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An Exploratory Study of Situational Error on the Web

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Abstract

Users frequently make errors, and these errors can be frustrating, and can keep the users from reaching their task goals. In the networked environment of the Internet, there are an increased number of transactions and components involved, increasing the opportunity that the user will not be able to reach their task goal. Some of these errors are not due to the action of the users, but rather, are due to factors outside of their control, such as the inaccessibility of a network resource. These errors have previously been named Situational Errors, because while the user perceives that an error has occurred, the specific situation is possibly the cause of the error, rather than the user’s actions. While theoretical examples of situational error have been presented, no experiments have been performed to examine situational errors and determine how often they occur, as well as what types of situational error can occur. This paper presents the methodology for an experiment on situational error.

1. Introduction

Errors can occur frequently when users are interacting with computers. This is especially true with novice users, who are not as familiar with the procedures required to successfully complete a task, and therefore, might not be able to reach their task goal (Lazar & Norcio, 1999; Lazar & Norcio, 2000b). Donald Norman’s taxonomy of error describes, at the top level, two different types of error: mistakes and slips (Norman, 1983). A mistake is when the user does not choose the appropriate commands to reach their task goal (Norman, 1983). A slip is when the user chooses the correct commands to reach their task goal, but does not enter the commands correctly (due to incorrect spelling, etc.) (Norman, 1983). Both of these errors occur because of the incorrect actions of the user. What if a hard disk crashes, or there is a hardware failure? These errors are not due to the actions of the user, however, the user is in control of this situation, because they can replace any malfunctioning part of their computer. However, this situation is very different in the networked environment. Imagine a situation where the user has performed all actions in a correct manner, is not able to reach their task goal, and has no control of the situation and no chance to rectify the situation. This is the world of the situational error.
2. Situational Error

Novice users sometimes find the Internet and the Web to be very confusing. The users must first know the web location of the content that they are interested in, or be able to find the location of the content by use of a search engine. However, knowing the correct location (the URL) of the requested content is not enough; users may have problems actually accessing that content. When the user submits a request for a specific web page (by providing the URL), it is questionable whether they will be able to reach the web content, their task goal. With all of the networks and servers involved in accessing a web page, there is an increased likelihood of error (Lazar & Norcio, 1999; Lazar & Norcio, 2000b). A user may not be able to access the web site that they want, although the user has not performed any commands incorrectly. For instance, the user may correctly type in the URL for a web site, such as the Washington Post (http://www.washingtonpost.com), but is unable to access the web site due to problems with the Washington Post web server, the Internet Service Provider (of either the user or the Washington Post), or problems on the user's local network. (Lazar & Norcio, 1999; Lazar & Norcio, 2000b). In addition, a remote web site may have failed (Johnson, 1998). The error is not rooted in the user's own computer, so the user essentially has no control over correcting this type of error and reaching their task goal. This type of error has been named a situational error, because the error is due to situational factors which are out of the user's control (Lazar & Norcio, 1999; Lazar & Norcio, 2000b). Although the user has not performed any actions incorrectly, it has been postulated that novice users tend to view these occurrences as errors, and then blame themselves, when in fact the user has not caused the error (Lazar & Norcio, 1999; Lazar & Norcio, 2000b).

2.1 Download Time

If a web page takes a long time to load, the user may get frustrated and could possibly assume that there is an error (Lazar & Norcio, 1999; Lazar & Norcio, 2000b). In a distributed network environment, the delay between the time that a user makes a request and the time that the user is presented with the material requested can change the user's perception of the web content itself. A number of research studies on network delay of web pages have been previously published. In Ramsay, Barbesi, and Preece (1998), it was found that increased download time can change the perception of whether the material is interesting (Ramsay, Barbesi & Preece, 1998). Jacko, Sears, and Borella reported that the user's perception of the quality of the material was affected by download time (Jacko, Sears & Borella, 2000). In addition, Sears, Jacko, and Dubach report that increased download time increases the user's feelings of being lost (Sears, Jacko & Dubach, 2000). Sears and Jacko (2000) provide a good discussion of the causes of network delay (Sears & Jacko, 2000). Traditionally, when performing a most complex task, users expect a response from a computer within 10-15 seconds (Shneiderman, 1998). Jakob Nielsen suggests no more than a 10-second download is acceptable for the web environment (Nielsen, 2000; Nielsen, 2001). Of course, many users still have slow dial-up connections, and web designers have no control over this factor (Nielsen, 2001). A long download time can confuse or frustrate the user, possibly causing the user to perceive that an error has occurred.

2.2 Implications

If users can possibly perceive many different situations on the web as errors, it is important to learn more about these types of errors. When novice users browse the web, how often do situational errors occur, how do users perceive the errors, and what types of situational
errors are most frequent? Since there are not previously published studies relating to situational error, this study will be an exploratory study. This exploratory study could also serve as a pilot study for a larger study at a later time. There are numerous implications for learning more about situational error. When it is determined which situational errors are most troublesome, then related work can begin in three areas: system design, training design, and documentation design. Relating to system design, error messages continue to be some of the worst parts of the human-computer interface (Lazar & Norcio, 2000a). At the recent CHI 2001 conference, Bill Gates admitted that even he cannot understand many of the error messages provided by Microsoft operating systems. Training methods can be improved so that they incorporate appropriate responses to error. And documentation can be improved so that it better prepares users to deal with errors. These areas will all improve the user interaction experience.

3. Proposed Methodology
This research experiment is currently under progress, and it is expected that preliminary results will be available at the time of the conference. A total of ten subjects will take part in this exploratory study. Two separate groups of five novice subjects each will receive training on how to browse the web. The subjects will receive exploratory training, which was previously found to be an effective training method for the web (Lazar & Norcio, 2001). In exploratory training, users receive an exploration of how the web environment and the browser function, but they do not receive any direct instructions on what to type in. The actual training script for exploratory training has been previously tested for clarity. As the subjects receive the training on using the web, they will be encouraged to explore the web environment. Subjects will be asked to indicate when they feel that an error has occurred. Interaction logging would be inappropriate, since the goal is not to learn about system error, but the user perception of error. When the user indicates that an error has occurred, a description of the error will be recorded. After the experiment, the data will be analyzed to look for patterns, to determine how users perceive situational errors, and to determine which situational errors are most frequent.

4. Summary
It is hoped that by learning more about situational errors, the entire user interaction experience on the web can be improved. A new trend in the field of human-computer interaction is universal usability--designing systems that can be used by a range of different users in a range of different settings, using a range of different platforms (Shneiderman, 2000). By learning more about the errors that are perceived to occur, user interfaces can be improved to better assist these many different user groups and situations. Error messages in web browsers can be improved, and training methods for the web can more effectively address the issue of error. Most error messages do not provide helpful information for users, instead offering cryptic phrases such as "server could not connect" (Lazar & Norcio, 2000a). By knowing which situational errors occur frequently, error messages can be improved to more effectively assist the user in these situations. With a greater understanding of situational error, training methods and documentation for the web can be designed to specifically address situational error, so that users have a better understanding of the situational error and are therefore less frustrated.
5. References


