

Show-all-Links: Identifying Hyperlinks in Websites that use Non-Standard Formatting

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ABSTRACT

Many websites no longer follow traditional usability standards such as blue, underlined text link. Users may miss important information by not knowing which elements are clickable and which are not. The present study sought to determine whether an option to highlight all the hyperlinks (links) on a website would help users locate available image and text-based links. All participants were shown two different websites and asked to click on all design elements that they thought were links. In one condition, participants had the option of using a keyboard shortcut key that, when pressed, would highlight all the links on the page. In the other (control) condition, this option was not available. Significantly more participants in the experimental condition found *all* of the links compared to the participants without the highlight option. If the design of a website prevents developers from implementing easily-discoverable links, developers should consider adding an option that can highlight all of the links.

INTRODUCTION

- The more confusing a website is perceived to be, the more likely it is for visitors to leave the website without clicking on some links of potential interest or benefit to them.
- This can result in a higher bounce rate (Edmonds, White, Morris, & Drucker, 2007) in which there is a higher percentage of people who leave a website without further engaging with the page.
- The bounce rate can be reduced by identifying the type of information the website's audience will likely seek and then tailoring the navigational system to fit those needs (Perkowitz & Etzioni, 2000).
- Designing a user-centered navigational structure that reflects the mental model users will aid better decision making, e.g., decisions on which parts of a website they wish to view (Chaomei & Rada, 1996).
- Various visual treatments applied to links can make link localization difficult for users (Gill, 2000).

This study was conducted to determine whether giving Internet users the option to highlight all the hyperlinks (links) on a website would help them locate all the available links on that page.

METHOD

Participants

- 82 participants
- 50 males; 32 females (mean age = 20.5, *SD* = 4.4)

Design

Between-Subjects Experiment

Show-All- Links Condition

- Participants were asked to view two websites, displayed in **Figures 1 and 2**
- Participants were told that they could use a keyboard shortcut to instantly highlight all available links of the website.
- Pressing the 'S' key (for **Show** link) would highlight the links
- Pressing the 'H' key (for **Hide** link) would remove the highlights.

Control Condition

- In the conventional-view condition, participants were not told that they could use the two keyboard shortcuts.

Procedure

- Two websites were shown in randomized order.
- Participants were told that the goal of the study was to investigate how people interact with certain types of websites.
- For each website, participants were asked to click on as many elements on the page that they visually determined to be links. They were told the links could be text, graphics or photographs.
- Participants were also advised that clicking on the links would not load new websites, and all interactive indications of active links were disabled.
- Every time the participant clicked on an element that was a link, it would become highlighted with a thin, green border.
- If participants clicked on anything other than a link, a semi-transparent red circle would appear to indicate an incorrect click (**Figure 3**).



Figure 1. Website 1 with Show-all-Links Function Activated

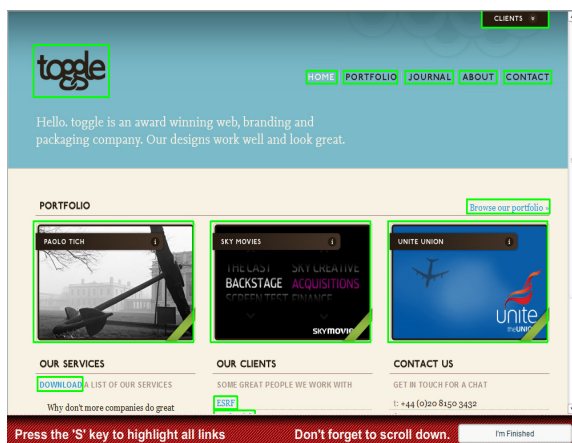


Figure 2. Website 2 with Show-all-Links Function Activated

RESULTS

A series of one-way ANOVAs were conducted to examine whether participants in the show-all-links group were significantly different in both task time and link-location accuracy than those in the conventional-view group. The method of calculating the dependent variables are shown below. **Table 1** displays the means and standard deviations.

$$\text{Click Accuracy} = \frac{\text{number of incorrect clicks} - \text{number of correct clicks}}{\text{total number of available links on the website}}$$

$$\text{Correct Clicks} = \text{total number of correctly identified links}$$

$$\text{Incorrect Clicks} = \text{total number of clicks on non-link areas of the website}$$

$$\text{Percent Correct} = \frac{\text{number of correct clicks}}{\text{total number of available links on the website}}$$

RESULTS

Table 1. Means (and Standard Deviations) of the Response Measures as a Function of the Conventional and Show-All-Links Views (n=82)

	Experimental Condition			
	Conventional (Control)		Show-All-Links	
	M	SD	M	SD
Website 1				
Click Accuracy	82.00	17.67	89.41	19.00
Correct Clicks	23.05	4.46	24.15	4.39
Incorrect Clicks	1.71	2.21	.88	1.18
Percent Correct	88.60	17.12	92.78	16.97
Task time (s)	49.68	16.14	48.77	25.47
Website 2				
Click Accuracy	58.62	22.03	80.29	25.93
Correct Clicks	18.45	5.12	20.98	5.34
Incorrect Clicks	4.40	3.74	1.73	1.92
Percent Correct	76.98	21.35	87.48	22.17
Task time (s)	51.78	23.23	44.07	23.26

Website 1

- A significant difference between conditions was found in the number of incorrect clicks, $F(1, 81) = 4.53, p = .04, \eta^2 = .05$.
- Those in the show-all-links group clicked on significantly fewer incorrect visual elements.
- Click accuracy just missed the conventional level of significance, $F(1, 81) = 3.35, p = .07, \eta^2 = .04$ but showed a trend in the direction of making more accurate clicks.

Website 2

- Significant differences were found for the number of correct clicks, $F(1, 81) = 4.79, p = .03, \eta^2 = .06$ and the number of incorrect clicks, $F(1, 81) = 16.39, p < .001, \eta^2 = .17$
 - Those in the show-all-links group clicked on significantly fewer incorrect elements, and found significantly more links.
- Significant differences were found for the % correct of links located, $F(1, 81) = 4.77, p = .03, \eta^2 = .06$ and the overall click accuracy, $F(1, 81) = 16.68, p < .001, \eta^2 = .17$.
 - Participants in the show-all-links group found significantly more of the available links, and were significantly more accurate than those in the conventional-view group.

DISCUSSION

- As expected, the results revealed that users can miss a number of links on a website if the links are not obvious to the user.
- Participants who viewed Website 2 in the conventional-view group were less able to locate a number of links; even when they were specifically looking for all of the links on the page.
- The results from the analysis of Website 2 also revealed that users with the show-all-links function were significantly more likely to locate all the links on the website without making incorrect clicks.
- The results from Website 1 show that those in the show-all-links group were significantly less likely to make incorrect clicks, although there were no significant differences in locating links.
 - One explanation for this nonsignificant result is that, as **Table 1** indicates, both groups found a high percentage of links suggesting a probable ceiling effect.
- Though it was expected that those in the show-all-links group would find all the links quicker than those in the conventional-view group, the time to locate all the links on both websites was not significantly affected by the view conditions.
 - This may have been due to some additional time that was needed to adjust to the added functionality in the show-all-links group. Future research should be conducted to examine how users in both groups allocate their time.

Implications

- The results also indicate that the lack of web design standards can play an important role in the user's ability to correctly locate links on a website. Molich and Nielsen (1990) found that guidelines were frequently not followed due to how lengthy and complicated they have become. They suggested using easy-to-follow heuristics to aid the active design process.
- The results indicate that web designers could also decrease the amount of missed links by users by including a keyboard shortcut that allows users to instantly highlight all the available links on the website.

Future research

- A larger number of websites that that reflect the variety of real web pages should be used.
- It would be useful to compare user behavior and eye-tracking between standards compliant and non-compliant websites.

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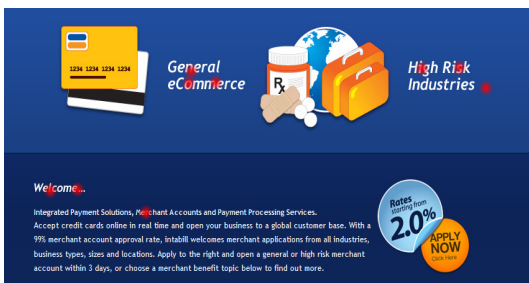


Figure 3. Website 1 with Incorrect Clicks Displayed