

Breadcrumbs, usability and architecture: a field research

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Abstract

The objective of this research is to evaluate the breadcrumb usability. Breadcrumb trails are a textual representation of a website structure, providing links that allow users to return to previously visited pages. There are different types of Breadcrumbs represented in websites, and its efficiency will be investigated during this study.

1 Introduction

This study is based on one of the most important characteristics of the Web environment: navigation. The structural navigation, also known as Breadcrumb Trail (Krug, 2001), is an accessory commonly used by websites with different purposes, mainly e-commerce. Its visual presentation can be as follows:

[HCI2005: Home](#) > [Thematic Areas](#) > **Human-Computer Interaction**

The name “breadcrumb” derives from Grimm’s fairy tale, Hansel and Gretel. Theoretically, the breadcrumb shows the trails used to reach the highlighted page (Human-Computer Interaction). In this example, the user would have entered the home page of the site, accessed the "Thematic Areas" page and finally accessed the Human-Computer Interaction page.

The structural navigation is commonly used in websites of different categories and became popular in the last years due to its constant use. Some authors such as Krug (2001) and Macdonald (2003) state that Yahoo is the site responsible for this popularisation (Figure 1).



Figure 1: Example of breadcrumb trail used in the Yahoo website (www.yahoo.com).

Breadcrumb serves two purposes (Lida and Chaparro, 2003):

- Provide information to users as to where they are located in the site, working as a simple “site map”
- Offer shortcut links for users to “jump” to previously viewed pages without using the Back button, other navigation bars, or typing on a keyword search.

An extensive literature search was done, aiming to find specific experiments that analyse the breadcrumbs efficiency and efficacy, and also its relation to usability and site architecture: Lazar and Eisenbrey (2000); Bowler et al. (2001); Lida et al. (2003); Lida and Chaparro (2003); Hull (2004).

1.1 Types of Breadcrumbs

Breadcrumbs have different characteristics that go beyond their graphical representation. The truth is that the name “breadcrumb”, that shows the path to the users current location, is not necessarily right for all its occurrences. The reference to the fairy tail would be perfect if the user really had visited the path shown in the interface.

A common situation, mainly after the Google growth, is the direct access to internal website pages, not necessarily visiting the homepage. So, people do not go through the normal path, created by information architects, and

considered ideal to find the information. This is the reason why the reference to the fairy tail is not considered correct in all cases.

Instone (2002), trying to separate the different types of Breadcrumbs, created three categories:

- Location Breadcrumbs;
- Path Breadcrumbs;
- Attribute Breadcrumbs.

Beyond these different breadcrumb categories, this study mentions another one, not foreseen by Instone, called “Title Breadcrumbs”. These different types of breadcrumbs will be analysed in detail as follows:

1.1.1 Location Breadcrumbs

It is the simplest and the most used because its implementation is extremely simple. It shows users their current location in relation to the website structure, but not how they got there. It is the most popular Web representation and was used in the examples above mentioned. In other words, the page has always the same breadcrumb, no matter how users get there.

1.1.2 Path Breadcrumbs

It is the more adequate representation of the name “breadcrumb”. The element is necessarily the path the user chooses, and not the pre-determined presentation of a possible path. In other words, same results found through different browsing paths have precise breadcrumbs showing the last visited pages. This is only possible in dynamic sites. The case below (Instone, 2002), shows that the page "Service A" can be accessed through several paths:

1. [Consulting](#) > [Services](#) > [Implementation](#) > **Service A**
2. [Consulting](#) > [Services](#) > [Optimisation](#) > **Service A**
3. [Consulting](#) > [Services](#) > [Upgrade](#) > **Service A**

1.1.3 Attribute Breadcrumbs

The Attribute breadcrumb represents the classification of a certain matter searched by the user in a determined directory organization, based on its information architecture. According to Instone (2002), a page of an e-commerce website can have many breadcrumbs, representing several possible locations of the product in its directory. So, this type of breadcrumb, that can be used in other categories of websites, like the search ones, display information showing different trails representing several possible paths to reach a page. Google for example, uses Attribute breadcrumbs in searching results (Figure 2).

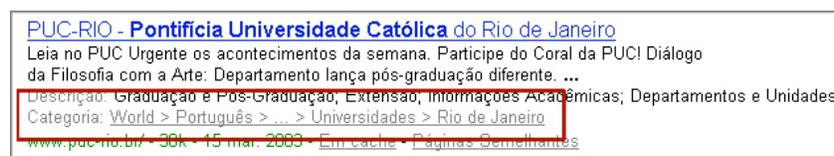


Figure 2: Google searching result (www.google.com) for “Pontificia Universidade Católica”, as an example for the Attribute breadcrumbs (Word > Português > ... > Universidades > Rio de Janeiro).

1.1.4 Title Breadcrumbs

Due to the fast evolution of the Web, it is easy to find new forms of using old concepts. Some sites use Title breadcrumbs, but they are not so popular. They are identical representations of the Location breadcrumbs, however, they are applied in the browser’s heading (Figure 3).



Figure 3: Example of Title breadcrumb (Rocha Design > Serviços > Desenvolvimento) used in the Rocha Design’s website (www.rochadesign.com).

1.2 Problem and goal

There is a doubt about the efficiency of the different types of breadcrumbs, and also about the users recognition of the accessory as a tool for the main navigation. Do the users perceive the characteristics and recognize the two basic functions of the element? Does people who know how it works use this resource? Assuming that users are familiar with the breadcrumb trail, there is another question: what type of breadcrumb works more efficiently when applied to determined website?

The goal of this work is to evaluate the use of the breadcrumb trail, contributing to help designers to know when and where to use this interface element.

2 Method

Usability tests are the most powerful tool that HCI professional can use. The tests for this research were undertaken in the Globo.com Usability Lab, enabling to control all necessary variables. In Brazil, Globo.com is pioneer in creating a dedicated laboratory exclusively for usability testing. Globo.com is the on-line presence of the companies that compose the Globo Organization, one of the world's largest communications group. Among the different methodologies to evaluate usability, the chosen one was the task analysis.

According to Diaper (1989) and Santos (2000), the task analysis is potentially the most powerful method Human-Computer Interaction professionals can use, and it can be used in all the systems development cycle, from the first requirement specifications to the final system evaluation.

Based on the researches accomplished by now, and mainly on the methodology used by Lida and Chaparro (2003), we concluded that the best way to evaluate the usability of the breadcrumb browsing would be a website that could present different forms of using the element in its interface.

2.1 The website chosen for the research

The website chosen for the development of the simulators that made the research possible, belongs to the Brazilian Central Bank (Figure 4). It is the federal government site that has the larger access volume per day, with about 400 thousand unique users per month. It offers a great volume of information, with more than 10 thousand pages, and uses the Location breadcrumbs as navigation tools. Moreover, its interface is simple, following interface Web design standards, like the main menu on the left side and the search box in the upper right corner.



Figure 4: Brazilian Central Bank website (www.bcb.gov.br).

Its target public is very inclusive, and basically formed by four primary groups: financial market professionals, students/researchers, press vehicles professionals and common citizens.

The case study about the creation of the Brazilian Central Bank website was presented in the Latin American Conference on Human-Computer Interaction, in 2003. The article provided an excellent amount of necessary and interesting data regarding the site, developed by a company who cares about its products usability.

2.2 Simulators development

The simulators were developed using the original Brazilian Central Bank site. Because of the huge amount of pages, the complete reproduction was not possible. So, the interface and navigation was simplified, based on the tasks chosen for the experiment. The complete reproduction of the area where the tasks were conducted totalised 85 pages.

The idea was to create 4 identical simulators, which only difference would be the type of breadcrumb used in each interface. The developed simulators were as follows: without breadcrumbs; with Location breadcrumbs; with Title breadcrumbs and with Path breadcrumbs. The Attribute breadcrumbs were not analyzed in the research.

2.3 Information architecture questionnaire

After the accomplishment of the usability tests, the participants were instructed to answer a multiple-choice questionnaire. This questionnaire is based on the one used by Lida and Chaparro (2003) and has 4 different information architectures (Figure 5). Drawings 1 and 4 represent non-hierarchical models, with a more chaotic organization. Models 2 and 3 are hierarchic, with a logic similar to the one of the Central Bank website. This questionnaire aimed to prove if the breadcrumb trail helps users to understand the site's information architecture.

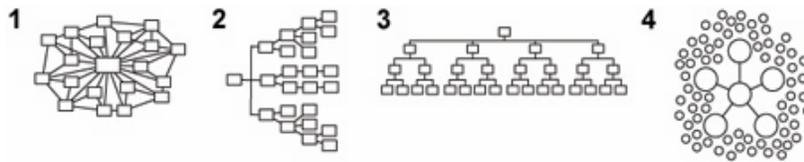


Figure 5: Different models of information architecture.

2.4 On-line questionnaire to choose the participants

The level of knowledge of the users needed to be measured before the usability tests. So, an on-line questionnaire was created based on the model used by Padovani (1998), Caldas (2002) and Rubin (1994). A link to that questionnaire was sent by e-mail for a series of pre-selected persons for the tests. A good number of persons answered the questionnaire, totalising 450.

2.5 The pilot test

The pilot test of the experiment took place after everything was prepared: simulators developed, on-line questionnaire ready, test scripts printed and tests' follow-up sheet created.

Dumas (1999) states that the most important objective of a pilot test is to “debug” the equipment, software, materials, and procedures to be used during the test. A secondary objective is to give the test team a chance to practice the activities they will be using during the usability test.

The pilot test was extremely important for the research, enabling to correct some errors. 8 persons were tested, 2 users for each simulator.

3 Pilot test results

The main errors observed during the tests were the following:

Navigator: the use of the Ergobrowser, created by Ergolabs exclusively for Web products usability tests, was foreseen. Unfortunately, the pilot test showed that the Ergobrowser did not show the text present in the navigator's title bar text. It kept a fixed text, with the name of the software in the title bar of all the pages. This disabled the Title breadcrumbs tests.

Tests' follow-up sheet: the format previously created to take notes on the experiment did not work, because people browsed faster than expected. One of the primary ideas of this test was to identify the pages where the breadcrumbs were used. It was detected that the appraiser could not write his comments, register the time spent and follow the pages in which the participants were browsing simultaneously.

Screen resolution: the first participants used the computer with video resolution adjusted for 1024 x 768 pixels. The Central Bank website, as well as the majority of the sites created for the Web, is based on the 800 x 600 pixels resolution. So, the computer was adjusted for this set-up.

Simulators: the pilot test also showed that the simulators had some imperfections, with some broken links. Moreover, the Path breadcrumbs were not working correctly.

Material: the test enabled to notice the lack of some simple equipment necessary to the accomplishment of the tests, such as thin board and chronometer. The use of the system desktop clock was inefficient and not precise. Besides that, due to the distance between the researcher and the screen the reading was not clear. Another interesting detail was that the lack of support for the follow-up sheet caused a great discomfort in accompanying the tasks.

4 Conclusion

After the accomplishment of the tests, the Ergobrowser was excluded from the research, and the Internet Explorer started to be used. The follow-up sheet used during the test was redesigned, the resolution of the monitor was modified, the simulators were fixed and a chronometer and a thin board were included in the accompaniment material.

Based on the corrections made after the pilot test, the research will be developed testing approximately 60 persons, 15 for each simulator. These people will be chosen and the groups will be divided using as a basis some criteria analysed through the results of the on-line research. The next tests will be decisive for the generation of enough data that can help answering some related usability questions about the breadcrumb navigation.

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