the location of the answering keys was different. Group 1 (N=6) used first a phone which had keys located in a manner corresponding to the DFS and then an other phone that was a mirror image of the first one (END on the left, SEND on the right). Group 2 (N=5) used the same phones in a reverse order. The results discussed in this paper concern the 12 calls answered with the symbol and color coded phones.

3 RESULTS

Errors made by the two groups with the two kinds of symbol and color coded phones are presented in figure 1 (note that the phone changes after the sixth call). Errors occurred mostly when one color phone was switched to another. In all cases the errors made caused the call to be terminated because the participant pressed the END key instead of the SEND key.

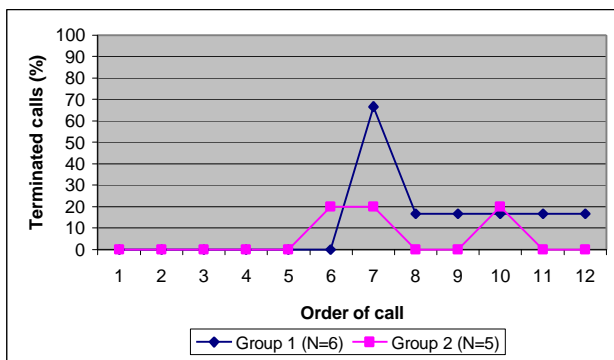


Figure 1. Errors made with the symbol and color coded phones.

In figure 2 the amount of correct responses with symbol and color coded phones is compared to the results of our previous unpublished study (Hyypä et al. 2000) where an identical test paradigm was used with phones

that had either no coding or symbol coding without color.

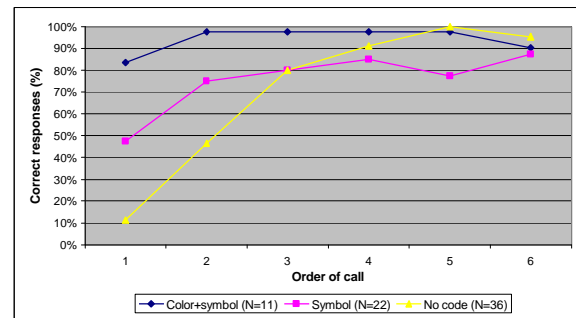


Figure 2. Correct responses with phones that have different kinds of codes on their answering keys.

4 DISCUSSION

The results of this study provide further support to the benefits of color coding. Symbol with color coding in mobile phone keys is very effective compared to no coding or symbol coding alone. It seems that the symbol coding without color caused some interference because the level of participants' performance did not reach the same level as in the no-coding situation. It remains to be examined if color coding itself would be better than symbol with color coding. Though both symbol and color coding are present a user can totally ignore crucial perceptual information as did one participant in group 2. Similar results were obtained in our previous study with symbol coding (Hyypä et al. 2000). It seems that symbol and color information do not always drive automatically the user's attention to the correct key. It needs to be examined in more detail what kind of codes the human information processing system uses in this kind of situations.

5 REFERENCES

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