

Web-Based Usability Evaluation of Ink-on-Page Indicators

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James R. Lewis

IBM Voice Systems

West Palm Beach, Florida

Abstract

When working with displayless devices that store pages of electronic ink, it is useful to know whether the current and immediately surrounding pages are blank or contain electronic ink. This study's purpose was to evaluate the accuracy of interpretation and usefulness, appropriateness and intelligibility ratings of indicators developed for this purpose. The results indicated that participants strongly felt that the indicators were useful, appropriate, and intelligible. However, there was some ambiguity in the interpretation of the indicators. In general, the indicators worked well, and appropriate documentation should increase the accuracy their interpretation.

ITIRC Keywords

IBM ThinkPad TransNote with ThinkScribe digital notepad

Web-based usability study

Accuracy of interpretation of page-on-ink icons

Usefulness

Appropriateness

Intelligibility

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Introduction

When working with a displayless device that stores pages of electronic ink (such as the IBM ThinkPad TransNote with ThinkScribe digital notepad¹), it is useful to know whether the current page and its immediately surrounding pages are blank or contain electronic ink. Specifically, knowing this helps the user to avoid the problem of overwriting ink already on a page with new ink.

The purpose of this study was to evaluate the usefulness, appropriateness and intelligibility of indicators developed for this purpose.

¹ IBM, ThinkPad, TransNote and ThinkScribe are trademarks or registered trademarks of International Business Machines Corp.

Method

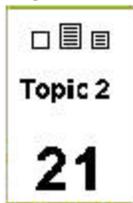
Participants

The source for participants in this study was a set of 300 IBM employees, selected at random from an internal e-mail directory of all of the IBM employees in the United States and sent an e-mail invitation to participate. Of the employees invited to participate, 97 (32%) responded to the invitation.

Materials

I used the IBM User-Centered Design's version of WebSurveyor² to construct a web-based form for the evaluation. The form had two key sections. The first section assessed whether participants interpreted the ink-on-page indicators in the expected way. It contained a sample depiction of the indicators and three questions, as shown below in Figure 1:

Figure 1. The Sample Display and Three Questions



Please answer the following questions:

1. Does Page 21 have any electronic ink on it? YES NO
2. Does Page 20 have any electronic ink on it? YES NO
3. Does Page 22 have any electronic ink on it? YES NO

The expected answers to the three questions were YES, NO, and YES respectively.

The second section assessed user's subjective judgment about the quality of the indicators using the three bipolar scales shown in Figure 2 (7-point scales in which a larger number indicates a more favorable rating):

Please rate the small page icons using the following scales. If you indicate dissatisfaction with any scale, please use the Comments section to tell us what we need to do to improve.

Useless	1	2	3	4	5	6	7	Very Useful
Inappropriate	1	2	3	4	5	6	7	Appropriate
Unintelligible	1	2	3	4	5	6	7	Very Clear

Figure 2. The Three Rating Scales

² WebSurveyor is a trademark of WebSurveyor Corporation.

Procedure

After receiving the e-mailed invitation, participants clicked a link in the message that brought up the WebSurveyor page containing the evaluation items. The participants read an introduction explaining the purpose of the icons, then completed and submitted the form. The WebSurveyor program kept track of the data.

Results

Selection Accuracy

Table 1 and Figure 1 show the accuracy results (percent accuracy and 90% binomial confidence intervals) for the first three questions (where a correct answer corresponds to the expected answer).

Table 1. Selection Accuracy

Question	% Correct	Lower limit	Upper limit
Ink on 20?	96.9	92.2	99.2
Ink on 21?	96.9	92.1	99.2
Ink on 22?	88.7	81.9	93.5

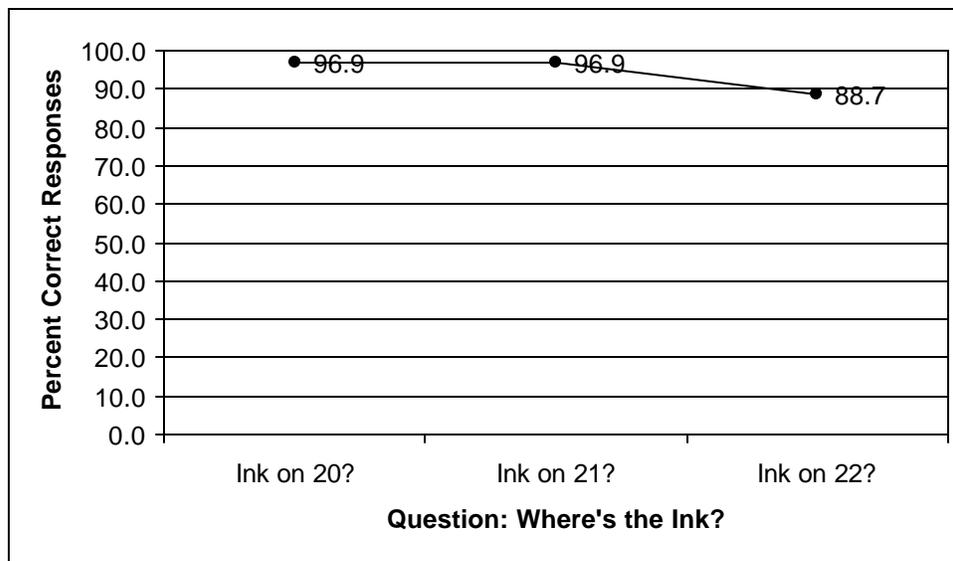


Figure 1.

Selection Accuracy

The answers to all the questions showed a very high correspondence with the expected answers, but the responses to the “Ink on 22” question were significantly less in correspondence than the other two questions ($p < .10$).

User Ratings

Table 2 and Figure 2 show the user ratings for the attributes of usefulness, appropriateness and intelligibility of the indicators. Users provided positive ratings for all three attributes (mean ratings ranging from 5.5 to 5.9 on scales with a maximum score of 7), indicating their acceptance of the indicators. The differences among the mean ratings for the three indicators were not statistically significant (all $p > .10$)

Table 2. User Ratings (Mean and 90% Confidence Interval)

Attribute	Rating
Usefulness	5.7 +/- .24
Appropriateness	5.9 +/- .21
Intelligibility	5.5 +/- .22

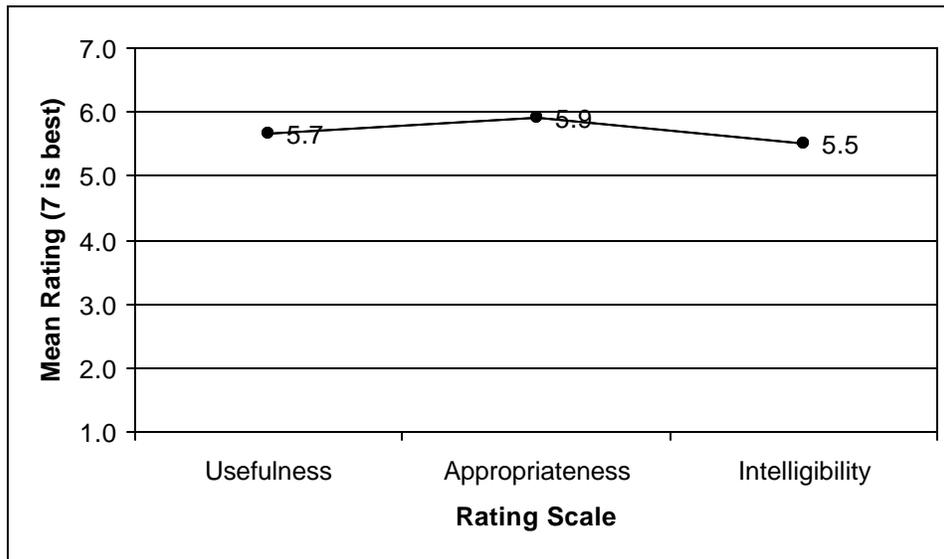


Figure 2. User Ratings

Discussion

The results indicated that the participants generally interpreted the icons as expected, even without any supporting documentation. Their ratings were consistent with the accuracy of their interpretations, supporting the use of the indicators for their designed purpose.

Despite being a relatively rare choice, the statistically significant magnitude of the unexpected response to the third question is consistent with an alternative interpretation of the indicators in which a large page icon indicates a page with ink and a small page icon indicates a page with no ink. Thus, it is important to provide supporting documentation (Quick Reference, User Manual, on-line help, etc.) that clearly specifies that the large icon represents the current page and the presence or absence of lines in a page icon indicates the presence or absence of electronic ink on the indicated page.