

# Determination of Presence within Virtual Space: Implications for Interface Design.

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This research explores potential applications of measurements of emotional perceptions of place in space or the feeling of "presence" in a socio-techno-political context with respect to human computer interface design. A focus is made on both how virtual or cyber space is mapped and represented in an emotional context, and how this influences presence in Human Computer Interaction (HCI). An attempt will be made to decipher the relatively new frontier of cyberspace and to explore new methods for representing this form of space. Findings may engender new and improved measures of user perceptions and extend the efficacy of HCI, especially in response to new computing technologies and global cultural changes.

The ultimate goal of this research is to explore the emotional perceptions of "place" in "virtual space" - or the feeling of "presence" - in a socio-political context to act as a tool for informed interface design. Essentially the main objective of this research is to explore methods that can be used to determine the level of presence felt by a user within virtual space.

A focus is made on assessing current methods of evaluation for virtual environments while developing a new method that encompasses the wider experience of the user. By using the basis of post-modern theory of the culture that created this synthetic environment at the time of its conceptualisation or the socio-political context, a confident analysis has taken place to enable a new and different method of user feedback. Importantly, an adaptation will be made of the theories of the *dérive* and psychogeography which were used by the politically motivated group the Situationist Internationale to combat physical space - generally urban space - to form a unitary urbanism into a virtual setting.

A *dérive* can be classified as a spatialising action where any amount of people abandon their current activity and instead follow the "path of least resistance" (Debord, 1955, p. 2) and thereby gain an understanding of the precise laws and specific effects of the environment, and an awareness of the ways in which everyday life is presently conditioned and controlled and the way that this can be exposed and used (Debord, 1955). The outcome traditionally prescribed by the SI was the psychogeographical map, which is the "cartography of the precise effects of geographical setting, acting directly on the mood of the individual" (Debord, 1958). An attempt has been made to create a new interpretation of the *dérive* to form psycho-cyber-geographical mappings of virtual environments, which results in more subtle way of gauging user perceptions of what it is to be in cyberspace. This proposed method looks at exploring users' social and individual experiences of virtual space, and the emotions they associate with space in their technological and cultural setting.

As this research is largely based around how users in virtual environments perceive their world, the project lies within an interpretivist paradigm (Miles & Huberman, 1994), but an investigation into the shared and individual construction of presence within virtual space is explored using a variety of mixed methods.

Combinations of quantitative and qualitative methods are required for a successful exploration into the effectiveness of and derive future designs, for an informed "humane" interface. Such measures are employed in relation to the realisation of a new method involving the contemporary implementation of the *dérive* and psychogeography even though the project proposed is qualitatively based in method. The research situates mainly in this qualitative setting in accordance with techniques projected by Miles and Huberman (1994) with the analysis being presented using Denzin's (1989) approach to interpretive synthesis by use multiple exemplars for cross-case analysis.

## **Determination of 'Presence' within Virtual Space: Implications for Interface Design\***

### **1. Abstract**

This paper proposes that measuring and mapping perceptions of 'presence' (or, the experience of 'place' in 'space') may lead to a greater understanding of virtual or 'cyber' space experiences, and contribute to the theory of human computer interaction (HCI) and design theory. As the experimental design is focussed on how users perceive and interact in their virtual world in relation to the effect of place and space, an attempt will be made to decipher perceptions of the relatively new frontier of cyberspace, leading to new methods for representing this form of space.

### **2. Space**

Firstly, An investigation into the shared and individual construction of presence within virtual space will be explored using a variety of mixed methods for a successful exploration into the effectiveness of and derive future designs, for an informed humane interface considering degrees of presence or immersion as prescribed by Preece, 1993, 1994, 2002; Raskin, 2000; and Norman, 1988. Definitions of the concepts of 'space', 'place', 'presence' and 'cyberspace' are required to determine their respective roles in users' perceptions of computer interfaces, and new evaluation methods for defining relationships that exist between users and interfaces.

'Space' in its many different forms continues to be analysed to the point where it "becomes a kind of fundamentally malleable matter that can be made to mean virtually anything" (Saco, 2002, p. 3). Here, the concept of space is learned and

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comes from the three main contributors to the notion of space in a westernised context: Euclid, Descartes and Newton.

Despite its many forms and definitions, space is generally regarded as being physical and based around geographic zones and boundaries. It is also associated with the development and enforcement of conventions (Ludlow, 2001; Saco, 2002; and Foucault, 1979, 1994b). It may in addition be viewed as a construct, or as a container (Soja , 1989).

De Certeau (1988) asserts space may be regarded as fluid movement of objects and trajectories; a network of pathways with intersecting mobile elements. Lefebvre (1991), de Certeau (1988); Foucault (1979, 1994a, 1994b) and Debord (1955; 1994) choose to look at space in a manner that emphasises the influence of culture and society on space. Lefebvre (1991) strove for a definition of space, in terms of practice, rather than representing containers of objects, suggesting that theorists should be looking at space according to physical, mental and social aspects. Space therefore becomes a socio-spatial determination and is produced and affected by direct or indirect human force or motion.

## **2.1 Physical Space**

Space, and its influences and effects on inhabitants, may be explored in many ways. Foucault (1979) used the example of Bentham's Panopticon, a constrictive form of prison architecture, to illustrate how environment informs space in social, historical, and physical contexts. For Foucault, the opinions and practices of the time in relation to the discipline and punishment of lawbreakers contributed to the creation of this prison environment.

Other theorists, including Debord (1955; 1959; 1994) of the Situationist Internationale (SI), investigated the processes by which Paris has been shaped since Baron Georges Eugène

Hausmann conducted bold alterations to the layout of Paris from 1850-1870 under Emperor Napoléon III. Well into the new century, Hausmann saw the transformation of the relatively independent medieval Parisian townships, with their areas ranging from their small winding laneways and slum areas, into uniform zonings with monument works, street lighting, new sewer and water systems, and the broad boardwalks of Paris which are still visible today.

As developing an understanding of this “real” space enables architects and urban planners to tailor space to specific uses and to elicit responses from its inhabitants. So too could an understanding of cyberspace lead to informed design for more effective usage. It has the potential to influence other realms and this research specifically focuses on the approach taken by the SI to space.

## **2.2 Representational Space**

The SI was a movement that metamorphosised from a group primarily concerned with aesthetics into a formidable band of social agitators that caused considerable havoc in the student and worker uprisings of Paris in 1968. The aesthetic became a powerful socio-political tool.

They also practised the *derive*, a spatializing action (Wollen, 1993), which involved any amount of people abandoning whatever they previously occupied in favour of following the “path of least resistance noting, the sudden change of ambience in a street within the space of a few meters; the evident division of cities into zones of distinct psychic atmospheres” (Debord, 1955, p. 2).

Through the *dérive*, the SI expressed the actualities of Parisian Urban Space. The outcome prescribed by the SI was the psychogeographical map, psychogeography is the “cartography of the precise effects of geographical setting, acting

directly on the mood of the individual” (Debord, 1958). Debord (1956) asserted that “The lessons drawn from the *dérive* permit the drawing up of the first surveys of the psychogeographical articulations of a modern city” (p. 5). So too it may be interesting to transpose this type of investigation to virtual spaces. More specifically it is the adaptation of these techniques to the evaluation of virtual activities that is of concern for this paper.

According to Lefebvre (1991), representational space is “space as directly lived through its associated images and symbols, and hence the space of inhabitants and ‘users’ [is] passively experienced ... it overlays physical space, making symbolic use of its objects. These representational spaces may be said...to tend toward more or less coherent systems of non-verbal symbols and signs” (p. 39).

The SI practice of the *dérive* and subsequent psychogeographical maps were used as tools to form a plan for a unitary urbanism, or, a utopia of self-management and play-zones applied to lived space or “place”. In this case the user is a consumer in a capitalist society, a concept which highlights the premise that “even though separated from his product, man is more and more, and ever more powerfully, the producer of every detail of his world” (Debord, 1994, p. 19) which is further explained in section 4.

### **3. Place**

Place, to use a simple interpretation, is represented as lived space and determined by the same concepts as applied to space such as geographical setting, history, culture, personal association, and similarity or contrast of other places (Cruesiner, 1998). Hirsh & O’Hanlon (1995), assert that ‘place’ is simply a subject’s position in space.

Perhaps the most direct definition of place is that place *is* space, and has meaning (Harrison and Dourish, 1996). A greater understanding of these meanings may give rise to the possibility of understanding perceptions of place that are inexplicably linked to the way space is expressed.

McCormack and Dorin (2002) argue that humans are rooted in the physical world and perceive space through the attachment of meaning, converting space into place, and turning inhabited space into landscape. The importance of representations of the physical, emotional and mental habitus in various forms of artistic expression indicates that these issues of space and place are important.

#### **4. Virtual or Cyber Space**

Virtual space is based in the context of technological settings whereby humans interact with computers and other electronic devices. William Gibson coined the term “cyberspace” to describe a “consensual hallucination...a graphical representation of data abstracted from the banks of every computer in the human system” or “the point at which media [flow] together and surround us” (Saco, 2002, p.102).

Interaction takes place between the human user and computer via the interface, a “site of the joining of culture and technology” (Blashki, 2002, slide 11). The interface is therefore a key concern in the development of improved relationships between user and system. Testing of these interactions is important, as was discovered by software manufacturers in the 1980s who found that testing their products using end-users promoted customer satisfaction (Palmquist, 2001, p.125).

An important consequence was the development of the point-and-click facility by Tim Burners-Lee (1989) where the link

could send the user to any place within cyberspace, using hypertext links to other graphical interface designs. On referring to this style of travel in space Rybaczyk (1998) comments “that one experiences the destination but misses the trip” (p. 9).

However, Guy Debord in his seminal work “Society of the Spectacle” insists that “Spectators”, or members of society, are already separated from many aspects of society due to commodity relations, and through cyberspace, the spectator is separated from the body and the mind. Debord (1967/1994) stated that “all that once was directly lived has become mere representation” (p.12). As society seemed to be designed for interactivity and community, so too it seems that cyberspace exemplifies these values. This can be perceived as both exciting and for others like Debord (1967/1994), just another manifestation of the culture of its creation..

## **5. Presence**

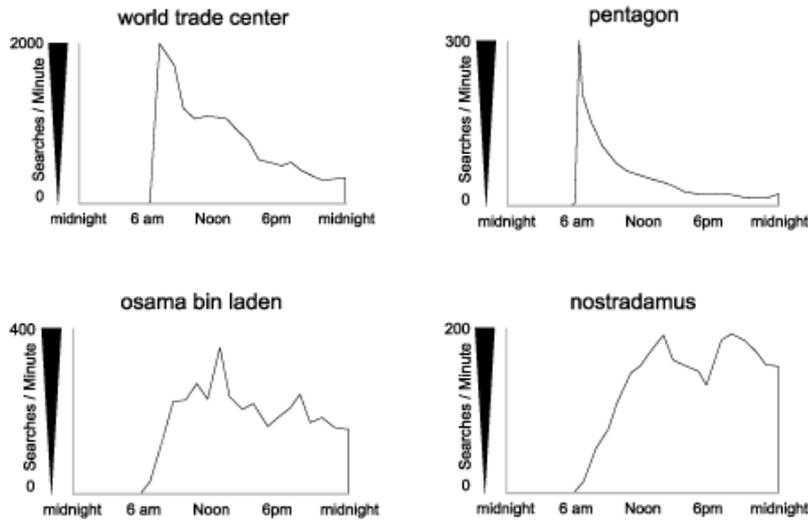
Presence can be defined in both an individual or group context. Individual presence relates to the way that a user is aware of the interactions made in virtual space, while the group context incorporates individual perceptions of others in the same environment and the dynamics of the group. It is the concept of the user’s perceptions of “presence” - or the subjective experience of “being there” in mediated environments (Saco, 2002) - that is important for the “feel” and ultimate enjoyment of a product designed to fulfil the expectations of the user for whom the product is designed. Presence is therefore a key element in the study of HCI for improved systems and a focus for this research.

## **6. Methods for Determining Usability**

Quantitative methods to determine system usability including the GOMS technique and the use of screen cameras to track eye movements, measure physiological events but do not allow the user to articulate their interpretations of the experience, and may result in subjective interpretations by “experts”.

More qualitative findings can be obtained from “task centred focus groups” where users perform everyday tasks in a laboratory environment and then converge to discuss experiences. Surveys are also utilised. Results from either method may, however, be confounded due to the phrasing of questions and a possible lack of adequate response categories. Importantly, current methods fail to employ the concept and importance of presence.

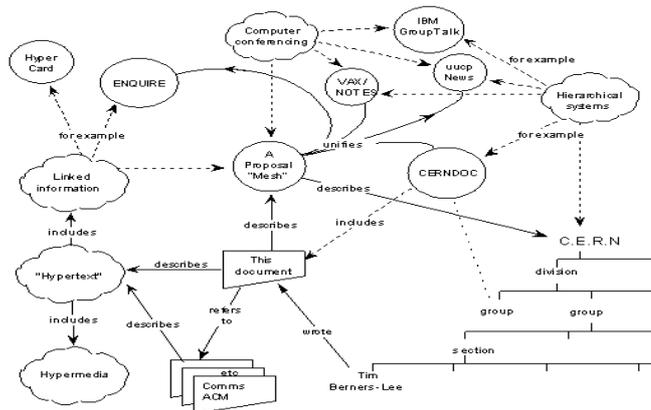
Organisations such as the Access Testing Centre test website and software usability through eye-tracking (Manktelow, 2003). University-based usability laboratories such as the Library and Information Services laboratory at Florida State University (Palmquist, 2001, p.126) employ diagnostic instruments and psychologically-based measures to understand internal reasoning behind user input and behaviours. Both of these methods have produced inconclusive results as to the concept of presence and what it means to be present within virtual space.



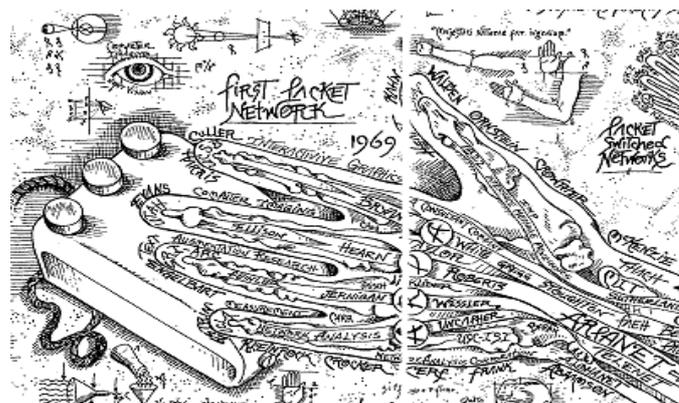
**Figure 1.** Graphs depicting the rate of search queries in relation to time and frequency. Google website. (Retrieved April 24, 2003, from [www.google.com/press/](http://www.google.com/press/))

One method to gauge users' current interests in people, places and events in cyberspace is through the analysis of logs of search engine requests. Google releases such information for free in its Google Zeitgeist web page (Google 'Zeitgeist' Home Page, 2003) while providing specialised data for payment to companies including Amazon books. Collecting and classifying data in terms of 'searches' and 'hits' is one way of identifying place and presence and may allow measurement of culturally shaped behaviour and external events.

Another website that attempts to measure cyberspace is "An atlas of cyberspaces" (An Atlas of Cyberspaces Home Page, 2003) which is concerned with mapping the informational landscape and generating interest in the aesthetic. The site aims to aid visualisation and comprehension of new digital landscapes beyond the computer screen, as in the examples below of the conceptual structures of a Linux kernel, a scroll relating the history of ARPAnet (as shown in figure 3) and a mapping of "chat circles", maps for plotting cyberspace in forms of coloured link graphs (depicted in figure 4). There is even Tim Berners-Lee's original World-Wide Web (www) proposal (figure 2).



**Figure 2.** This map by Tim Burners-Lee depicts the www. (Retrieved April 24, 2003, from [www.cybergeography.org/atlas/atlas.html](http://www.cybergeography.org/atlas/atlas.html))



**Figure 3.** This representation of the history of networking or the Internet was created by those that were instrumental in the creation of ARPAnet (Retrieved April 24, 2003, from [www.cybergeography.org/atlas/atlas.html](http://www.cybergeography.org/atlas/atlas.html))

Such representations of space collected into an atlas format allow exploration of the use of real world metaphors to map historical aspects of its creation.

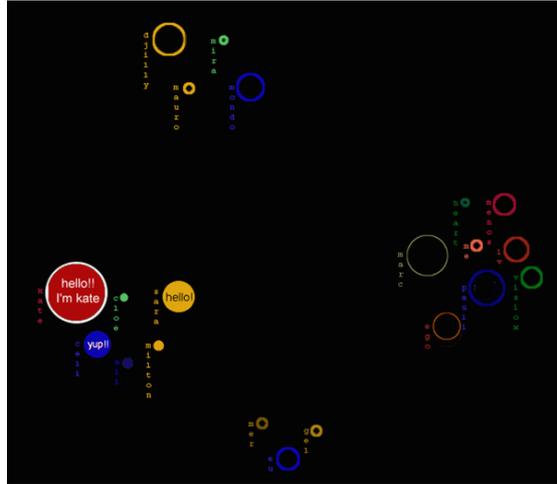


Figure 4. This is an artistic representation of “chat circles” (Retrieved April 24, 2003, from [www.cybergeography.org/atlas/atlas.html](http://www.cybergeography.org/atlas/atlas.html))

This understanding of the influences on space in a “real” environment can be extended to interactions that take place between humans and technology, and in particular, to virtual space. This premise is echoed in the work of Grush (2002), and Hesslow (2003) who state, “a simulated action can elicit perceptual activity that resembles that activity that would have occurred if the action had actually been performed” (p. 1). Therefore the assertion that the brain treats imagined experience as being real and the physiological responses may be extended to cyberspace.

As presence is critical to untangling the relationships between place, space and virtual space, an aim will be to focus on users’ perceptions of presence and the effective communication to designers to improve immersive computing experiences. This research therefore explores possibilities for gauging emotional perceptions of “place” in virtual space – or the feeling of presence in a socio-political context to act as a tool for informed interface design using the theories of the SI, and their use of the *dérive* and psycho geography which are

methods used to determine the distinct zonings of physically lived space.

An ever-expanding atlas of individual users' experiences mapped according to interaction and feeling of presence steeped social and emotional planes could result in a broader understanding of what it is to be in place and feel presence in space, especially cyberspace. A combination of experimental mapping methods and known usability testing techniques could perhaps form a new determination of presence.

An analysis of the positive or negative repercussions on individual experiences could allow the definition of a "humane interface", which may easily be inhabited, immersive, traversed for particular desired means and above all, be enjoyed (Preece, 1993, 1994, 2002; Raskin, 2000; and Norman, 1988).

It is hoped that a new interpretation of SI practices could add knowledge and insight into the field of HCI, particularly in the area of evaluation. Improved evaluation methods may lead to meaningful change in approaches by multimedia designers, theorists, and evaluators of multimedia applications if an effective means of communication can be established.

## **7. Method and Experimental design**

This project lies within an interpretivist paradigm (Miles & Huberman, 1994), Currently a full-scale experimental design is progressing.

Such measures will be employed in relation to the realisation of a new method involving the contemporary implementation of the *dérive* and psychogeography. Participants in the study will explore distinct spatial fields within three environments: home computer, networked gaming environment and virtual reality equipment. Subjects will have full control over their experiences.

The research situates mainly in this qualitative setting in accordance with techniques projected by Miles and Huberman (1994) with the final analysis being presented using Denzin's (1989) approach to interpretive synthesis by using multiple exemplars for cross-case analysis.

Participants will perform interpretations of a *dérive* and map their experience using psychocybergeography, a free interpretation. As the user is presented with any means of communicating the experience of the test environment as a form of "true", raw feedback it will allow expression of nuances of feeling involving vision, hearing, touch, dexterity, vocalization, and perceptions.

Analytical methods will essentially emerge from the data as in the case of evaluative research (Patton, 1996) where the participants have a greater role in the determination of results. Following the interpretation of the main case and experimental study results, participants are asked to participate in a survey, in the form of an interview with the results assisting with identifying alternative trends.

The SI experience via psychogeography commonly formed a time dependant historical document of spatial discovery. This method could therefore be applied to multimedia evaluation in combination with GOMS in relation to Keystroke level models for future usability testing.

A pilot study was conducted in 2002 and involved a sample population of university graduates with a good grasp of English language and varying degrees of technological competency. The participants were asked to practise the *dérive* and drift through the nuances of cyberspace to provide a psychocybergeographical mapping of their experience. Using instructions appropriated from Ewenstein's (1999) website, subjects acted either by themselves or in groups to attain a mapping of their emotional and physical "virtual" experience in the vein of the SI.

Subjects were encouraged to experience playful but constructive behaviour with reference to the SI and Debord's (1958) definition of a *dérive*.

Participants were asked to note the physical space in which they were based during the experience. Participants in a group setting were asked to note interactions such as conscious decision-making that took place. In all cases participants were asked to note discoveries and interactions using Ewenstein's adapted instructions.

The account of a *dérive* by four users produced a search for a cyber-entity. Recorded elements of the *dérive* included interludes of conversation and other "physical" elements, such as an interruption by a cat. All participants remarked on the playful and ludic nature of the *dérive*, while highlighting areas of difficulty experienced, such as losing the Internet connection.

Expert evaluation often requires role-playing and as such is subject to bias; other techniques may affect user activity and performance and therefore not capture accurate user behaviour. The introduction of the *dérive* as a qualitative method is yet to produce limitations for examination due to the infancy of its testable application but will be continually evaluated throughout the research process.

The combined methods and techniques proposed here are designed to contribute to knowledge in the area of HCI and aim to add a novel approach to user evaluation with an ultimate aim of increased levels of usability. This method invites interpretive evaluation, taking into account experimental evaluations based in scientific methodology.

## **8. Conclusion**

As computing technology and culture changes, so will individual perceptions of cyber culture (Massey, Hung, Montoya-

Weiss and Ramesh, 2001). Case studies of individual depictions of this type of space may enable a designer to better understand user perceptions, wants and needs and could be a focus for future research.

The practice of the *dérive* and psychogeography could lend itself to the evaluation and testing of user interfaces in multimedia applications and the World Wide Web. It would map the emotional journey of a user interacting with an interface or interfaces, allow an estimation of the 'feel' of a product, and help to improve the usability of virtual space, unprompted by researcher influence.

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