

Message and Messenger: The Carrier Effect on Judgments of Credibility

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Abstract

When examining the ways in which individuals evaluate the credibility of information sources, it is easy to assume that these judgments are based solely on the quality of the information being presented. The study described here questions this assumption by establishing a link between the quality of the interface (rather than the content) and perceived credibility. Essentially, interface design and the “form” of information (the messenger) can negatively impact the perceived quality of the “content” of information (the message). This study tests the hypothesis that individuals searching a poorly designed digital library will perceive the contents of the collection as less authoritative and credible than a digital library with a superior interface. This focus on interface design illuminates one of the methods by which individuals evaluate new or poorly understood information: by examining the quality of its distribution mechanism. Generally speaking, this research is an indication of how individuals are prone to the carrier effect, allowing features of the messenger (the interface) to affect the perception of the message (the digital library content).

Introduction

There is often an unintended consequence of our desire to perfectly match search results with the semantic intention behind a search query: when an *empty* result set is returned to a user’s search query. This consequence emerges as an often unattractive visual: the “no results found” page returned by a search engine (see Appendix A for sample phrases taken from the “no results found” pages of current academic search tools).

By itself, a “no results found” page is not improper (although it may be poorly designed, or have any number of usability or navigational issues); however, the meaning it conveys may not be the appropriate one. “No results found” is a misleading phrase because it masquerades as a definitive answer; in reality, the collection being searched may actually contain content that matches a user’s query.

In examining this problem, it helps to narrow our focus a bit; in this case, we will be restricting our discussion to digital libraries and their search tools. Digital library retrieval systems are presented with a much different and a much more particular subject of focus than their larger siblings, Web search engines. The most obvious difference between the two is collection size, but there are others. In this investigations of a specific information retrieval system type (i.e., digital library search tools), we hope to provide a narrow enough focus to develop and defend research hypotheses, with the ultimate goal of extrapolating the results back to the larger community of information retrieval systems.

Related Research

Previous studies that have examined empty result sets (see DeFelice, Kastens, Rinaldo, & Weatherley, 2006; Kan & Poo, 2005; Zhuang, Wagle, & Giles, 2005) have been more focused on the collections themselves rather than the users encountering the empty result sets. In order to probe the effects that null result sets have on digital library users, this study addresses two broad questions. First, what are the affective implications of encountering a null result set? Measures of affect are an appropriate indicator of many aspects of the user experience, and bear a relationship to many expectations for a digital library: namely, retention of users, ease-of-use, minimizing extraneous cognitive load, satisfaction, and sense of accomplishment (Dillon, 2001). This proposal is aligned with Dervin’s concept of Sense-Making (Dervin & Nilan, 1986; Dervin, 1993; Tidline, 2005) and Nahl’s Affective Load (James & Nahl, 1996; Nahl, 2005), in that the active process of triaging information and making sense of it is hugely impacted by the momentary affective state of an individual, which in turn is impacted by the interface that communicates the information.

Second, what impact does the digital library interface have on the interpretation of its contents? An examination of the effect of a digital library’s interface on the perception of its contents may have strong repercussions for digital library designers and administrators. The general assumption is that the content and the interface to the content are separate entities. For example, a research paper can exist in two different digital libraries—one with a highly usable interface, the other a disaster of design—but it is assumed that users who end up finding the research paper in question will treat it the same way, regardless of which library they found it in. In other words, the content of the message is self-contained, and not in any way affected by the messenger (i.e., the way in which it arrived in the hands of a reader—in this case, the digital library and its interface). This study seeks to test whether or not a poorly developed user interface will have a strong effect on the way a user sees the content offered by that interface.

Research Study

Participants interacted with a mock digital library via a simple search engine interface (see Figures 2 – 4); they were under the impression that they were evaluating a new digital library and its overall design and responsiveness. They were given a topic to search for (this topic was chosen to be academic in nature, but not a topic that might be intimately familiar to potential participants) and several comprehension questions to answer regarding the topic. The mock digital library contained a small (15 in each topic) set of documents pertaining to the topic at hand; their presentation on the search results screen is the main manipulation in this study.

Participants were divided into two groups: the first (control) group had appropriate results returned to them on the search results pages, regardless of the terms they use in their search query; the second (experimental) group always obtained an empty result set back in response to their first search query; further search queries would alternate between delivering the appropriate results and empty result sets. When search results were shown, all participants received the same set of results (randomly ordered within each result set).

Measures. Participants were asked to rate their perception of the quality of the search results using a Likert scale on the following items: authentic, factual, inaccurate, scholarly, trustworthy, relevant, important, pertinent, unrelated, and significant.

These descriptors were intended to represent a sense of the authoritativeness (the first five descriptors) and meaningfulness (the latter five) of the articles viewed in the digital library. These two categories, authoritativeness and meaningfulness, broadly encompass the ways in which individuals triage information: meaningfulness is more of a personal judgment (similar to cognitive authority) that is unique to individuals, while authoritativeness is seen as an outside force that lends credence to a particular piece of information. Once again, because of this difference between interior and exterior indicators of validity, it is hypothesized that a user interface problem (here represented by no results found pages) will more likely affect users' sense of authoritativeness rather than meaningfulness.

Results

The main article validity items were subjected to a principal components factor analysis with oblique rotation (due to the amount of correlation between the two factors, $r=.31$). Two factors—Meaningfulness and Authoritativeness—were extracted; these agreed with the hypothesized structure. The Meaningfulness construct (composed of the following five items: relevant, important, pertinent, related, and significant) reveals a conception of the amount of substance, value, worth, and meaning within the articles in the search results. The Authoritativeness construct (composed of the following five items: authentic, factual, trustworthy, scholarly, and accurate) reveals a conception of the dependability, veracity, and authoritativeness within the articles in the search results. These two factors accounted for 55%

of the total variance. Further, these two factors showed satisfactory reliability (Cronbach's $\alpha=.84$ for Meaningfulness, $\alpha=.71$ for Authoritativeness) in this sample (N=91). Table 1 illustrates the factor loadings, and Table 2 reveals correlations between the items.

The individual factor scores were computed and used as dependent variables in a MANOVA comparing participants in the results and no results groups. Individuals that got results differed significantly from those that had trouble getting results with respect to the second factor, Authoritativeness ($F(1,90)=13.99$, $p\leq.01$). Specifically, those who had no troubles getting results considered the articles in the search results to be more trustworthy, authentic, factual, scholarly, and accurate (hence "authoritative" as that factor is labeled). To further support the hypotheses, the two conceptual factors were then used to compute mean validity scores (one representing meaningfulness and the other authoritativeness), and a one-way ANOVA was run for each of them with results. The results for the Authoritativeness factor were significant ($F(1,90)=12.45$, $p<.01$).

Discussion

The results of this study strongly support the hypothesis that individuals' judgments of authoritativeness are affected by frustrating aspects of the interface that conveys the information in question. We have discussed at length how interface design and the "form" of information (or, alternatively, messenger) can negatively impact the perception of the quality of the "content" of information (the message).

How can we explain this apparent interrelationship between the message and the messenger? One framework we can use is Wilson's concept of cognitive authority (Wilson, 1983), discussed more recently in reference to online materials in Rieh's work (Rieh, 2000; 2002; 2005; Rieh & Belkin, 1998). Based on Wilson's dichotomy between first-hand knowledge (e.g., direct experiences of an individual) and second-hand knowledge (e.g., things learned from other people not based on direct experience), information found in an online environment (and thus implicitly placed there by another individual) is a form of second-hand knowledge. This implicit relationship with the other individual or organization, the source of the second-hand knowledge, speaks to the importance of authorship in an individual's judgment of quality when encountering these information sources, and also lends credence to the idea that interface problems are likely to cause a decrease in perceived authority. In a sense, the presentation of the information (the messenger) is a surrogate for the actual author, so an interface that lacks credibility implies an author that lacks credibility, and hence content (message) that is questionable. Further, because of the lack of gatekeepers in online environments, an individual's sense of administrative authority is diminished, in effect placing a greater emphasis on the actual presentation of information as a cue of its credibility and authority.

Another framework that provides a helpful perspective is Fogg's concept of computers as persuasive actors (Fogg, 1997; 1998; 2003). The idea that computers are persuasive, and thus

potentially authoritative, supports the notion that interface frustrations can cause a loss of faith or trust in the “agent” communicating information, which in turn can lead to an attenuation of the perception of quality of the search results. Because the computer (and by extension the interface) is considered an actor that exhibits qualities that represent believability, any affront to this believability affects the message being conveyed. In other words, in much the same way that we tend to distrust information coming from a questionable source (like a tabloid or a person with signs of mental illness), a computer that exhibits a questionable countenance is likely to be treated in the same way.

Conclusion

“No results found” is a misleading phrase because it masquerades as a definitive answer. The study discussed here was an attempt to understand the effect of null result sets on search behavior and on the perception of contents in digital libraries. In particular, this research supports the hypothesis that interface and design flaws have an effect on the perceived authority (here defined in terms of being authentic, factual, trustworthy, scholarly, and accurate) of the information being communicated by the interface in question. At a high level, this research acts as an indication of how individuals are prone to interpret the content of a message in relation to its messenger, in this case allowing features of the messenger (the interface) to negatively affect the reception of the message (the digital library content).

Appendix A: Sample Phrases from No Results Found Pages

(Note the difference in punctuation, capitalization, and phrase vs. sentence structure.)

- “No results found”
- “No results returned for your criteria.”
- “No results were returned.”
- “Nothing Found”
- “Sorry, no documents were found matching search terms.”
- “There are 0 results”
- “No Results Found.”
- “0 articles with title/keywords/abstract containing *”
- “Your search matched 0 documents.”
- “There are no products that match your search”
- “No videos were found to match your query.”
- “No results were found.”
- “Sorry, your request returned no records.”
- “Results: Not Found”
- “No documents were found for your search.”
- “No Results matching your search term(s) were found.”

Table 1. Factor loadings (Oblique Rotation) of validity items

| Validity Items | Factor 1 | Factor 2 |
|----------------|------------|------------|
| Relevant | .78 | .27 |
| Important | .79 | .36 |
| Pertinent | .73 | .31 |
| Related | .77 | .23 |
| Significant | .82 | .19 |
| Scholarly | .42 | .55 |
| Accurate | .45 | .64 |
| Authentic | .09 | .65 |
| Factual | .21 | .78 |
| Trustworthy | .32 | .75 |

Note: only values $\geq .50$ are in bold.

Table 2. Correlations between validity items

| Validity Items | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. Relevant | 1 | .48** | .49** | .55** | .55** | .24* | .30** | .21* | .09 | .28** |
| 2. Important | | 1 | .51** | .45** | .64** | .39** | .38** | .09 | .27** | .30** |
| 3. Pertinent | | | 1 | .54** | .43** | .27** | .23* | .15 | .27** | .23* |
| 4. Related | | | | 1 | .48** | .09 | .50** | .05 | .20* | .15 |
| 5. Significant | | | | | 1 | .35** | .29** | .09 | .05 | .23* |
| 6. Scholarly | | | | | | 1 | .13 | .13 | .23* | .53** |
| 7. Accurate | | | | | | | 1 | .32** | .50** | .31** |
| 8. Authentic | | | | | | | | 1 | .33** | .30** |
| 9. Factual | | | | | | | | | 1 | .40** |
| 10. Trustworthy | | | | | | | | | | 1 |

* $p \leq .05$.

** $p \leq .01$

Figure 1. RELIB start page from Digital Library Evaluation Study

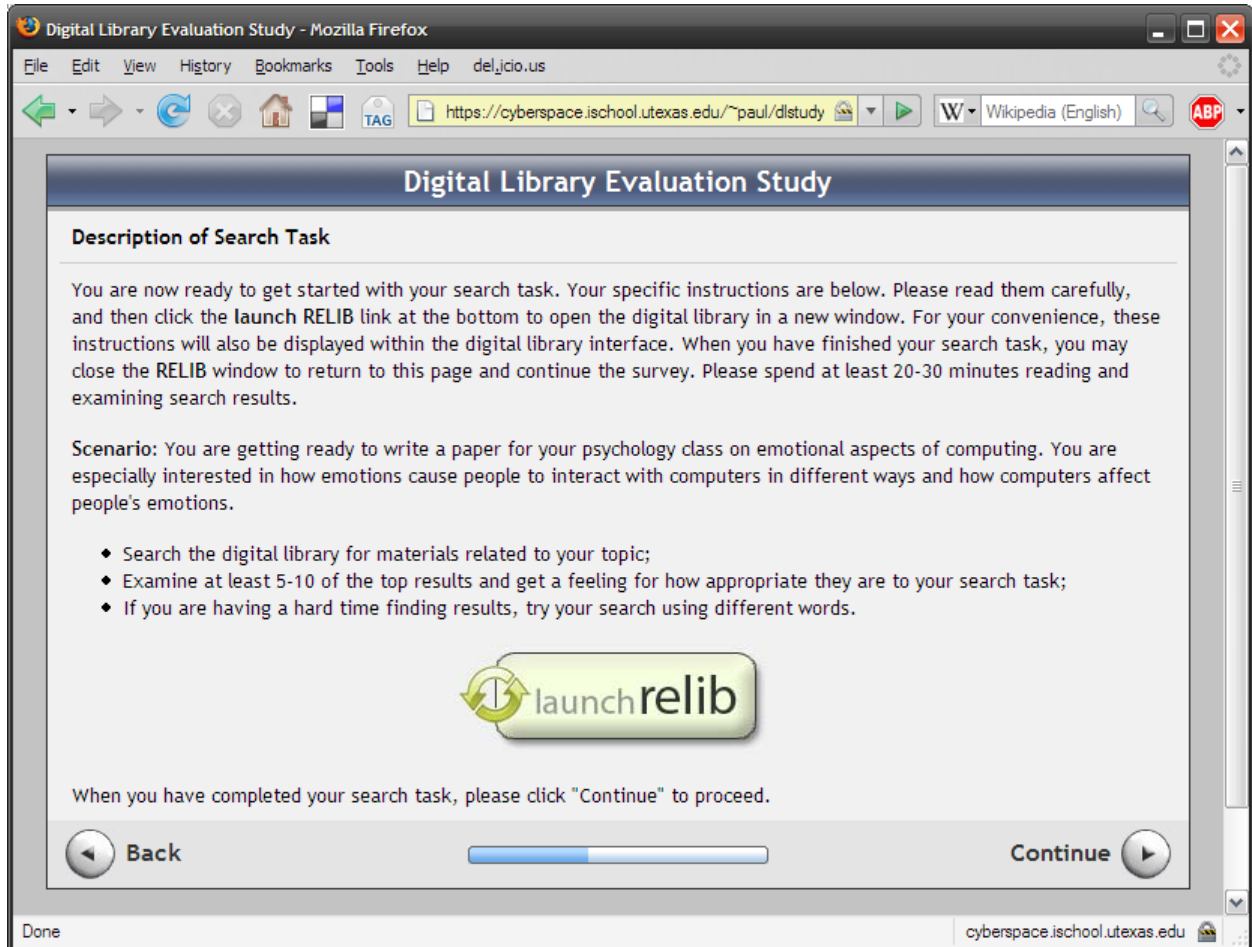


Figure 2. RELIB mock digital library interface



Figure 3. RELIB mock digital library results page: no results found

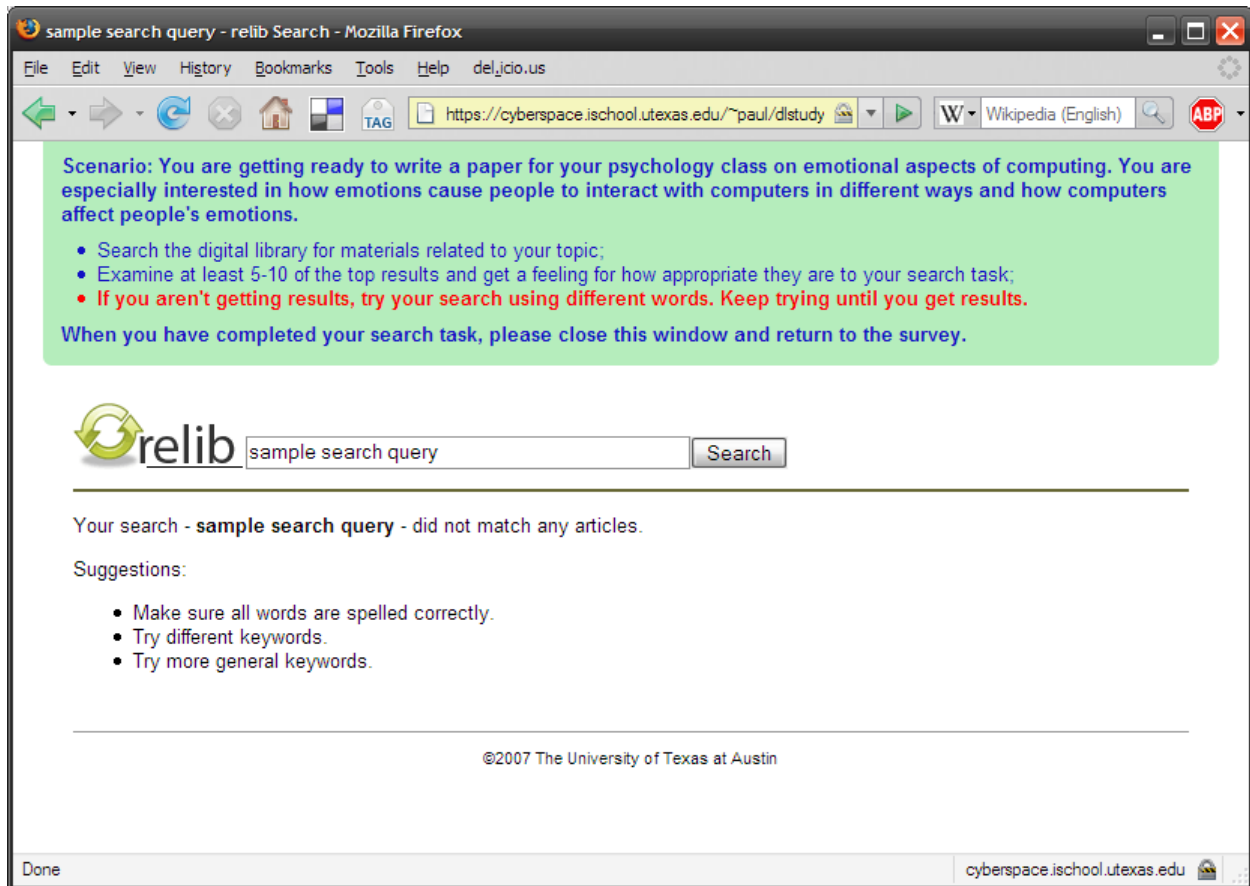


Figure 4. RELIB mock digital library results page: results found

sample search query 2 - relib Search - Mozilla Firefox

File Edit View History Bookmarks Tools Help del.icio.us


https://cyberspace.ischool.utexas.edu/~paul/dlstudy

Wikipedia (English)

Scenario: You are getting ready to write a paper for your psychology class on emotional aspects of computing. You are especially interested in how emotions cause people to interact with computers in different ways and how computers affect people's emotions.

- Search the digital library for materials related to your topic;
- Examine at least 5-10 of the top results and get a feeling for how appropriate they are to your search task;
- If you aren't getting results, try your search using different words. Keep trying until you get results.

When you have completed your search task, please close this window and return to the survey.

 relib

Showing results 1-15 of about 15:

[Designing emotionally evocative homepages: An empirical study of the quantitative relations between design factors and emotional dimensions](#)
J Kim, J Lee, & D Choi - International Journal of Human-Computer Studies, 2003
Emotional aspects of homepages are becoming more important as people spend more time in cyberspace. This research aims to identify quantitative relationships between key design factors and ...

[Anthropomorphism, agency & Ethopoeia: Computers as social actors](#)
C Nass, J Steuer, E Tauber, & H Reeder - Conference on Human Factors in Computing Systems, 1993
Attempts to generate anthropomorphic responses to computers have been based on complex, agent-based interfaces. This study provides experimental evidence that minimal social cues can ...

[Computers as social actors](#)
C Nass, J Steuer, E R Tauber - CHI, 1994
This paper presents a new experimental paradigm for the study of human-computer interaction. Five experiments provide evidence that individuals' interactions with computers are fundamentally ...

[Computers that recognise and respond to user emotion: Theoretical and practical implications](#)
R W Picard & J Klein - Interacting with Computers, 2002
Prototypes of interactive computer systems have been built that can begin to detect and label aspects of human emotional expression, and that respond to users experiencing frustration and other negative ...

[Product design, semantics and emotional response](#)
O Demirelek & B Sener - Ergonomics, 2003
This paper explores theoretical issues in ergonomics related to semantics and the emotional content of design. The aim is to find answers to the following questions: how to design products triggering ...

Done cyberspace.ischool.utexas.edu

Figure 5. Usability questionnaire from Digital Library Evaluation Study

Digital Library Evaluation Study

Usability Questionnaire

Please respond to the following statements about the experience you had during your search task. Indicate your level of agreement by marking the appropriate box.

| | Strongly Agree | Agree | Neither Agree Nor Disagree | Disagree | Strongly Disagree |
|---|----------------------------------|-----------------------|----------------------------------|----------------------------------|----------------------------------|
| I found enough results that applied to my search topic | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I had a hard time finding results | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I felt like the results I found were relevant to my topic | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| I think that the interface made it difficult to find what I was looking for | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I would recommend RELIB to others | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |

Were there any problems you had while using the digital library?

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