

Web Usability: Its Impact on Human Factors and Consumer Search Behaviour

Bernie Lydon

Dublin Institute of Technology
Aungier Street
Dublin 2
Ireland
E-mail: bernienlydon@eircom.net

Tom Fennell

Dublin Institute of Technology
Aungier Street
Dublin 2
Ireland
E-mail: tom.fennell@dit.ie

Abstract

Usability testing methods and phenomenology based qualitative techniques were applied in naturalistic settings in consumers' homes to establish factors which are perceived as hindering and facilitating consumers in finding product/service information, and making e-commerce purchases. A facility to see an overview of site structure in order to make quick evaluations about content and navigation schemes emerged as prominent user concerns with regard to human interface design factors. The placement of a search engine on the homepage of a website, so that users can easily establish the starting point for specific search tasks, was found to be critical. The absence of such search functionality on homepages led to users navigating many irrelevant pages and in some instances failing to find sought product/service information. In such cases, consumers sometimes opted to abandon the site altogether and access alternative sites to complete the tasks (which can impinge directly and negatively on e-commerce sales). Search engines that returned inaccurate results within a site also led to dissatisfied customer experiences. Layout of price information was found to be essential to aid readability and interpretability. The results suggest that more positive user attitudes are associated with the vertical layout of such content as opposed to a horizontal style layout.

1.0 Introduction

In the literature, web usability is highlighted as a key factor likely to affect web search and subsequent buying behaviour. In fact it has been claimed that "usability is a prerequisite for e-commerce success" (Nielsen et al, 2001: 1). The main elements of usability may be categorised as the quality of interaction between primarily personal factors and primarily human interface factors (Turk 2000: 12). Usability refers to the interaction between the personal factors and site attributes in relation to the specific tasks that users need to perform (Mcleod, 1994). The main personal factors concerned with usability are constructs such as consumer attitudes, expectations, satisfaction and consumer commitment. The main site attributes are encapsulated in the human interface design, which incorporates elements such as web content, web structure, speed of accessing webpages, and search functionality. These personal factors and human interface design factors interact to form the total web experience for consumers.

1.1 Personal Factors

In relation to personal factors, it has been claimed that in order to develop, evaluate and improve the usability of virtual environments, a comprehension and appraisal of human performance and satisfaction is necessary (Gabbard & Hix 1997). A large number of web sites are poorly designed, because user requirements are often not incorporated into the web design process (Vora, 1998; Nielsen 1999; 1996; 2001). Online purchasers' attitudes and behaviours towards the site is affected by a mixture of web design evaluation, brand loyalty (Supphellen & Nysveen 2001), and the outcome of their first online purchase experience (The Boston Consulting Group, 2000). If a consumer encounters a positive experience on a web site, it is likely that it will increase their time spent at the site (Hoffman & Novak 1995). Furthermore, if consumers are satisfied with the site it is plausible that they may revisit.

1.2 Human Interface Design

In regard to human interface design factors, taking the content aspect of design first, Nielsen (1999) suggests three main guidelines that he feels should be obeyed when writing content for any web site. These include creating a web site that is concise, scannable, and objective. In addition, many sites lack fundamental up-to-date information, and appear more interested in content quantity than content quality (Jerrams-Smith, 2000).

As regards the structural aspect of design, web content should be presented and structured in a scannable format that supports navigation (McGovern, 2000:56). Many users express frustration at getting lost within sites (Badii & Murphy, 2000). Modjeska

& Marsh (1997) found that site structure significantly affects user navigation. Therefore, web structure needs to be carefully considered in web design guidelines to assist in user navigation, and to deter users feeling disorientation and getting “lost in hyperspace”(Modjeska & Marsh, 1997).

Speed of accessing or downloading pages another key site attribute involved in human interface design. GVU’s 10th User Survey reports that one of the top pressing issues facing the Internet is speed of downloading a page to access content on particular web sites (www.cc.gatech.edu 1998, Jerrams-Smith, 2000). Research conducted on this problem has indicated that if web designers indicate a downloading time to consumers’, it may reduce consumers’ negative evaluations of the website (Dellaert & Kahn 1997). A major concern, therefore, for any e-commerce site, is how easily users can find the information they need and how accessible it is.

In relation to search functionality, the reality for many users is that finding their desired product is neither easy nor quick (Reda 1997: 60). The search tools available online influence consumers perceived efficiency of search (Jiang 2002: 184). As research conducted by Lauren Freedman, a retailing consultant at Chicago-based E-tailing Group notes: ‘research shows that 70 per cent of shoppers know what they want to buy. If you can’t offer them a faster or better alternative, you’ve lost them’ (Reda 1997: 60).

1.3 Research Objectives

Accordingly, the following research objectives have been set:

To determine the attitudinal reactions, search behaviour and levels of commitment of Irish consumers towards e-commerce web sites on the following usability dimensions:

- searching and navigating mechanisms
- sequencing, and linking mechanisms
- ease and speed of accessing information
- quantity, quality, and presentation of information content
- overall usability

To establish whether and to what extent the following factors are associated with variations in consumer attitudes, search behaviour and commitment:

- web expertise of consumers
- age
- social class
- gender
- education level

Various methodologies and web usability guidelines in the literature are drawn on in order to research the above objectives.

2.0 Research Approach

Usability methods such as task based scenarios (Dunliffe 2000; Nielsen et al 2001) and the think aloud protocol (Nielsen 2001) were used in conjunction with the phenomenology method (Thompson et al 1989) in an attempt to get as close as possible to informants’ web experiences.

Rather than examine a range of product sectors, with concomitant etiolation of the data, it was decided to concentrate on one sector where richer data might emerge. The travel industry was chosen because it represents a substantial proportion of online sales. According to BizRate total online sales amounted to \$35.87 billion in 2001 (Greenspan, 2003). A consumer survey conducted by Jupiter claimed that online travel sales for 2001 were \$24 billion with airline tickets accounting for \$16 billion of online travel transactions (Greenspan, 2002). Airline businesses are increasingly migrating significant portions of their business to the web. Low-cost carrier Ryanair (the largest low-cost airline in Europe (Guardian 2003)) receive 100 per cent of bookings via their website (Pastore, 2001) and they boast that their profits are up by 50 per cent for the last three months of 2002 (www.ryanair.com 2003). In comparison Aer Lingus, a more traditional full service airline currently has 45 per cent of the company's customers booking via the web. Given that air tickets are among the biggest online purchases for Irish Internet users (Amarach, 2002), the Irish airline industry has been chosen for the current study.

3.0 Research Process

Consumers living in Dublin were recruited, using the following selection criteria: web expertise, age, social class and gender. Unlike a typical usability study where the test is carried out in a lab based environment (Nielsen 2001, frontend.com 2001), the

facilitator's intent here was to carry out the interviews in the homes of the chosen respondents on a one to one basis. Informants were asked to carry out specific scenario based tasks on both the Ryanair and Aer Lingus websites using their own computer equipment. This was critical to the study in order to elicit the true perceived speed and ease of carrying out the tasks as experienced by participants in their naturalistic setting. Prior to carrying out the tasks users were encouraged to talk out loud and describe their thoughts and feelings towards different aspects of the sites during the execution of each task.

Tasks were modified in accordance to problems highlighted from the pilot study. Accordingly, the following tasks were set:

- **Task 1(a):** Imagine you are searching for flight and fare information for a return trip from Dublin to Paris. Departing Dublin on the morning of Sep 13th 2002, and departing Paris on the evening of Sep 15thth, 2002.
- **Task 1 (b):** Imagine you wish to compare the flight and fare information from task 1(a) to another airline.
- **Task 2(a):** Imagine you are booking a connecting flight from Dublin to Rome. Departing Dublin at any time on Sept 13th 2002, and departing Rome at any time on Sept 15th 2002. Please organise your trip using connecting flight information. Find the total cost of flight in Euros, and also give your chosen flight times. Proceed with the booking until the site prompts you for your credit card details.
- **Task 2 (b):** Imagine you are booking a direct flight from Dublin to Rome. Departing Dublin on the morning of Sept 13th 2002, and departing Rome on the evening of Sept 15th 2002.

An interactive style of facilitation was used during the tasks. The ensuing dialogue was emergent, led by informants' own focus and comments. In this way informants went into depth describing their experience in lived terms often either commenting on specific aspects of the site or pointing towards them. Whenever consumers appeared stuck, frustrated, or indeed satisfied, neutral questions were asked such as 'Can you describe what are you thinking now?' 'Can you describe how you are feeling now?' The format of the in-depth interview aided interpretation as illustrative comments reflecting informants' lived web experience were captured so that the true meaning of the phenomena could be established. Behavioural, affective and cognitive responses were assessed in depth. Facilitator reports of informants' reactions and body language were used in order to convey user attitudes and motives and to provide an overall picture of responses. Twelve usable interviews were completed.

4.0 Discussion of Results

Many complex and inter-related issues concerning usability emerged. The following summary points regarding human interface design factors are presented here as illustrative of the findings:

4.1 Site Content

Ryanair's 'summary of flights selected' page presented flight fares in a vertical fashion and therefore was seen as easier to read than the Aer Lingus page, which presented the prices horizontally. This was seen as an issue because participants associated the presentation of total fare price information with the vertical method that is generally used to display accounts.

It was considered that *'flight times are easy to see'* on the Ryanair 'summary of flights selected' page whereas on the Aer Lingus page it was felt that the flight times were difficult to read *'you wouldn't know is it the flight number or the flight times'*. Some attributed this to the size of the font used and the colour of the background and text.

As product/service information, particularly price information, is becoming increasingly important to the online consumer (Shanker et al, 1999), it is important that this information is laid out in a manner that facilitates legibility. Turban & Gehrke (2000) support this view and claim that simple background, textures, colours, and clear text should be used.

4.2 Site Structure

Participants felt that the task map on the Aer Lingus site acted as a useful navigational aid that allowed them to see where they were at each stage of the booking process. *'I always liked that... They tell you what part of the process you are at. At any stage before you get to the final booking stage you know that you can stop.'* (See Figure 1)

The Ryanair site also had a task map located on the top of the screen, but some did not recognise that it actually represented a visual guide to where the consumers were in the booking process. *'I do see itinerary up here though. I am wondering what that is so I might go in there and see'* (See Figure 2). Other consumers clicked on it thinking that it represented a search engine. Such confusion can be eliminated if the steps of the shopping process are presented in a clear manner to users while they are executing this important online task (Nielsen, 2001).

Figure 2

Figure 1

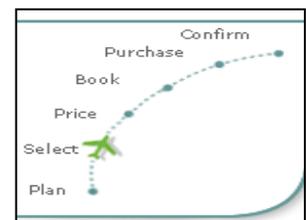


Figure 3



Participants claimed that the hyperlinks (see Figure 3) on the Ryanair homepage were not well labelled because they did not accurately describe the content accessed when clicking on them. This led to informants clicking on many links before reaching their sought information. The following text describes some experiences that people encountered when trying to search for flight and fare information from the Ryanair homepage. *'I had the problem of getting to the page that I wanted to get to, I had to go through all this confusion, you know, which link do I click on, am I doing the right thing'*. As a result, respondents were confused and thus their mental model of the site's overall structure was affected. The linking mechanisms on the Aer Lingus homepage were seen as more comprehensive and thus navigation was more straightforward.

Participants experiences confirm that effective screen layout and linkage structure should be incorporated into the design process in order to reduce the number of steps taken to locate sought information, and facilitate users' search and navigation patterns (Schneiderman, 1997).

4.3 Search Functionality

Participants were primarily concerned with the ease of establishing from the sites, how to find flight information. It was generally felt that it was *'much easier'* to navigate the Aer Lingus site to retrieve the required information than on the Ryanair site. Participants seemed more in tune with where to go and attributed this mainly to the position of the search engine on the Aer Lingus homepage. *'I mean to me a screen with just that (search engine) on it is all that I need'*. Whereas the absence of a search engine on the Ryanair homepage meant it was *'..vague to know where to go from the first page'*. Another informant suggested abandoning the site altogether *'I would look at another site, I suppose Aer Lingus would be the next one'*. Consequently, in line with guidelines already established by Nielsen & Tahir (2002) it is vital to provide users with a search facility on the homepage.

When consumers eventually found the search engine on the Ryanair site, the search results proved more accurate in terms of fulfilling the search criteria specified by users. In contrast, the Aer Lingus search engine was seen as providing users with flight information that they did not select.

Providing users with information that they specify is seen to be critical, and designers should ensure that search functionality on the site will produce accurate results.

4.4 Accessibility

Pages on both sites were generally considered *'Quick'* to download in order to access the information required. The Aer Lingus site was perceived by some respondents to be a *'bit slower'* in comparison to the Ryanair site. Some attributed the large company logo presented on the pages as being the cause for slower web page response time.

According to a report by Zona Research, consumers expect to be able to download web pages in less than eight seconds; if this does not occur it could lead to vast losses in sales (Lake, 1999). The speed at which webpages download is key to success in the online marketplace.

5.0 Conclusion

This research has focused on a substantial sector of the online market (airline travel). The naturalistic (in-home) locus of the study has facilitated an in-depth analysis and understanding of consumer experiences of human interface design factors. To improve the generalisability of this work, it is intended to extend this approach across different product and market sectors. It is also planned to undertake quantitative surveys, based on the identified consumer language utilisation and response patterns.

References

- Amarach Consulting (2000) 'iMarketing Insight 3: eGuarantees' *iMarketing The Future of Direct Marketing*: pg 1-65
- Amarach Consulting (2002) 'E-Commerce' Retrieved 11 January, 2003, from <http://www.etcnewmedia.com/>
- Badii, A. & Murphy, A. (2000) 'Point-of-Click: Managed Mix of Explicit & Implicit Usability Evaluation with PopEval_MB & WebEval_MB' *Encompass 2000*
- Burke, Raymond, R (2002) 'Technology and the Customer Interface: What Consumers Want in the Physical and Virtual World' *Journal of the Academy of Marketing Science*, Vol. 30, No. 4, 411-432
- Boston Consulting Group (2000) 'Bridging the Gap Between the Online Promise And The Current Consumer Experience' *Winning the online Consumer: Insights Into Online Consumer Behaviour*, March, pp1-32. Boston: Houghton Mifflin Company
- Dunliffe, Daniel (2000) 'Developing usable Web sites – a review and model' *Internet Research: Electronic Networking Applications and Policy*, Vol 10, No.4, pp 295-307
- Dellaert, Benedict G.C. and Kahn, Barbara, E (1999) 'How tolerable is Delay? Consumers' Evaluations of Internet Web Sites After Waiting' *Journal of Interactive Marketing*, Vol 13, No 1, 41-54
- Frontend.com 'A Brief User Test: Aer Lingus and Ryanair' Retrieved January 22, 2003, from <http://www.frontend.com/>
- Gabbard, J.L. & Hix, D (1997) 'A Taxonomy of Usability Characteristics in Virtual Environments' Department of Computer Science Virginia Polytechnic Institute and State University Blacksburg, VA 24061. Pg 1 –182.
- GVU's WWW Surveying Team (1998) 'GVU's 10th WWW User Survey' Retrieved August 28, 2001, from http://www.cc.gatech.edu/gvu/user_surveys/survey-1998-10/
- Gehrke, D & Turban, E (2000) 'Determinants of E-commerce Website' *Human Systems Management*, Vol 19, Part 2, 111-120
- Greenspan, Robyn (2002) 'Online Travel Expected to Fly High' Retrieved 11 February, 2003 from http://cyberatlas.internet.com/markets/travel/article/0,,6071_1002561,00.html,
- Greenspan, Robyn (2003) '2002 E-Commerce Holiday Wrap Up'. Retrieved 11 February, 2003 from http://cyberatlas.internet.com/markets/retailing/article/0,,6061_1563551,00.html#table1.
- Guardian (2003) 'Ryanair flies a risky route' Retrieved January 31, 2003, from <http://www.guardian.co.uk/airlines/story/0,1371,886448,00.html>
- Hoffman, D.L., and Novak T.P., (1995) 'Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations. *Journal of Marketing*, Vol 60, 50-68
- Jeramms-Smith, Jenny (2000) 'Helping e-customers satisfy their information needs' *Encompass 2000*, pg
- Macleod, Miles (1994) 'Usability: Practical Methods for Testing and Improvement' in *Proceedings of the Norwegian Computer Society Software '94 Conference* (Sandvika, Norway, 1-4 Feb).
- Lake, David. (1999) 'Slow Sites Cost Vendors Billions' Retrieved on 25 September 2002, from <http://www.thestandard.com/article/0%2C1902%2C5374%2C00.html>
- Modjeska, D. and Marsh, A. (1997) Structure and Memorability of Web Sites. *Technical Report of the Computer Science Research Institute of the University of Toronto*, Toronto: University of Toronto
- Nielsen, J. (1999) 'User Interface Directions for the Web' *Communications of the ACM*, Vol. 42, No.1.
- Nielsen, J., Molick, R., Snyder, C., Farrell, S (2001) *E-Commerce User Experience: USA*
- Nielsen, Jacob & Tahir Marie (2002) *Homepage Usability: New Riders Publishing*
- Pastore, Micheal (2001) 'Europeans Increasingly Turn to the Net for Travel' Retrieved 13 February, 2003 from http://cyberatlas.internet.com/markets/travel/article/0,,6071_554271,00.html
- Rowley, Jennifer (2000) 'Product Search in e-shopping: a review and research propositions' *Journal of Consumer Marketing*, Vol. 17 No. 1, pp20-35
- Schanker, Venkatesh, Ranganaswamy, Arvind & Pusateri, Michael (1999) 'Customer Price Sensitivity and the Online Medium' *Working Paper*, University of Maryland, College Park, MD 20742
- Schiffman Leon, G. & Kanuk, Leslie L (2000): *Consumer Behaviour* (7th Ed): Prentice Hall
- Schneiderman, Ben (1997) 'Designing information-abundant web sites: issues and recommendations' *International Journal of Human-Computer Studies*, Vol 47, 5-29.
- Schneiderman, B. (1998) 'Designing the User Interface: Strategies for Effective Human Computer Interaction. Third Edition: Addison-Wesley.
- Supphellen, M & Nysveen, H (2001) 'Drivers of intention to revisit the websites of well-known companies' *International Journal of Market Research*, Vol 3, Quarter 3, 341-352
- Thompson, Craig J, Locander, William B., Pollio, Howard R. (1989) 'Putting Consumer Experience Back into Consumer Research: The Philosophy and method of Existential-Phenomenology' *Journal of Consumer Research*, Vol 16, September
- Turk, A. (2000) 'A Contingency Approach to Designing Usability Evaluation Procedures for WWW Sites' *Encompass 2000*, pg 12
- Rowley, Jennifer (2000) 'Product Search in e-shopping: a review and research propositions' *Journal of Consumer Marketing*, Vol. 17 No. 1, 20-35
- [ryanair.com](http://www.ryanair.com/) (2002) 'Ryanair delivers record Q3 Profits' Retrieved 13 February, 2003 from <http://www.ryanair.com/>
- Vora, Pawan (1998) 'Human Factors Methodology for Designing Web Sites' in: Forsythe, C., Grose, E. and Ratner, J. (1998) *Human Factors and Web Development*.
- Yoon, Sung-Joon. (2002) 'The Antecedents and Consequences of Trust in Online-Purchase Decisions' *Journal of Interactive Marketing*, Vol 16, Number 2, 47-63