Metaphors of the World Wide Web

'The Web … is limited only by mans' imagination'

User 3: 249

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Abstract

In just nine years since its debut, the 'Web' has generated a wide variety of metaphorical expressions. Metaphor, a powerful linguistic device, is used when users try to make sense of the Web's foreign environment by describing the unfamiliar in terms of the familiar. Current metaphors used to describe the Web are limited, simply because it is too complex a phenomena to be fully contained by any one metaphor. This exploratory study sought to establish the often tacit metaphors people use to represent the World Wide Web. It aimed to investigate whether the metaphors used varied according to experiential use. Finally, it discusses how these metaphors constrain or enhance our understanding of such a technology. Metaphoric analysis of structured, qualitative interviews indicates that metaphors are a necessary component in the user conceptualisation of the Web. It remains inconclusive as to whether there is a relationship between patterns of metaphor use and level of Web experience. There is a general trend that users' metaphors of the Web as a fixed entity changes as the level of skill increases. However, there is evidence to suggest that there is some concurrence of metaphors used across user groups. Further investigation is needed into this novel area to establish this relationship. Although there are some limitations of the use of metaphor, it is concluded that the importance of Web metaphors cannot be underestimated

Keywords: Metaphor; World Wide Web; Technology.

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1. Introduction

> *Do you have a mental image of 'online' technologies? Perhaps you picture a giant filing cabinet with each drawer representing an online service, each folder a database ... or maybe you see it as a cafeteria where new information comes in ... and is laid out to be viewed, selected and paid for ... Many people visualise a physical library where both browsing and the use of catalogues help them locate books that contain useful information...*

(Tenopir 1997: 35).

1.1 Technology and Metaphor

Every age sees the world through the lens of its latest technology (Segelken 2001). How we have come to understand the human mind has greatly changed in the last 3000 years according to the dominant prevailing technology [1]. Nowadays we understand the mind as a computer. Considering the few short decades since the invention of computers and the even shorter span since they have become an everyday tool, the penetration of this technology into everyday thinking is striking. Humans are now beginning to utilise this technology in new ways: computers are used to access the broader environment of information sources and services (Palmquist 1996). The World Wide Web is a large and rapidly growing information resource. It consists of multimedia data which are stored as hypermedia documents; its user-friendly 'clickable' hyperlink structure is credited for bringing vast amounts of information to a wider audience with low tolerance for learning new technical skills (Hine 2000; Bruce 1999). With an estimated 500 million online users world-wide by the end of 2002 [2], the permeation of the Web is extensive. However, it should not be assumed that those with access to this technology automatically understand how to use it. The meaningfulness of such a technology is negotiated within a specific context where the technology is understood and used. We tend to use metaphor to make the technology meaningful by representing it in recognisable ways (Hine 2000). For a technology to become a part of our lives, it must be a part of our metaphorical substrate (Lienhard 1996). It is widely acknowledged that our interaction with such technological tools entrenched in everyday practice generate new theoretical metaphors and concepts (Gigerenzer 2000; Basalla 1988). In just

nine years since its debut, the 'Web' has generated a wide variety of metaphorical expressions. Somehow users have come to 'surf' the 'Web', follow their 'bookmarks' to 'sites' where they browse 'pages', registering 'hits' with the 'host' computer. Those who actually use the Web quickly stop thinking of any of this as metaphor and simply accept it as a new technology, with new conventions and a new lexicon of its own (Basalla 1988). It is difficult to imagine a Web language with entirely new and unique vocabulary, devoid of metaphors (Jacobs 1999).

1.2 Metaphor

The significance of metaphor has long been recognised (Haste 1994). It has a large and notable literature [3]. Metaphor is a powerful linguistic device. Although definitions and types of metaphor can vary [4], the function of metaphor is clear: we try to understand a less well understood concept in terms of one that is better understood (Lakoff and Johnson 1980; Ortony 1993). Metaphor is a ubiquitous phenomenon in everyday life (Petrie and Oshlag 1993 in Ortony 1993). Far from being a mere linguistic decoration, metaphor is an omnipresent feature of our thinking and discourse (Taylor 1984; Ogborn 1996). The metaphors we use in our everyday language profoundly influence what we do, because they shape our understanding (Haste 1997). When we change the metaphors therefore, we change how we think about things. Metaphors not only enable the understanding and communication of complex topics, they also affect further perception and interpretation of experiences (Gentner and Gentner 1983 in Moser 2000). In this way, metaphors not only guide our imagination about a new technology, they influence what it can be even before it exists (Stefik 1997).

1.3 Metaphor and the Web

There has been a rapid evolution in computing metaphors as the Web has grown and changed. As computing technology advances at a rapid pace, it is imperative for those affected by it to understand the key concepts and tools involved [5]. Metaphors

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[1] Descartes referred to the human mind and body as a clock; Freud a hydraulic system, Pavlov a telephone switchboard, Wiener a steam engine and finally, Simon a computer.

[2] CommerceNet (2001) http://www.commerce.net/research/stats/wwstats.html

[3] Ortony (1993), Lakoff and Johnson (1980) are the best sources for examination of the usefulness of metaphor across many different disciplines.

[4] There are many different types of metaphor (see Appendix 1). Also, there is a noted distinction between simile, metaphor, analogy and model. There is a tendency to use the word 'metaphor' as a generic term and for simplicity, this convention will be followed in this research.

[5] The impact of computer-based metaphors has been extensive (Rohrer 1995; Stefik 1997). The use of metaphors have been important in the development of computer interface elements; Apple's graphical user interface with its trash can and file folders has been widely emulated (Palmquist 1996)

enable us to understand technologies (Coyne 1997). Metaphors are especially appropriate for conceptualising the Web, for it is such a new technology. As Lawler (1997: 3) notes: '*new things are hard to talk about … Our experience moves much faster than our language does and few things are newer than [the Web] … Fifty years ago, the Internet in any form didn't exist, and less than 10 years ago, before the advent of the World Wide Web, the Internet was unknown except to a relatively small number of research scientists, academics, and computer buffs'*. When people try to understand something new, they put it into a conceptual framework of something else they already know about (Carroll and Thomas 1982). By identifying the Web as analogous to something more commonplace, it helps to explain the unknown or unfamiliar and hence the technology is made meaningful (Hine 2000).

Furthermore, it is through metaphor that we not only apprehend new technologies but also reshape our understanding of them (Postman 1992). Although metaphors arise from our individual beliefs and backgrounds, they are also inevitably influenced by our experience of media characterisations of such technologies (Bruce 1999). There have been many popular conceptions of the Web [6]. These representations have begun to consider the ways in which the Web is being envisioned by writers, film makers, artists and architects. More importantly, contemporary visions of the Web have begun to move away from the purely fictional to more concretised illustrations. There is now a body of research that attempts to form maps of 'cyberspace' that help us to visualise and comprehend the new digital landscapes beyond our computer screen (Dodge and Kitchin 2001). Some of the maps appear familiar, using the cartographic conventions of real-world maps, however many of the maps are much more abstract representations (ibid.). It seems that '[metaphors] of technology … have become powerful elements of popular culture ' (Joerges 1990). These metaphoric visualisations are important creative works providing a critical way in which to think about the Web. They are also of particular relevance because they are a source of inspiration for users and 'blueprints' for designers of cyberspace.

This is especially important, as the Web is very complex to comprehend and mentally visualise (Dodge and Kitchin 2001). The Web has a hypertextual structure,

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[6] In the literary world, Gibson first coined the term 'cyberspace' his novel '*Neuromancer'* (1984). Key representations of the Web have also been proffered in cinematic cyberspace; most recently Hackers (1995) and The Matrix (1999).

which means that any word or image can be linked to any other in an infinitesimal range of destinations or locations. By clicking on a link 'users …jump between and search for relevant documents, without concern for the specific location in geographic space' (ibid.:2). This has lead some commentators to believe the Web brings about a 'death of distance' (Cairncross 1997). The hypertextual nature of the Web is, at least initially, alien to most. Metaphor are powerful tools that provide a way of visualising and comprehending this space that is too large and too complex to be seen directly, thus making it easier to understand and use (MacEachren 1995 in Dodge and Kitchin 2000). Furthermore, metaphors exploit the extraordinary human ability to organise objects in space (Dieberger 1998; Dieberger and Frank 1998). The function of this is twofold: metaphors create a 'sense of place' by re-establishing a connection to the tangible physical world that we all know and function in (Dodge and Kitchin 2000). More importantly, they are 'a strong influence in the development of an information infrastructure' (ibid.).

This is especially important for the Web is devoid of any inherent structure. With the exception of the Internet's supporting infrastructure (fibre-optic cables, servers, satellites etc) the Web is composed of computer code with no material existence (Dodge and Kitchin 2001). Thus, the spatial geometries and forms of the Web are entirely produced. The Web is essentially without form; it is a noumenon, an object of intellectual existence only. As there is no physicality to the Web, the ways in which we impose structure through metaphor varies culturally, historically and individually. In this way, the Web is a unique cultural technology (Swiss and Herman 2000): it is the result of the negotiation between different interest groups who potentially understand and represent the technology in differing ways. Indeed 'technologies possess interpretative flexibility, such that not only do relevant social groups view the technology differently, but the technology could be said actually to be a different thing for each' (Hine 2000;33, Bijker 1987).

1.4 Varying Metaphorical Representations of the Web

1.4.1 Non Users

In recent years, the uninitiated majority, although lacking personal experience, has nevertheless been able to develop mental representations of the Web (Ballofett 1999). Indeed, Bruce (1999) found that metaphors are used by the media to explain emerging unfamiliar entities and they ultimately influence what people expect, how they identify with, use and learn about new technologies. More importantly, users

will frequently never get past their initial metaphorical representation (Carroll and Thomas 1982).

1.4.2 Users

Over 33 million UK online users will have experience of attempting to understand and navigate through the complex geometries of cyberspace. They are likely to employ a range of metaphors. However, it is important to recognise that the Web may be constructed differently by both users and Web site developers. In this way 'users are, in principle, free to understand the technology in quite different ways from those that designers intended' (Memarzia 1997: 61 in Dodge and Kitchin 2000).

1.4.3 Designers

As the reality that can be manipulated by the user gets more complex, it becomes even more important that Web designers communicate a cogent model of that reality to the user (Lindeman 1991 in Palmquist 1996). In this way, the design process involves developers embedding their notions of what users are like into their design (Hine 2000). If people employ metaphors when understanding new technologies, the designers of those systems should anticipate and support likely metaphorical constructions in order to ease understanding and use of such system. In addition, designers should provide guidance to new users who may otherwise select inappropriate or inefficacious metaphors (Carroll 1997).

It seems therefore that 'metaphors are powerful rhetorical devices used by both non/users and designers in the continuing reconfiguration of the World Wide Web (Thomas and Wyatt 1999). However, current metaphors used to describe the Web are limited, simply because it is too complex a phenomenon to be fully contained by any one metaphor. As the user must traverse a more hyperlinked and distributed environment, the complexity of that reality is particularly difficult to capture in a single metaphor (Palmquist 1996). In addition, problems arise through the application of spatial (and often linear) metaphorical representations (Tauscher and Greenberg 1997)[7]. The implications of this are twofold; the metaphors people invoke will drastically affect the success with which users are able to understand and use the Web. More importantly however is the idea that either new, more detailed metaphors need to be introduced or the metaphorical approach may have to be abandoned in favour of a more literal one (Carroll and Thomas 1982). It seems

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[7] Hypertext navigation is rarely linear yet users often apply metaphors of the physical environment - such as employing stepwise path following enabling users to retrace their path one page at a time.

therefore that there is a forum for debate as to whether metaphor enhances or inhibits our understanding of a technology such as the Web.

1.5 Previous Studies

There have been only a few analytic studies of Internet metaphors in general (Palmquist 1996) or Web metaphors in particular (Ratzan 2000).

1.5.1 Internet Metaphors

In her seminal work, Palmquist (1996) investigated the metaphors being used to explain the Internet. Palmquist examined 100 articles from three indexing services and found that metaphors were used in 70% of Computer Database articles, 65% of the Magazine Index articles and 55% of the Information Science Abstracts (ISA) articles. Palmquist categorised the metaphors into major families: travel (20%) buildings/politics (15%) anthropomorphic (15%) commerce (14%) space (12%) frontier (12%) fire/water (6%) and animals (6%). In addition, Palmquist found that the articles indexed by various databases vary in their use of metaphors. Those regarding travel were used in 44% of ISA articles but only 15% of other databases. Metaphors regarding commerce, politics and place were used 29% of ISA articles but only 16% and 2% of Computer Database and Magazine Index respectively. In contrast, Computer Database articles tend to emphasise anthropomorphic metaphors (43%).

Other studies of Internet Metaphors have often focused on word play (Cunningham, 1996; Davis, 1997) or general usage (Rohrer 1995). Word play studies demonstrated the ubiquitous use of Internet metaphors by the on-line community. The latter has applications toward computer jargon as a separate and distinct linguistic form. (2000).

1.5.2 Web Metaphors

Ratzan (2000) used an online sampling technique to explore the metaphors users use to describe the online environment. Using a Web-based questionnaire, Ratzan sampled 350 users and categorised them according to varying levels of expertise, and gender. Ratzan found that novices tended to use finite and tangible metaphors while experts tended to use more metaphysical, intangible metaphors. Men tended to consider themselves as higher skilled users while women tended to perceive themselves as lesser skilled on-line users. Females were more likely to use highway and frontier metaphors than did males and this held true over all age categories.

Although Ratzan entitles his paper 'Making Sense of the Web: A Metaphorical Approach', he actually does not make the clear distinction between the Internet and Web. For the current research, the distinction between Internet and Web is important and hence only Web metaphors will be studied – (see Appendix 2 for rationale).

2. Rationale

The understanding of user perceptions of the Web is a particularly significant area of research, as more of our time, leisure and business activities are conducted in virtual space. Although there is a growing body of theoretical and analytical work, there have only been a few analytic studies of Internet/Web metaphors. The Web remains a largely unmapped space in terms of contemporary cultural research. Our conceptualisations of the Web are powerful in framing our conception of the new virtual worlds beyond our computer screens. The metaphors we adopt to describe the Web will determine how it develops, who has access to it in the future, what kind of information it will carry and what its primary purpose will be. The beliefs we hold about technology will have important consequences for ways in which we relate to, interact with and understand it. Our understanding of Web representations will help users, service providers and analysts comprehend the various spaces of online information, providing understanding and aiding navigation. This research will have a significant educational value by making complex spaces comprehensible. By exploring how we represent the Web, 'we can better plan, design and manage the [virtual] environment for and with people if we know how they imagine the world' (Kitchin 1994). In this way, there is a future of psychology as a design science.

3. Aims

Research into the psychological implications of the Web is still relatively novel and thus there is not an established research base. The current research therefore is an exploratory qualitative study that aims to:

1) Establish the metaphors people use to represent the World Wide Web

2) Investigate if these metaphors vary according to different levels of experience [8].

3) Discuss whether the metaphors we use constrain or enhance our understanding of the Web.

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[8] The aim to explore the varying metaphorical representations by different user groups was formulated prior to the publication of Ratzan's (2000) study. Although the idea was autonomously developed, this research will partly be extending Ratzan's initial research.

4.1 Design

Structured, qualitative interviews were employed to elicit the metaphorical descriptions of Web users at three varying levels of experience: low users, average users and expert users. Participants were required to complete four tasks:

- Drawing a picture of the Web prior to the interview

- An interview based around three central themes

- Discussion of Web representations as drawn by Web analysts

- Completing Summary statements

The final two tasks were completed as part of the interview. Using metaphor analysis, the main themes and patterns of metaphor use were elicited.

4.1.1 Design Rationale

The methodology utilised in this study is unique; it has no parallel in the literature. It has been specifically designed to elicit metaphorical conceptualisations of the Web. The qualitative study of Web metaphors is a novel methodology: previous methodologies have included indexing or quantitative techniques. The interview technique was chosen for it is arguably more suitable for eliciting linguistic data, which otherwise may be hindered by more closed questionnaire techniques (For example, Ratzan 2000). The preliminary Interview Schedule was developed from a number of pilot studies (Appendix 8). It centred on three main themes: information searching, mental representations of the Web, linking and structuring the Web. These themes are central to any study of the Web in general and Web metaphors in particular (See Appendix 10 for full rationale). The inclusion of graphical representations into the methodology is especially unique. The idea to ask participants to draw and discuss pictures of the Web stemmed from the Zaltman Metaphor Elicitation Technique (ZMET). It is based on the premise that human think in images as well as words (Kosslyn 1980) (See Appendix 9 for full rationale). The participants were asked to complete summary statements in order to concretise the ideas as developed through the course of the interview. The combination of these methodologies provided a unique way to elicit the metaphorical representations of the Web.

4.2 Ethical Considerations

Issues of deception are not applicable to this study for participants were given an Information sheet (Appendix 6) explaining the purpose of the study. Participants were also asked to sign a consent form (Appendix 7), whereby they were given the opportunity to ask any questions not already covered. Finally, participants were assured of confidentiality and anonymity throughout the study and were informed that they had the right to withdraw at any time and for any reason.

4.3 Sample

Previous studies of the Web have tended to focus on specialist groups such as children, elderly and the disabled (Kitchin 1994). There have only been one study that explore experts' and low users' representations of the Web (Ratzan 2000). This study examines the metaphorical conceptualisations of more than one type of user group: low-users [9], average users and expert users. These categories can be defined as follows:

Definition of User Categories (See Appendix 3 For Rationale):

User categories are defined by their experience and average use of the Web. The expert user category is further defined by the participant having a job in Web design/development.

	Experience	**Average Use**
Low User	Less than one year	1 hour a week
Average User	Approx. 3 years	3-4 hours a day
Expert User	Over five years	8-10 hours a day

Table 1. Definition of User Categories.

Sample sizes were small: only 9 participants recruited, 3 users in each group. This is based on the premise that it was better to get detailed representations of a small number of each user group, rather than a larger number of Web representations from

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[9] The study initially aimed to sample 'non users' of the Web. However, as the percentage of the population with Web access is dramatically increasing (see Appendix 3) it was extremely hard to find participants that had not encountered the Web. The study was modified to look at the representations of those who use the Web minimally.

one user category. This would better enable the investigation across varying levels of Web experience. Participants were obtained through opportunity and snowball sampling. The age range of participants was between 18-45.

	Sex	Average Age	Average Use	Average Experience
Low User	3 Female	29.6	1 hr /week	1 year
Moderate User	2 Female 1 Male	30.75	2-3 hrs /day	3 years
Expert User	3 Male	31.6	8-10 hrs /day	7 years

Table 2. Average Profile of Sample Groups

4.4 Materials

1. Interview Schedule (Appendix 4)
2. Six Representations of the Web (Appendix 5)
3. Information Sheet (Appendix 6)
4. Consent Form (Appendix 7)
5. Transcription Machine/Tapes

4.5 Method and Procedure

Participants were required to complete four tasks: one prior to an interview, and two others during the course of the interview.

1. Drawing a picture of the Web prior to the interview
2. An interview based around central themes
3. Discussion of Web representations as drawn by Web analysts
4. Completing summary statements

4.5.1 Prior to the Interview

Participants were given an Information Sheet and a Consent Form. A mutually convenient time was scheduled for the interview to take place. Participants were asked to draw a picture(s) of how they imagine the Web. (The rationale for this can be found in Appendix 9). The participants were made aware that these pictures would be needed at the interview the following week and discussed.

4.5.2 Interview

The full Interview schedule can be found in Appendix 4. It is worth noting that the questions followed general themes:

General Introductory Questions

In order to ease the participants into the interview, they were given some easy, introductory questions, covering their experience and use of the Web. This also functioned to establish which user category they belonged to.

Searching the Web

Participants were asked a number of simple questions to establish the purposes for which they use the Web. It also explored how participants searched for information.

Mental Representations of the Web

Participants were then asked about their representations of the Web. This usually led to participants describing the pictures they had drawn. They were asked to explain how their picture represents how they imagine the World Wide Web. To extend their ideas, a number of probing questions were asked. Participants were encouraged to fully discuss their own drawing in relation to these questions.

Linking/Structuring Web pages

Participants were asked general questions about how they think Web pages are linked and structured. It was thought that these questions might elicit more metaphorical descriptions.

Interview Schedule for Experts: 'Expert' users are asked a few additional questions specifically aimed at their expertise. This was done for two reasons: Firstly, it elicited any metaphorical representation entrenched in the Web design process. Secondly, it addressed the experts on their level. Thus, the researcher did not appear condescending to their knowledge.

4.5.3 Other representations of the Web

The participants were asked to discuss how other people might imagine the Web. To explore this further, the participants were given six representations of the Web (See Appendix 9 for rationale) and were asked to discuss how each picture was dis/similar to their own picture(s). The Dictaphone was temporarily turned off while each participant spent some time looking through the pictures. This ensured that the participant felt s/he had sufficient time to think their ideas through. The participants usually identified pictures that were similar and dissimilar to their own idea and were encouraged to fully explain how and why they were dis/similar and any themes across the pictures.

4.5.4 Summary Statements

At the end of the interview, participants were asked to summarise how they imagine the Web. They were then asked to complete two statements:

> 'When I think of the Web I think of'

> 'The Web is like a'

It was hoped that these final questions would concretise the ideas developed through the course of the interview. Finally, the participant was told that the interview had come to an end and was given the chance to add, modify or discuss further any points. The participant was thanked for their time and effort and was fully debriefed. This was the standardised procedure.

4.6 Metaphor Analysis

Metaphor Analysis is an established analysis technique. It has been popularised and used extensively by many metaphor researchers, most notably Lakoff (1987), Lakoff and Johnson (1980), Ortony (1993). It involves identifying the main metaphor themes and patterns of use. In this study, patterns of metaphor use were identified according to the different user groups. The metaphor themes and patterns of use were taken from direct quotes from each interview and include both explicit and instantiational metaphors [10]. The salient themes are presented in the latter sections of this report.

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[10] Explicit Metaphorical Reference (e.g., *The Web is a pool of information*). Instantiations of metaphor (e.g., *I tap into the Web*).

5. Results

This results section mentions a number of metaphor themes that are used to describe the Web [11]. With data from nine participants it is acknowledged that the scope of this research is limited; different metaphors might be found if the sample was larger Furthermore, it only addresses the most important and obvious metaphors. Many more metaphors could be found in the data. The results presented here reflect a salient summary.

The study aimed to explore the metaphors used to conceptualise the Web and to investigate if they vary according to differing levels of experience. Thus, there are two different aspects to the analysis:

1. The range and use of metaphors across user groups
2. The types and use of metaphors used across user groups.

5.1 The Range and Use of Metaphors

The results suggest that all users do utilise metaphors to describe their image of the Web. In fact, the use of metaphors is extensive. An average of 50 metaphorical references per interview and over twenty different metaphors were used to describe the Web.

Furthermore, the range of metaphors used is related to the level of Web experience. This neatly demonstrated in the following table:

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[11] In the participant quotes presented, there is an interchange between the terms Internet and Web. This does not reflect an inaccuracy or confusion in reporting. It reflects that only one third of low users and users knew the distinction between the Internet and Web. They therefore use these terms interchangeably.

User Category	Metaphor Type [12]	Average No.	Metaphor Themes
Low User	Explicit Reference	85	Train Network Filing Cabinet Gaseous Cloud Library Spider Nervous System Book
	Instantiation		Hierarchy/Levels Information Store Anthropomorphising Search Engine Steps and Jumps Travel
User	Explicit Reference	60	Information Resource Card Index Hovering Mass Book/Encyclopaedia Hierarchy Chaotic Puzzle Book Magnetism
	Instantiation		Information Moving Consumption Steps and Jumps Tree Travel
Expert User	Explicit Reference	30	Hierarchy Encyclopaedia Tree Gaseous Cloud Book
	Instantiation		Travel

Table 3. Summary of Metaphorical Themes and Frequency of Use.

Low users and users seem to utilise the same number of metaphorical themes, although the metaphor themes generally vary. Furthermore, there is a tendency for

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[12] Explicit Metaphorical Reference (e.g., *The Web is a pool of information*). Instantiations of metaphor (e.g., *I tap into the Web*).

low users and users to use more metaphorical references than experts users. Indeed, experts seem to use substantially fewer metaphors than the other user groups. There seems to be a decreasing linear relationship between the range of metaphors used and level of experience: low users and users more likely to use metaphors than experts. This is perhaps accounted for by the fact that low users and users seem more likely to use metaphorical references to explain their ideas.   This can be demonstrated in the following two examples:

Steps and Jumps

Low users and users groups appreciate that one of the defining characteristics of the Web is that information can be hyperlinked.

'Its not having a linear progression of information from A to B its about things being able to go all over the place'

(Low user 3:146).

However, they further make the distinction between a hyperlink and 'normal' links. To do this, they refer to following standard links as walking down a linear path. Hyperlinks however are 'jumps', a quick shortcut to get to the destination point:

'So the series of steps, like a linear progression, is your way of getting from one site to another to search, whereas if you know where you want to go, you don't have to follow the path you can just [jump] there'

(User 1:423-425).

'it's a virtual jump … for example, if you had one site here and another site here you'd just jump directly, a virtual jump from there to there'

(Low user 1:413-416).

This 'steps and jumps' metaphor theme is only used by the low users and users. Expert users simply refer to the correct label of hypertext.

Doors and Gates

Similarly, when dealing with issues of access to information on the Web, users especially refer to doors/windows as metaphors for access and metaphorical gates that prevent access.

'The Web has gates like my bank, for example you can log onto the front of my bank but you cant get access to my records without a password or some kind of protection, a firewall or whatever. Some of these sites are actually gated'

(User 2: 98-102).

'The Internet service provider which is sort of a portal onto the Net'

(User 2: 93).

'I would click on my favourites or well it would give me the window to get to the outside world'

(User 3:46-48).

'I've got this set of access points onto the Web like portals'

(User 1: 109).

Whereas users tend to refer to issues of access as doors, portal or gates, expert users do not tend to use these metaphorical expressions. Furthermore, once committed to a metaphor, low users and users are more likely to extend the use of the metaphor to explain other things. After their initial conceptualisations, low users and users referred back to their initial metaphor an average of eight times during the course of the interview. They use their initial metaphor to explain different elements of the Web. For example, one low user described her mental image of the Web as a railway network. At the end of the interview, she explained why she did not like one of the Web representations in terms of her initial metaphor:

'In picture 3 ... its only got the stations and it hasn't got the rail track ... its like I can see how they've stored the information but I cant see any way of going to access the information ...

(Low User 1: 313-317).

Extending the use of initial metaphors is a trend for most of the low user and user participants. In contrast, not only are experts less likely to use metaphors to explain their ideas, they actually explicitly use analogies.

'It's a bit like, if you talk about a television the Internet would be all the transmitters and satellites and cabling, all the infrastructure and hardware, whereas the Web is like the actual broadcast'

(Expert 1: 24-26).

'The Internet is like … a telephone network and the Web might be … a telephone service or chat line that's like a service it uses an infrastructure, it structures it internally… so the Web's a service'

<div align="right">(Expert 2: 74-76).</div>

'I would say it would probably be best thought of as an encyclopaedia which is cross referenced and for each entry under each subject it would suggest other places to look and you'd follow those suggestions to go to another page .. that would be the closest analogy to a link to a Web based system of hyperlinks'

<div align="right">(Expert 2:310-315).</div>

It seems therefore that expert users are more likely to use metaphors as a communication tool, whereas users and low users use them as a conceptual tools.

5.1.2 Summary

Metaphor is extensively used to describe the Web. The range of metaphors used varies according to level of Web experience. Low users and users use the same number of metaphors, although the metaphors may vary. Once committed to a particular metaphor, low users and users tend to extend it use to explain other things. In contrast, expert users tend to use fewer metaphors than the other user groups and are more likely to explicitly use analogies to explain their ideas. In this way, experts are more likely to use metaphors as communication aids. Users and low users are more likely to use metaphors as conceptual tools to aid their understanding of the Web. Overall however, it is clear that metaphors play a central role in understanding and communicating about the World Wide Web.

5.2 Types of Metaphor

It seems that the range and use of metaphor generally varies according to different levels of Web experience. Although users and low users might utilise the same number of metaphors, there seems to be some distinction in the types of metaphor used. These contrasting metaphors suggest that we might not all speak the same metaphorical language.

There is a less straightforward relationship between the different metaphors used and level of Web experience. The patterns identified can be divided into 3 categories:

1. **Different metaphors used in different ways**. In this way, different metaphors are used to convey different ideas according to level of Web experience.

2. **Same metaphors used in different ways.** There are instances whereby the same metaphor was used, but it was utilised to convey different things.

3. **Same metaphors used in the same ways**. There are a number of metaphors that all participants used irrespective of level of Web experience.

5.2.1 Different Metaphors, Different ways

There is a general distinction between the metaphors used by low users, users and experts. How the Web is conceptualised depends not only on level of experience but the primary use for which the Web is used. Generally, low users use the Web for one main purpose: information searching. They tend to use metaphors of offline searching and accordingly conceptualise the information on the Web as static and fixed.   Users however not only use the Web more but also use it for significantly more activities. They see the Web as an information resource. Interestingly, users tend to use competing metaphors: like low users, some envision the information as static and fixed, but others imagine it as amorphous and fluid.   Experts tend to use the latter metaphors to conceptualise the Web; the property of interlinking information is paramount. As their job in Web design would suggest, they tend to use metaphors that structure information.

Low Users:

Profile Table: Low Users (3)	
Average Use	1 hour/week
Experience	Less than 1 year
Use	Email [13] Information Searching

Table 4. Low User Profile.

Each of these low users reported a single main use of the Web: information searching. It is unsurprising therefore that they had a plethora of metaphors to describe their understanding of information on the Web.

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[13] Email is an activity conducted on the Internet. However, as two thirds of the low users did not know the distinction between the Internet and Web, it could still be classed as an activity conducted on the Web.

The Web as a Library

For the most part, the Web today is seen as a giant public library (Nie 2001). The most widespread use of the Web today is as an information search utility for products, travel, hobbies, and general information.

'For me its very much an electronic information store its like a library'

(Low user 1: 359).

'Somehow all the information is stored in these mega computers in this big library … I see it as these monstrous computers just holding vast amounts of information'

(Low user 2: 124-126).

The Library metaphor is often used, because it is a familiar concept for dealing with vast amounts of information. It is a place where information is stored, accessed and organised.

'The Web for me is something where information is stored so anybody can put any information on the Web …. the Web itself is only somewhere where you store things'

(Low user 1:73, 76-77).

'It's a place where information can be stored … I know where the information is and how to get to it'.

(Low user 2: 356).

'I have access to the information … Its like opening the door going into that section of the library'

(Low user 3: 61).

The Web as Filing Cabinet

Most computer users will be familiar with the concept of files. It is a metaphor used to describe a theoretical grouping of dispersed data. The file metaphor is very useful as it enables the user to organise information.

'Its just like leafing through a filing cabinet, you know you look for the right names you pull out the file and you look through it and if its got what you want you take it out and photocopy it and if its not you put it back and try another drawer'

(Low user 2: 81-84).

'If I'm looking for something about a certain event it just flicks through the filing cabinet systematically and pulling up searches and categorises them into what should relate better to my search'.

(Low user 2: 109-112).

Low users tend to refer to metaphorical places or objects that would be used to store and organise information offline. In this conceptualisation, the information tends to be static. To overcome the issues of retrieving the information, instead of seeing the information itself moving, low users tend to anthropomorphise the Web. Anthropomorphism is the ascription of human-like attributes and characteristics to an otherwise non-human object. It is the social role of a human that the Web is expected to take on (Lawler 1997). In this instance, the Web becomes a 'conscious agent', like a librarian or secretary, that helps search for information.

'I kind of imagine it having knowing all the words in the documents and so if I'm looking for something about a certain event it just flicks through the filing cabinet ... like a quick secretary'

(Low user 2: 108-112).

'When it comes up with a list of suggestions I click on the address that it suggests and it pulls up the right page that it thinks is relevant to my search'

(Low user 1: 57-58).

Summary

Low users report one main use of the Web: information searching. They tend to use metaphors that convey the ability to store and organise static information. They tend to animate the Web to explain how they retrieve the information. In sum, low users use offline techniques as metaphors for using the Web.

Users

Profile Table: Users (3)	
Average Use	2.5 hours/day
Experience	3 years
Use	Email * Internet Banking * [14] Information Searching Entertainment Chat

Table 5. User Profile.

In contrast to low users, users report using the Web for many more activities. Users tend to refer to the information as a commodity or a resource to be used to help facilitate ones life.

The Web as Information Resource

Users tend to see the Web as a resource which is used to facilitate their work.

'Dipping in to it for the specific things I want to look for ... I suppose I'd define [it] as an information resource'

(User 3: 92, 100).

'When something's on the Internet.. you can tap into it'

(User 1: 63-64).

Furthermore, users tend to refer to themselves as 'consumers' of the Web (User 3: 219). Accordingly therefore, users utilise consumption metaphors to refer to the information on the Web.

Consumption metaphors

'[Websites] feed me information'

(User 3: 23).

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[14] Once again, Email and Internet Banking are Internet activities. Similar to the low users, two thirds of the users did not know the distinction between the Internet and Web.

> *'There's all this information and you're using a search engine to take a slice out of it'*

> (User 1: 171).

In contrast to the more static, fixed representations of information, users tend to see the information as 'flowing':

> *'The flow of information can go in many different directions'*

> (User 2: 164).

> *'The Web's over there and I'm plugged into it'*

> (User 2: 213).

Users also seem to have more active role in searching for information. Rather than anthropomorphising the search engine, users utilise an attraction metaphor.

Attraction metaphor

Users set a term of attraction in their mind to draw certain information to themselves.

> *'Like some kind of magnet thing bringing all this information to me'*

> (User 3: 63-4).

> *You have the very clever stuff that is actually pulling information to you*

> (User 3: 167-168).

The information being 'pulled' to them, and thus users conceptualise information as much more active. Contrast this with low user conceptualisation of information:

> *'Its not the information coming to me its I'm going into where the information is … its not some kind of magnet thing bringing all this information to me'*

> (Low user 3: 60-64).

In contrast to the low users, users have enough experience of the Web to understand that online information is not analogous to offline information. They use a number of metaphors to convey that information as fluid. It is also functional – the Web is a

resource to be used to facilitate life. However, there is some confusion over how to structure the information on the Web. This is demonstrated by competing metaphors: Like the low users, some users represent the structure of the information as relatively fixed:

Web as card index

> *'It's a bit like a card index and you index each age by a series of .. series of codes which are you know linked um I know a bit about how they are put together …with sort of electronic links into the next page … so I see those well I suppose I see them all as like a big card index'*

(User 3: 162-165).

The Web as a Tree

> *'So what is it that characterises the Web?*
>
> *I guess its like branches of a tree'*

(User 2: 160-162).

> *'I think there is one big tree but there might be a few oak trees and lots of little trees and baby trees in the forest'*

(User 1: 239-240).

Yet users also refer to it as an amorphous, astructural entity. These competing metaphors may be referred to more than once within an interview.

The Web as Ethereal Mass

> *'Its just this huge mass of dots in a 3D space that is not structured in any way'*

(User 1: 83-84).

> *'Its like this hovering mass of stuff above us'*

(User 1: 153-154).

> *'Its just a whole mass of things that are just connected in different ways that are just kind of hovering somewhere'*

(User 1: 77-78).

It is interesting to note that these user conceptualisations are similar to those proffered by expert users:

> *'You know its just this complete complex um interconnected kind of entity'*

<div align="right">(Expert 3: 139).</div>

> *'Its pretty amorphous .. like a gaseous cloud kind of thing'*

<div align="right">(Expert 1: 371, 375).</div>

This mixture of fixed, organised representations and complex, fluid, amorphous representations suggests that there are some competing metaphors at play. The user group reflects a transition from the low-user category where information is fixed and static to a more detailed understanding of the Web.

Summary

With more experience of using the Web, users utilise metaphors that convey that the Web is functional; a resource to be used to facilitate life. They tend to represent information on the Web as fluid but often use conflicting metaphors to structure that information. Users have more experience of using the Web than low users but less than experts. It is suggested that their metaphors represent the transition between differing levels of experiential knowledge of the Web.

Experts

Profile Table: Experts (3)	
Average Use	8-10 hours/day
Experience	7 years
Use	Email Internet Banking Information Searching Entertainment Chat Activities for Work

Table 6. Expert User Profile.

Experts report using the Web for the same kinds of activities as users, (except for their work being conducted on the Web), but the amount of time spent on the Web is significantly increased. For experts, the Web is a place where information needs to be made accessible and meaningful. This is unsurprising given their job as Web designers and developers. However, it is interesting to note that 'structure' does not

refer to a fixed organisation (like the structure applied by low users); rather it refers to information being semantically ordered.

> *'[The structure] is based on the meaning, on the content .. they aren't necessarily linked in terms of Web pages but they do have related content, so if you have a cluster of nodes on one side of the graph they are about a similar subject'*

(Expert 1: 190-193).

> *'I view the Web organised by meaning rather than physical location on the Web'*

(Expert 1: 494-495).

The importance of ordering information is also effectively demonstrated in the metaphors used. In addition to the metaphor of the Web as ethereal mass as described earlier, expert users tend to refer to the Web as an encyclopaedia.

The Web as Encyclopaedia

> *The Web's like a big encyclopædia with less structure and formalism*

(Expert 1: 414).

The emphasis here is on the interlinking nature of information on the Web. In contrast to the more fixed nature of information implied by such a metaphor (and one more likely to be used by low users), experts utilise this metaphor to convey something entirely different; that is, the notion of interlinking information.

Indeed, it is this very point that leads into the second category of metaphor use as outlined earlier: how the same metaphor is used in differing ways according to levels of experience.

5.2.2 Same Metaphors, Different ways

Irrespective of experience, all users utilised the metaphor of the Web as a book. However, the metaphor was used to convey different things for each user group:

The Web as a book

> *'What I do online is the way I would use an encyclopædia type approach offline … its like having a reference book on the shelf [I] go read the bit I want and then put it back'*

(Low user 3: 70, 80).

'Its an information source like opening a book like going to an encyclopaedia'

'Its like a complex encyclopaedia where all the information is hyperlinked … every source would refer to an infinite number of other sources and so forth'

In the first metaphorical representation, the low user is using the book to refer to a fixed, structured entity in which the information is static. In the second quotation, the user is referring to the book as an information resource. In the final quotation the expert is referring to the complex interlinking nature of information on the Web. It seems therefore that although the same metaphor may be used, it is utilised to convey different aspects of the same metaphor.

5.2.3 Same Metaphors, Same ways

Finally, the results suggest that there are a number of metaphors that are consistently used across all user groups. These are dominant themes that are consistent regardless of use and experience.

Navigation Metaphors

Navigation is the common metaphor used to explain how users interact with the Web. The navigation metaphor tries to provide a framework to explain users moving to and through an information space.

'I could choose which route I could go down … to get to my destination Website'

'This is my picture and it looks a little bit like the London underground system and this is how I visualise the Web with rail tracks forming branches where you can go along each track and search for information. The stations is where the information is stored and at some points where the tracks dissect each other for me these would be much more important and it would be somewhere where you could go either way … so its not just along one straight road where you can go and come back at some point in time you can use the intersection to decide which way you want to go'.

'Information or whatever travels both ways'

<div align="right">(User 3: 141-142).</div>

'I would click on a link on that page and follow where that takes me until it … then I would backtrack to my starting point'

<div align="right">(Expert 3: 52-54).</div>

Hierarchy Metaphors

The hierarchy theme is a very important set of metaphors that proliferate across all user categories. It embodies two central notions of information and structure. Inherent in the hierarchy metaphor is the notion of levels of information.

'I do think that there are different levels of information'

<div align="right">(User 1: 204).</div>

'I think you can think of [the Web] as an absolute enormous hierarchy'

<div align="right">(Expert 1: 162).</div>

Furthermore, the hierarchy is associated with levels of specificity of information. General information is referred to as wide, on the top or inside; specific information is at the bottom, the end or the outside.

'I would probably have them all on top of each other and start at one level and go down and go down and go down … and you can move down and up the levels because sometimes you can go too detailed and find nothing and then have to go up again. And you must have to be able to go sideways [as] they would be at the same level of detail, so the hierarchy represents how deep you want to go how much information you get at each level and if you search sideways you're getting different types of the same amount if information'

<div align="right">(Low user 1: 398-407).</div>

'If you put the search too wide you get too many results … so for me its just a question of learning how to search it properly so that you can narrow down the search'

<div align="right">(Low user 1:48-52).</div>

'As you get towards the end you get more and more specific'

<div align="right">(User 2: 142).</div>

'I'd narrow down the search … sort of a technique of refinement so gradually … filtering down on what you really want'

<div align="right">(Expert 2: 42, 56).</div>

Most interestingly, one particular user utilised this notion of hierarchy in order to explain her use of the Web and her relationship to it. For example, she used the hierarchical idea to convey two competing representations of the Web:

'[I see it as] a lot of stuff in the air because it seems really strange to me that it all runs through the little cables underground … I never really associate the Internet with cables I think of it as a more ethereal abstract thing um just like plucking bits of information out of the atmosphere'

<div align="right">(Low user 2: 117-120).</div>

'Yeah, it's a map of the underground …because … the Internet is obviously under ground … it makes sense there'

<div align="right">(Low user 2: 207).</div>

For this user, her abstract representation of the Web is 'up in the air', whereas her more concretised representation is 'grounded'. Furthermore, she continues to use these two competing representations to convey her different interactional experiences with Web. When she feels in control, the Web is structured and grounded. However, when the user feels at the 'whim of the Web' (232) she refers to it as being in the air:

'So in the tube map … you have an element of control because you an get off the train you can change platforms you can get on a different train, change direction, so you do have that element of control … whereas my gaseous cloud picture is more passive because I just find the Internet so completely uncontrollable … so I guess its an element of luck really if you get the right information or not'

<div align="right">(Low user 2: 360-375).</div>

It seems therefore that the notion of hierarchy is central to metaphorical conceptualisations of the Web. In fact, so much so that it is actually incorporated into the design of Web pages:

'If I'm designing a group of Web pages I would design them as a hierarchy … so the pages are structured into a hierarchy…, you apply a hierarchy 'cos that's the best way to organise the information'

<div align="right">(Expert 2: 354-359).</div>

This hierarchical theme is even further corroborated by each user group choosing a hierarchical Web representation. Out of the six possible pictures, seven out of nine participants chose picture number 4 (See Appendix 5) as central to their own notions.

User Group	Pictures Similar	Pictures Dissimilar
Low User	1 4 6	2 3 5
	2 4 6	1 3 5
	4 6	1 2 3 5
Moderate User	1 6	2 3 4 5
	1 4 6	2 3 5
	1 4 6	2 3 5
Expert User	1 3 6	2 4 5
	1 4 6	2 3 5
	1 4 6	2 3 5

Table 7. Web Picture Choice.

Each of the user groups saw the hierarchical representation in concordance with their own ideas of the Web.

'This is what I was talking about, levels. The more specific you get in your search is like um … its like you're going… like you start off on the outside of something and the more specific you get its like turning the pages of a book or getting more and more deeper and deeper into the Internet'

(Low user 3: 243-247).

'This one which is number 4 … works going from one level so look at the first level and then refining it down and refining it down and refining it down'

(User 1: 232-236).

'I like number 4 with all the different levels its like a filing cabinet idea where you can systematically search through the different areas'

(Low user 2: 414-415).

As the table illustrates, pictures 1 (chosen as similar seven out of nine times) and 6 (chosen 100% of the time) also conveyed themes that were picked out as being similar to the participants' own ideas. The central notion here was the idea of networked information:

> *'Number 1 definitely because it reminds me of the nervous system actually … you've got one starting point going out to various peripheral points but you know get more and more linked and detailed the further you go out. Its like… the spreading out of information, but its all linked together'*

<div align="right">(Low user 3: 237-243).</div>

> *'[Picture 6] is close to my idea because here you can see that they've got the little balls which are joined by linking so for me this is my … rail network'*

<div align="right">(Low user 1: 228-231).</div>

> *'Number 6 is quite interesting because kind of the way it has a central starting point the ring and it goes out in all different directions and then different connections go off from there like a big tree I suppose. I like that idea the way I suppose that's the way I'd imagine the Internet to be connected, from a central ring and stuff flying out from it'*

<div align="right">(User 2: 417-421).</div>

The high rate of concurrence between pictures chosen, and the prevalence of metaphors used across all user categories suggest that metaphorical themes are consistent according to experiential use. Indeed, this is further corroborated by the 100% rejection of Web picture 5: this embodies the notion of the Web as place;

Rejection of place metaphors

> *That one [referring to picture 5] that's its sort of depicting that's its in one particular place a… I don't see it as that because … Websites are just everywhere and anywhere*

<div align="right">(User 2: 253-255).</div>

> *'It seems to be showing physical locations of servers, the geographical location which isn't something you ever really consider when you're using the Web, you don't really care whether the site is in France or Australia'*

<div align="right">(Expert 1: 518-522).</div>

'I think its kind of everywhere, there is no specific place where the Web is'

(User 1: 147-148).

'Its not anchored in one place'

(User 1: 262).

Not only is there a rejection of place, but more so a rejection of the geographical grounding in the world. Paradoxically, there is a notion of the 'World' Wide Web being constrained by the globe metaphor:

'It doesn't fit with my own idea, ... because its in a globe. I know its called the World Wide Web and I can understand why people put it in the shape of the globe of the world ... my picture of it is something which is not real, it doesn't relate to the world, its out there it could be in space it could be anywhere where this is more confined. Its not confined at all, this one seems as if it's confined'

(Low user 1: 243-249).

Finally and perhaps more importantly, is the notion that the underlying theme that all user groups use the metaphors to convey is the same. There seem to be two over arching themes: Information and Web structure.

'[The Web] is all about the information ... the important thing is knowing how to structure it'

(Expert 1: 244).

The theme of Information and structure dominates all the users perceptions of the Web. This is effectively demonstrated by users' responses to the two concluding statements at the end of the Interview:

	Web Characteristics	
Statement	**When I think of the Web I think of …**	**The Web is a …**
Low User	Information Information with no specific form Information	Train Network Spider Web Gaseous Cloud Filing Cabinet Nervous system
User	Accessing information Communicating Information World communication	Forest of Trees Multidimensional String Puzzle Hovering Mass Card Index
Expert User	Complex interlinking information Information Information linked together	Complex interlinking entity Encyclopaedia with less structure and formalism Huge library of cross referenced information

Table 8. Characteristics of the Web.

Thus, although superficially metaphors used may change according to user group, all users are concerned with understanding the central notions of information and how to structure the Web. In this way, what the metaphors are used to convey is consistent for all users groups.

In sum, the results strongly suggest that the metaphors used are consistent across user groups. The high rate of concurrence between Web pictures chosen, the prevalence of metaphors used across all user categories suggest that metaphorical themes are consistent according to experiential use. Furthermore, even when metaphors differ, they are used in different ways to explain the same underlying themes: information and structure.

5.3 Overall Summary

Metaphor is extensively used to describe the Web. The range of metaphors used varies according to level of Web experience. Low users and users use the same number of metaphors, although the metaphors may vary. Once committed to a particular metaphor, low users and users tend to extend it use to explain other things. In contrast, expert users tend to use fewer metaphors than the other user groups and are more likely to explicitly use analogies to explain their ideas. In this way, experts are more likely to use metaphors as communication aids. Users and low users are

more likely to use metaphors as conceptual tools to aid their understanding of the Web. It seems that the range and use of metaphor generally varies according to different levels of Web experience. There is also some distinction in the types of metaphor used. How the Web is conceptualised depends not only on level of experience but the primary use for which the Web is used. Generally, low users use the Web for one main purpose: information searching. They tend to use metaphors of offline searching and accordingly conceptualise the information on the Web as static and fixed. Users however not only use the Web more but also use it for significantly more activities. They see the Web as an information resource. Interestingly, users tend to use competing metaphors: like low users, some envision the information as static and fixed, but others imagine it as amorphous and fluid. Experts tend to use the latter metaphors to conceptualise the Web; the property of interlinking information is paramount. As their job in Web design would suggest, they tend to use metaphors that structure information. These contrasting metaphors suggest that we might not all speak the same metaphorical language. However, the results suggest that there are instances when the same metaphor is used in differing ways according to levels of experience. Moreover, there are a number of metaphors that are consistently used across all user groups. These are dominant themes that are consistent regardless of use and experience. There is strong evidence to suggest that the metaphors used are consistent across user groups. The high rate of concurrence between Web pictures chosen, the prevalence of metaphors used across all user categories suggest that metaphorical themes are consistent according to experiential use. Furthermore, even when metaphors differ, they are used in different ways to explain the same underlying themes: information and structure.

6. Discussion

The current research is an exploratory study that aimed to establish the metaphors people use to represent the World Wide Web and investigate whether these vary according to different levels of experience. It also aims to discuss whether the metaphors we use constrain or enhance our understanding of the Web. Research into the metaphors of the Web is still novel; there have only been two studies and there is not an established research base. It is worth noting therefore that the majority of these findings cannot be discussed in detail with reference to relevant literature.

6.1 Metaphors of the Web (Aim 1).

The primary aim of the study was to explore the metaphors people utilise to describe the World Wide Web. The results suggest that all users do utilise metaphors to describe their image of the Web. In fact, the use of metaphors is extensive. An average of 50 metaphorical references per interview and over twenty different metaphors were used to describe the Web. These range from the mundane to the humorously elaborate [15]. Low users and users especially tended to refer to many metaphors to describe different elements of the Web. Indeed, as Lakoff (1981) notes, the way ordinary people deal with understanding something complex is by having many metaphors for comprehending different aspects of the same concept. Thus, people tend to use clusters of metaphors: each metaphor gives a partial definition of some element of the Web, enabling users to perceive some aspect of the Web that is not apparent in any of the individual views (Lawler 1997). With this in mind, it is unsurprising that the range of metaphors used was related to the level of Web experience. Those with less experience and understanding of the Web were more likely to use metaphors. Expert users tend to use fewer metaphors than the other user groups and were more likely to explicitly use analogies to explain their ideas. This is an important distinction. Analogies are used for explanation; they establish a set of equivalences between well-known and lesser-known concepts. Therefore, whereas analogies are limited statements of equivalence, metaphors are statements of identity (Downs 1981). In this way, experts are more likely to use metaphors as communication aids, whereas users and low users tend to use metaphors as

conceptual tools to aid their understanding of the Web. This suggests that lower skilled Web users need a 'cognitive anchor' to conceptualise the Web while expert users can free themselves of this mental support. This may have applications to Web education and Web commerce. Overall, it is clear that metaphors play a central role in understanding and communicating about the World Wide Web. It is equally clear that these metaphors are largely taken for granted: metaphors have become 'natural' ways of thinking (ibid.). This illustrated by the plethora of instantational metaphor use. Typically, the metaphors of ordinary discourse are transparent, so we pay little or no attention to the metaphorical character of ordinary discourse and the role that metaphor serves. Although experts tended to use less explicit metaphorical references, they still used implicit metaphorical language in describing the Web.

Previous research into Internet/Web metaphors has not investigated the frequency of metaphor use according to level of Web experience. Nor have they made the distinction between explicit and instantational metaphorical use. The results of this study therefore have no referent and perhaps more importantly, they signal the need for further investigation into this complex topic. Previous studies as conducted by Palmquist (1996) and Ratzan (2000) have however found that metaphor is extensively used to describe the Web. These results therefore partially corroborate previous research. Furthermore, Palmquist identified a eight central metaphorical themes in the study of Internet metaphors: travel, buildings, anthropomorphism, commerce, space, frontier, fire/water, animals. The range of metaphors identified in this study fit to a certain extent with Palmquist's findings:

Palmquist Category	Current Example
Travel	Train networks, steps and jumps
Buildings	Library
Anthropomorphism	Secretary
Animals	Spider

Table 9. Comparison of Metaphor Themes

However, it is evident that only half of Palmquist's metaphorical themes were identified in the current research, and where a duplicate theme was identified, the number of examples for each category is limited. In addition, the current research

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[15] See Appendix 11.

identified a number of additional metaphors that can not be divided into Palmquist's categories (for example body, network, hierarchical metaphors). There are a number of reasons why Palmquist's metaphorical themes are not concurrent with the current research. Primarily, it is argued that her central themes are culture specific. For example, it is widely recognised that the 'frontier' metaphor is very a powerful and influential way of thinking in the United States [16]. This indicates that metaphors are used within 'a shared category of meaning' (McLaughlin, 1990: 83). Certain metaphors are used so they can be comprehended, interpreted and communicated within a certain linguistic community (Pavio and Walsh 1993 in Ortony 1993). They are constrained by the available cultural repertoire; that is, the metaphors used will be dependent on resources of linguistic pool. In this way, specific metaphors are used to 'interpret, express, and negotiate meaning within specific contexts' (Kern 2000: 54).

Secondly, Palmquist used a completely different methodology: she explored the metaphors indexed in article titles, whereas the current study elicits metaphorical descriptions from users of the Web. It is widely acknowledged the method chosen for research can directly produce an entirely different result (Hazelrigg 2002). Finally, Palmquist intended to study metaphors of the Internet, whereas the current research explores the metaphors of the Web. The distinction between these two mediums is of importance. Whereas the Internet is a global network of physically linked computers, the spatial geometries and forms of the Web are entirely produced. As there is no physicality to the Web, the ways in which metaphors are used to represent and understand it will vary culturally, historically and individually. The Web is a perfect forum for an infinitesimal number of different conceptualisations of this 'space'. In this way, there may be a consistency of metaphorical use for the Internet, but it may not be so with the Web. This perhaps explains why Palmquist could identify central Internet metaphorical themes. It also explains why the phrase "information superhighway", an Internet metaphor which has appeared often in the mass media, was not mentioned as a metaphor for the Web. In sum, it suggests that metaphors of the Web and metaphors of the Internet may not necessarily be synonymous.

The inconsistency between previous and current research has two implications. Firstly, it arguably illustrates that Palmquist's metaphorical themes are not

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[16] Since the mid-1990s, the rhetoric of the American frontier has become one of the dominant strains in discussions of new computer technologies and their social effects (Reuben 2001).

applicable to the current study: her methodology and topic of study are totally different and thus cannot be used to compare metaphors of the Web. Secondly, it is this inconsistency that demonstrates there are a plethora of metaphors used to describe the Web; these vary according to methodology used and are culture specific: they are contained by the pool of cultural linguistic resources. Fundamentally, users perceive the Internet and the Web in different ways and they utilise different metaphors to describe those environments.

6.2 Do Metaphors of the Web vary according to level of experience? (Aim 2).

The second aim of the study was to investigate whether the metaphors used varied according to levels of Web experience. The results illustrate a general trend for low users to use more fixed, static representations of the Web. This trend decreases with level of expertise, culminating in expert users using more abstract representations to convey the hypertextual structure of the Web. This trend corroborates previous research. Ratzan (2000) found a decreasing relationship between the use of fixed metaphors by novices to experts. It might suggest that the users' metaphors of the Web as a fixed entity changes or evolves as the level of skill increases. Furthermore, this may indicate the lack of comfort level of the low user to conceptualise something amorphously vast and the significant ability of experts to do so. Whether or not this relationship holds for larger samples or for stricter definition of skill level remains to be seen. It seems therefore that the current research generally corroborates Ratzan's previous work and suggests that the metaphors used do vary according to experiential use. The results are important because they suggest the existence of different metaphorical images on the part of differently skilled users. This difference in conceptual imagery may have ramifications for the development of future Web services to target audiences (Ratzan 2000). Furthermore, differing metaphors between professional and lay audiences may be commonplace in areas of specialised knowledge. However, in software design and user instruction it is necessary to translate these metaphors so that they are meaningful to others (Tenopir 1997: 35). If people employ different metaphors when understanding new technologies, the designers of those systems should anticipate and support likely metaphorical constructions in order to ease understanding and use of such system. In addition, designers should provide guidance to new users who may otherwise select inappropriate or inefficacious metaphors (Carroll 1997).

It can be noted however, that beyond this initial similarity, the current results do not generally corroborate Ratzan's findings. The reasons for the lack of concurrence are similar to those identified for Palmquist's results. Ratzan uses a different methodology to investigate Palmquist's metaphor categories, which has already been demonstrated that they are not wholly applicable to this research. The question arises therefore as to why the current study did not extend the metaphorical themes approach. The single greatest weakness of most prior studies was that they could not or did not reveal why users utilised particular metaphors (Gold 1997). Moreover, Bruce (1999) found that type of use can influence the way a person thinks about or mentally constructs models of the system. Indeed, the results suggest that how the Web is conceptualised depends not only on level of experience but the primary use for which the Web is used. Generally, low users use the Web for one main purpose: information searching. They tend to use metaphors of offline searching and accordingly conceptualise the information on the Web as static and fixed. Users however not only use the Web more but also use it for significantly more activities. They see the Web as an information resource. Interestingly, users tend to use competing metaphors: like low users, some envision the information as static and fixed, but others imagine it as amorphous and fluid. Experts tend to use the latter metaphors to conceptualise the Web; the property of interlinking information is paramount. As their job in Web design would suggest, they tend to use metaphors that structure information. Furthermore, there were instances whereby all users, irrespective of experience, utilised the same metaphor - 'Web as a book'- but the metaphor was used to convey different things for each user group. It is evident therefore that each user group is using the same metaphor but to refer to different aspects. It is arguable that it is insufficient to merely analyse the superficial metaphorical themes because the reason for using each metaphor varies. It suggests that we use metaphors in different ways in order to convey different things. It attests to the functional nature of metaphor: particular metaphors are used to convey a particular meaning that is context dependent (Ortony 1993). In this conceptualisation, metaphor is performative and action-orientated: metaphors are used to achieve particular goals rather than merely reflecting themes. Furthermore, while the quantitative analysis of metaphors reveals general metaphorical themes, the full potential of metaphor analysis can only be reached when combining it with a qualitative approach. The qualitative approach enables the analysis and understanding of metaphor use in context (Moser 2000). In sum, this research tried to overcome the limitations of previous research and reflects an original attempt to

analyse the uses of metaphors. Once again therefore, these findings do not have any referent to which they can be compared.

Finally, in sharp contradiction to Ratzan's and Palmquist's earlier findings, the current study found a number of metaphors that were consistently used irrespective of Web experience. The results more strongly suggest that there is some concurrence of metaphors used across user groups. The high rate of concurrence between Web pictures chosen and the prevalence of navigational and hierarchical suggest that metaphorical themes are consistent according to experiential use. Furthermore, although the metaphors might change, all users are concerned with trying to represent how information is structured and ordered. This finding is concurrent previous literature that suggests that there are two common ways of conceptualising the Web; an emphasis on an information store and an emphasis of connectivity, structure and networks (Bruce 1999). Even though metaphor themes may not vary, it is still evident that users utilise metaphors to describe and understand the Web. It still points to the need for designers to embed users' metaphorical notions into their design in order communicate a cogent model of the Web to the user (Lindeman 1991 in Palmquist 1996).

In sum, the results are inconclusive as to whether there is a relationship between patterns of metaphor use and level of Web experience. Although there is a general trend for low users to use more metaphorical references to the Web as a fixed entity, there is also strong evidence to suggest that all users utilise the same metaphors. Further investigation is needed to establish whether metaphorical use varies according to level of Web experience.   These results largely do not corroborate previous research. The inconsistency is partly due to differing methodologies and research foci in an area that has yet to receive much attention.   Thus, it not suggested that the current results are any more or less accurate than other studies. In fact, there are a number of limitations associated with this study that will have affected the results obtained.

Limitations and Further research

The present study incorporates both novel methodology and novel analyses. It is obvious therefore that this research embodies a number of limitations. Firstly, with data from just nine participants it is acknowledged that the scope of this research is

limited; different metaphors might be found if the sample was larger. Indeed, it is not claimed that these results are generalisable to any population of Web users. In fact, it is recognised that the metaphor themes and patterns of use as presented here might not be replicated, for it is acknowledged that the metaphors used are constrained by the users cultural repertoire. Furthermore, the sample obtained were far from a representative sample of users from each category. Out of the nine participants, only three were not students and all have degree level education. There is evidence to suggest that one of the most important factors facilitating Web access is education level: 40% more of those with graduate level education will access the Web than those with lower levels of education [17]. It seems therefore that the current sample are more likely to use the Web and hence may have a greater understanding. This is perhaps reflected in the fact that low users and users seldomly referred to the more expert metaphorical representations of the Web as abstract interlinking entity.

Another limitation of this study is the interview schedule. Although the interview questions were developed from a number of pilot studies, it is self-evident that they need further refinement. Firstly, how questions were phrased might have elicited certain responses. For example, the fact that experts used analogies to explain certain Web phenomena could be partially explained by manner in which the question was phrased. Expert users might have thought they needed to use analogies to explain concepts to the researcher. More importantly however, there is a need for a greater range of questions. Indeed, it is unsurprising that two main themes of information and structure were found given that these were two of the central sets of questions asked. In addition, when the interview was primarily devised, the question of Web use was thought to be superfluous to the more central themes. It was not anticipated that this would become the crux of the analysis. Future research therefore would need to extend this part of the analysis and possibly include questions covering the differences between scanning (covering large are without depth), browsing (following a path until a goal is achieved), searching (explicit goal search), exploring (finding the extent of information and wandering (unstructured search) (Dodge and Kitchin 2001).

The most novel and unique part of the methodology was to incorporate the use of pictures into the design. This was based on a justified rationale that the pictures would be a powerful way to understand and conceptualise the Web; ways that may

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[17] http://216.110.169.143/Books/Challenges%20for%20New%20Century/Gifs/Fig_21.htm 4/5/02

be limited by mere description. There are a number of dis/advantages associated with this technique. Primarily, it was hoped that by getting participants to think about their picture of the Web, it would promote deeper thinking of topic prior to interview. This would ensure that the participant is prepared to fully discuss issues surrounding the Web. Indeed, some participants noted that the interview fully developed their ideas:

> *I found that the interview … really made me stop and think. When I drew my picture some of the questions really made me question whether I really think of it like that*

<div align="right">(Low user 1: 375-378).</div>

Hence, the probing nature of interview calls for some preparation time. However, it is this preparation element that becomes a significant disadvantage of the technique. It arguably may hinder the spontaneity of the interview processes and furthermore, participants' representations may be biased by information looked up prior to the interview. This technique involves a high level of commitment meaning that it is especially hard to persuade people to participate. Moreover, there may be a sample bias, for those who are willing to participate already have some interest in the Web.

The final criticism of the technique centres around the issues of drawing and discussing Web representations. Firstly, there was no rationale for choosing the specific analyst Web representations. It seems that these pictures presented two main themes (as demonstrated in Table 7), and thus did not really present a full diverse range of Web representations. These pictures should have been more fully tested in the pilot studies. Future investigation could extend and explore the uses of Web representations more fully. Secondly, it is arguable that drawing Web pictures elicits certain kinds of metaphors. Furthermore, the picture drawn was not always synonymous with the metaphors used throughout the interview. For example, one low user drew a picture of a train network, but repeatedly referred to the Web as a filing cabinet. Out of the fifteen pictures drawn, only three pictures were same as metaphors used to describe the Web. This may be explained by a distinction between pictures of the Web and metaphorical pictures employed to search the Web. Future research could incorporate this distinction and fully explore why the drawn pictures do not wholly represent what is described.

Thirdly, the results suggest that the drawn picture actually constrained the metaphorical visualisation. Indeed, as Tufte (2001) notes: 'the world is complex, dynamic, multidimensional; the paper is static, flat. How are we to represent the rich visual world of experience and measurement on mere flatland?'. Finally, the results suggest that not all users conceptualise the Web visually:

> *Well for me when I think about the Web I don't really visualise it in my head. When I'm searching I don't visualise what it looks like, but if you were to ask me to describe it of what I think it looks like I visualise it as ... a train network*

<div align="right">(Low user 1: 62-66).</div>

The question arises therefore the extent to which the interview process merely brings often tacit metaphors to the fore or whether these metaphorical visualisations are artefacts of the research.

There is a great deal of scope to extend and modify the research conducted thus far. The methodology could be infinitely refined to include many aspects that have been highlighted as a result of the exploratory study. For example, future research could explore the use of colour in the Web representations. The results could be analysed using more advanced methodological tools (e.g. Q-Sort). The methodology could be extended further to include a follow up interview to investigate whether users' perceptions of the Web have developed or been modified as a result of the initial interview. This would have significant implications for Web education. Finally, it would be interesting to explore researchers' conceptualisations of the Web. The research process could include a textual analysis of the main research to investigate the use of metaphors utilised by researchers, or indeed, those developing a metaphorical model to implement to aid Web navigation.

It is evident therefore that there are a number of limitations inherent in this research. However, it is important to keep in mind that the present study incorporates both novel methodology and novel analyses in a field that is yet to find an established research base. Although it is easy to find criticism, it is hoped that the research has begun to demonstrate that penetration and use of metaphors is significant with regard to the World Wide Web. Indeed, the final aim of the study was discuss whether the use of metaphor enhances or constrains our understanding of the Web.

6.3 Do metaphors enhance or hinder our understanding of the Web? (Aim 3.)

6.3.1 Metaphors Enhance our Understanding

There has been a rapid expansion in computing metaphors as the Web has grown and changed. As computing technology advances at a rapid pace, it is imperative for those affected by it to understand the key concepts and tools involved. In such a situation, overtly metaphorical language is likely to be particularly in evidence (Dowling 1996). We tend to use metaphor to make the technology meaningful by representing it in recognisable ways (Hine 2000). They are especially appropriate for understanding complex concepts that evade formal definition. Metaphors are especially appropriate for conceptualising the Web, for it is such a new technology. Metaphors play a vital role in helping us to make sense of unfamiliar situations. To appropriate an image from Wittgenstein (1961 in Grey 2000) metaphor is a ladder of cognitive ascent, which can be kicked away after the vista it has exposed is revealed. Through metaphor, an unfamiliar technology is structured and categorised usefully, and the metaphor provides a framework for understanding and exploring a novel situation (Grey 2000).

Metaphor is the vehicle of insight. It initiates and extends understanding through the formation of new conceptual connections (Encycl. of World Problems and Human Potential 1994). In this way metaphor creates rather than reflects similarity (Dowling 1996). 'Many of our activities are metaphorical in nature .. [these] metaphorical concepts structure our present reality…New metaphors have the power to create a new reality' (Lissack 1997: 294). Indeed, the importance of metaphor in relationship to creativity, whether in the arts or the sciences, has been frequently noted (ibid.). Metaphor enables us to generate new meanings from old (Grey 2000). Metaphorical extension forges and reshapes concepts and thereby modifies language so that it comes to embrace an ever wider and more complicated repertoire of referents and activities (Moser 2000). Metaphor, then, is not an alternative way of expressing common sense but a common way of achieving new sense (ibid.).

Metaphors enable us to understand technologies (Coyne 1997). The Web is a complex technology that is hard to comprehend and mentally visualise. Through metaphors, we build up cognitive map to represent our navigation through cyberspace. Metaphors help us formulate 'configurational knowledge; that is, knowledge of the associations between and relative locations of places' (Kitchin

1994). 'This is very important for the users in cyberspace - with a unified layout people can remember where they are and what's around them. Without this, people will find cyberspace rather disorientating and discontinuous' (ibid.: 172). These metaphoric visualisations are important creative works providing a critical way in which to think about the Web. They are also of particular relevance because they are a source of inspiration for users and 'blueprints' for designers of cyberspace.

Current metaphors used to describe the Web are limited, simply because it is too complex a phenomenon to be fully contained by any one metaphor. However, the search for one definitive Web metaphor is ultimately futile and ill-fated (Sullivan 1997). Indeed, as Lakoff (1981) notes, the way ordinary people deal with understanding something complex is by having many metaphors for comprehending different aspects of the same concept. Using differing metaphors simultaneously should not be seen as competing or confusing, rather complimentary; each gives a partial definition of the Web. In this way, metaphors are especially powerful in enabling users to perceive some aspect of the Web that is not apparent in any individual views (Lawler 1997).

Finally, metaphors are effective sources of communication (Dodge and Kitchin 2000). Once a concept has been formulated, it usually has to be communicated to people and groups who are unfamiliar with the specialised jargon in which it is embodied . In such a situation, metaphor can be called upon to convey the essentials of the concept (Encycl. of World Problems and Human Potential 1994). In sum, metaphorical associations provide a conceptual seed from which a more detailed description of the Web could grow, helping to explain a number of features which were formerly puzzling. When the Web is interpreted with the help of a useful metaphorical frame, insight and understanding of its unusual characteristics immediately follow (Grey 2000). It is also a tool of discovery, providing a way of imposing or discovering structure within novel or unfamiliar situations (ibid.). Overall, it is evident that metaphors play a central role in understanding and communicating about the World Wide Web.

6.3.2 Metaphors Constrain Our Understanding

There is little doubt that the Web represents a genuinely revolutionary technology. Throughout history, technologies that substantially increase the amount of information available, and lessen the burden of its distribution, have had a

fundamental and irrevocable impact on our everyday lives (Sullivan 1997). Furthermore, 'these new technologies seem to offer the possibilities for recreating the world afresh' (Robins, 1995: 153); a realm of 'it-can-be-so' over 'it-should-be-so' (Novak, 1992: 226). However, despite being able to have any form desired, many adopt standard metaphors to aid understanding, navigability and usage (Dodge and Kitchin 2001). In addition, problems arise through the application of spatial (and often linear) metaphorical representations (Tauscher and Greenberg 1997). Hypertext navigation is rarely linear in practice yet users often apply metaphors of the physical environment such as employing stepwise path following which enables users to retrace their path one page at a time. There is evidence to suggest that representing the 'Web' in spider diagram fashion is not most efficient way of thinking about and navigation through the 'Web' (Chen 1999). It seems therefore that although the technological capacity for revolution exists, the metaphors through which technology is understood and used in everyday settings remains in the present (Hine 2000). Furthermore, these metaphors are not necessarily the best way to conceptualise the Web. Perhaps the Web is truly is 'limited by man's imagination' (User 3: 249).

Metaphor is deeply rooted in and supports the social context in which the individual and the language operate. It reinforces and conserves commonly held beliefs and intuitions about how the world works. In this way, a compelling image can shape and constrain understanding (Dowling 1996). For example, the use of the 'library' metaphor considers only what is possible with specific types of technology, and then restricts the meaning of the metaphorical referent to that narrow conception. That is, we do not see the technology as restricted because we redefine the social phenomenon to include only what is technically possible (Ackerman 1994). Maintaining a consistent extension of one metaphor may blind us to aspects of the Web that are ignored or hidden by that metaphor (Lakoff 1981). The implications of this are twofold: firstly, it may be more beneficial to conceptualise alternative metaphors even at the expense of completeness and consistency. Secondly, users need to be aware of their metaphors, to be concerned with what they hide, and to be open to alternative metaphors even if they are inconsistent with the current favourites. (ibid.) Indeed, all participants seemed to have awareness of the limitations of the metaphors that were being used.

'I want to say the Web is a tree but that means it has roots and its stuck there and its not going to move, but I don't want to say that because the Web isn't 'there' ... I don't want it to be rooted somewhere ... I do still think its like a tree its just not like what you would automatically think of as a tree, the different components of a tree stuck in a ground with roots. I don't see it as that kind of tree, it's a tree in the sense that it branches and that things are linked together its not ... a tree in the physical sense'

(User 1: 376-382).

'You could think of it as a library with the addition that every page might have a reference to another page in another book. That would probably be the closest analogy but that's nonsensical because it doesn't exist'

(Expert 2: 270-273).

Indeed, the expert users noted that metaphors are unnecessary ways of thinking about the Web:

'The Web [is] such an important part of my life there is no parallel with anything else, the Web just 'is' ' ... its an important enough thing in my mind for it to be self existing in its own right'

(Expert 2: 229, 339).

It is in the nature of all revolutionary technologies that they stubbornly defy description in terms of prior technological artefacts (Sullivan 1997).

Finally, although metaphors help to illustrate a point, the associated meanings often confuse issues (Open University 1974).   In the current research, there were at least two issues that were confusing to participants: the confusion between electronic and semantic linking, and semantic structuring.   In this way, the metaphor can be stretched too far. It suggests that metaphor is not the best vehicle for understanding complex issues.   So while the metaphor allows for some furtherance of understanding, it does so only in a limited and particular way (Scheiderer 2000). '[Metaphors] can be dangerous 'the suggestions they make are often the source of profound error that could otherwise have been avoided' (Leatherdale, 1974: 181).

In sum, metaphors are powerful tools to help the uninitiated understand the complex, but become unnecessary for those who have Web expertise. Metaphors can be

limiting, confusing and constrain creativity. The implications of this are twofold; the metaphors people invoke will drastically affect the success with which users are able to understand and use the Web. One solution might be to make the metaphor optional: to implement metaphorical graphical user interfaces for the novice, but have optional non metaphorical ones too. More importantly however is the idea that either new, more detailed metaphors need to be introduced or the metaphorical approach may have to be abandoned in favour of a more literal one (Carroll and Thomas 1982). A better solution is to use metaphors sparingly. Rather than reinvent the real world, designers might try to refine the new conventions and metaphors of technology itself (Sullivan 1997). As more users become comfortable with the Web, perhaps we should abandon the search for a metaphor and embrace the new technology on its own terms.

Despite the inherent limitations of any metaphor, this research holds that the importance of metaphor can not be underestimated. A person's expectations and assumptions about how an online system works and what it can (and cannot) do come largely from this metaphor (McAdams 1995). A less radical solution therefore is not to abandon metaphor altogether, but to explore and generate 'successful' metaphors of the Web. Madsen (1994) has developed a set of criteria that deem whether a metaphor is useful [18]. Successful metaphors have a rich structure that generates additional related metaphors. Furthermore, a metaphor must have suitable relation to that which it is intended to metaphorise; the metaphor must retain some congruence with the source (Carroll and Thomas 1982).

As Hunt and Doherty (1995) note: 'we are throttling forward into 'how should we name this tool?' when nobody has really bothered to answer 'why should we?' '. It is hoped that the current research illustrates that it is good that we are throttling forward, wondering about how we should make sense of virtual space, contemplating what sorts of metaphors we should use to construct them. This concern is what keeps the metaphors from being naturalised and excluding other conceptualisations. It keeps the map from becoming the territory. It matters because

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[18] Richness of Structure: requires that the metaphor provide a variety of associations to meaningful other ideas or concepts. Applicability of structure: requires that the metaphor provide a structure of associations that is not misleading to the user. Suitability of metaphor to an intended audience. Well understood meaning for the audience.

metaphors control how we conceptualise cyberspace. They control and hide; they legitimate certain cultural experiences while excluding others. In this way we can draw a multitude of maps, each that give multiple ways of thinking about the Web.

Conclusion

Metaphors are a necessary component in the user conceptualisation of the Web. The results are inconclusive as to whether there is a relationship between patterns of metaphor use and level of Web experience. Although there is a general trend for low users to use more metaphorical references to the Web as a fixed entity, there is also strong evidence to suggest that all users tend to utilise the same metaphors. Further investigation is needed to establish whether metaphorical use varies according to level of Web experience.

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Appendix 1 : Types of metaphor

From: Shipley (1970), Sommer (1995)

- An **absolute metaphor** is one in which there is no discernible point of resemblance between the idea and the image. Example: "We are the eyelids of defeated caves." (1).
- An **active metaphor** is one which is relatively new and has not become part of everyday linguistic usage. The audience knows that a metaphor has been used. Example: "You are my sun." (2).
- A **complex metaphor** is one which mounts one identification on another. Example: "That throws some light on the question." (1).
- A **compound metaphor** is one that catches the mind with several points of similarity. Example: "He has the wild stag's foot." This phrase suggests grace and speed as well as daring. (1)
- A **dead metaphor** is one in which the sense of a transferred image is not present. Example: money, so called because it was first minted at the temple of Juno Moneta. (1)
- A **dormant metaphor** is one in which its contact with the initial idea it denoted has been lost. Example: He was carried away by his passions. Here, it is not known by what was the man carried away. (2).
- An **extended metaphor** is one that sets up a principal subject with several subsidiary subjects or comparisons. Example: President Lyndon B. Johnson's inaugural address pictured America as "the uncrossed desert and the unclimbed ridge...the star that is not reached and the harvest that's sleeping in the unplowed ground." (2).
- An **implicit metaphor** is one in which the tenor is not specified but implied. Example: I'm burning. Here, burning passion is implied. (1).
- A **mixed metaphor** is one that leaps, in the course of a figure, to a second identification inconsistent with the first one. Example: Clinton stepped up to the plate and grabbed the bull by the horn. Here, the baseball and the activities of a cowboy are implied. (2).
- A **root metaphor** is one which is basic or pervasive in human thought. Example: the thread or cord (spun and cut by the Greek Fates, worn by Parsi and Hebrew) Here, one's cultural background determines metaphorical understanding. (1)

Other scholars have placed metaphor into several theoretical categories (Ortony, 93; Lakoff & Johnston, 1980). Some common examples appear below:

Metaphor Type	Textual Example
Spatial	I fell into a depression.
Ontological	A mind is a terrible thing to waste
Personification	Life is cheating me
Metonymy	She's into dance
Synecdoche	Cars are choking our roads
Literal	The Turnpike is very heavy this morning
Homonymic	I am in the room and I am in love
Poetic Embellishment	She was my English rose

Table 10. Metaphor Types.

Appendix 2: The Distinction between the Internet and the Web

Internet

At the most basic level, 'the Internet is a way of transmitting bits of information from one computer to another' (Hine 2000). The Internet consists of a global network of computers that are linked together by 'wires'. Each linked computer resides within a hierarchy of networks; the sum of these nodes and all their connections forms a *physical network* that enables people to communicate and share information (Dodge and Kitchin 2000).

Web

The Web might best be described as a collection of interconnected multimedia pages containing text, graphics, audio bites and video clips [19]. It is a large, distributed repository of information whereby people use graphical browsers to navigate through links to view Web pages' (Tauscher and Greenberg 1997: 97).

Internet vs. Web

Although there are a number of distinctions between the Internet and Web (Berners Lee 1998), the most relevant difference will be discussed here. Whereas the Internet is a global network of physically linked computers, the spatial geometries and forms of the Web are entirely produced. In this way, there is no physicality to the Web. Indeed, Tim Berners Lee – the creator of the Web notes; 'it is an abstract (imaginary) space of information. On the Net, you find computers – on the Web, you find information. On the Net, the connections are cables between computers; on the Web, connections are hypertext links' (ibid.).

Why is this important?

As there is no physicality to the Web, the ways in which we use spatial metaphors to represent and understand it will vary culturally, historically and individually. The Web is a perfect forum for an infinitesimal number of different conceptualisations of this 'space'. The difference between the Internet and Web is a significant one for the study of metaphorical representations.

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[19] Your Dictionary http://www.yourdictionary.com/diction3.html 6/12/01

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Appendix 3: Rationale for User Category Definitions

From: http://www.commerce.net/research/stats/wwstats.html

Online Population

By the end of 2002, it is estimated that there will be over 490 million online users world-wide. In Europe alone, there are over 100 million Web users. It is predicted that one in three Europeans will embrace a digital lifestyle by 2003.

Average User Profile

- Average age is 32
- 61% of users are male

Compare this to the sample profile in Table 2, in which the average age is 30.65, 45% of users were male.

Average Web Use

From: http://Webdesign.about.com/cs/statistics/index_2.htm

This data was collated from NUA Survey of over 10,000 users between October 10, 1998 through December 15, 1998.
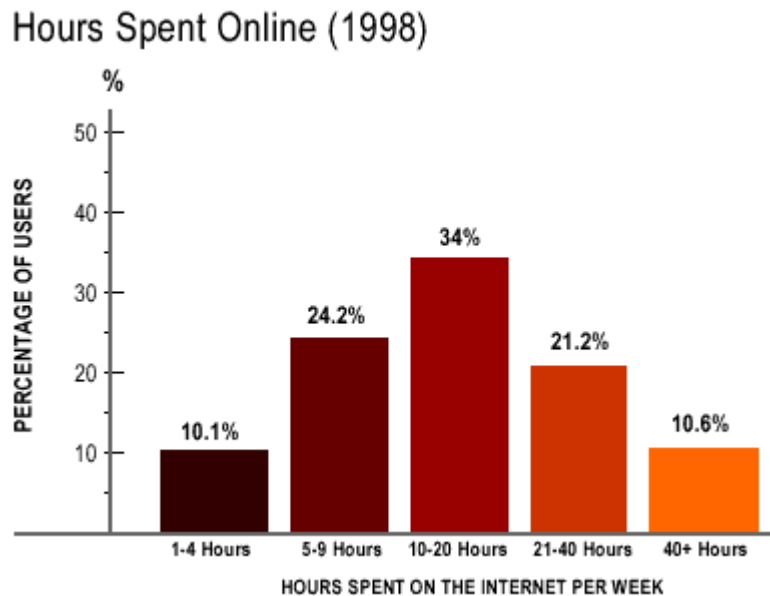

Figure 1. Hours Spent Online

Although above statistics are from 1998/9, recent statistics show same trend. Approximately 10% of users use the Web less that 4 hours a week. Similarly, approximately 10% of users use the Web for more than 40 hours a week. The average user uses the Web about 20 hours a week.

User Categories

These statistics were the basis of definition of the sample user categories.

Low User
With over half the UK population using the Web, it was extremely difficult to find participants who had not encountered the Web. The statistics show that only 10% of Web users use the Web for less than 4 hours. In this research, the low user participants only used the Web for one hour a week.

User
In this study, the average user category was defined in concordance with the average online use: 20 hours a week. The sample obtained in this study, although small, seem to reflect the average Web user.

Expert user
Reflecting the statistics, the expert category was defined as using the Web for more than 40 hours a week. In this sample, the experts used the Web for an average of 70 hours a week. This was mainly because the experts have a job in Web design and development. However, after work hours they still continue to use the Web.

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Appendix 4: Interview Schedule [20]

General Introductory Questions

How often do you use the Web?
Has the Web become a part of your everyday life?
What do you mainly use the Web for?

Searching the Web

What do you do when you search for information on the Web?
How do you find the information you are looking for?
How do you understand your own searching process?
Do you have a particular style of searching?

Mental Representations of the Web

How would you describe the Web?
Do you have an overall mental picture of what the Web looks like?

I have asked you to draw a/some picture(s) that best demonstrate how the Web appears to you. Can you go through it/them and explain how and why it/they represent the Web to you.

Probing questions to extend their own ideas

If drawn more than one picture, ask how the two pictures fit together?
Is there an overall theme (across the pictures)?
What is it that symbolises the Web?
Where are you in relation to the Web?
Do you interact with the Web? If so, how?
Is the Web static or dynamic?
Is the Web bounded?
What is the Web? What is the Internet? Are they different/the same?

Linking Web pages

Do you connect Web pages together in any way?
If so, can you describe how you do?
How are different Web pages linked?
Do you have a mental picture of how Web pages are linked?

Structuring Web pages

Does the Web have a structure?
When you think about the Web, do you give it a structure?

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[20] Order and specific phrasing of questions depends on participant's response and course of interview.

How would you describe that structure?
Is it useful to give it a structure?

Other representations of the Web

How do you think other people might imagine the Web?

I've got some pictures here of how other people have conceptualised the Web.
If you wouldn't mind, could you please take a little time and go through each of
them. If one jumps out at you can you explain why the picture is similar to your
own mental picture of the Web, or if none of them are similar can you explain
why they don't represent the Web.

In the pictures you have identified as similar, can you describe to me why they
are alike?
Is there a theme across these pictures?
Is there anything in these pictures that doesn't fit with your idea?

In the pictures you have identified as dissimilar, can you describe to me why
they are unalike?
Is there a theme across these pictures?
Is there anything in these pictures that does fit with your idea?

Summary Questions

Basically to sum up, can you summarise your basic idea or picture of the Web?

The last thing I have for you is for you to complete two statements for me:
'When I think of the Web I think of …'
'The Web is like a …'

That's the end of the structured interview. Is there anything you feel you would
like to add or discuss further?

Additional Questions for 'Expert' Users:

Is there a 'best way' to search for information on the Web?
When designing Web pages, is there a 'best way' to link them?
How do you decide what is the best way to link them?
When designing Web pages, what things do you have to take into account?
Is there any type of structure that you use developing a new Web page?
Is there any type of structure that you use to link between different Web pages?

Appendix 5: Web Pictures

From : Atlas of Cyberspace http://www.cybergeography.org

The 'Atlas of Cyberspace' provides graphic representations of the geographies of the World Wide Web created by analysts from many different disciplines. Some of the 'maps' use familiar cartographic conventions, however many are much more abstract representations. Six pictures were selected for participants to discuss. They were chosen as they represent a broad cross section of the representations from this source. These pictures are presented below.
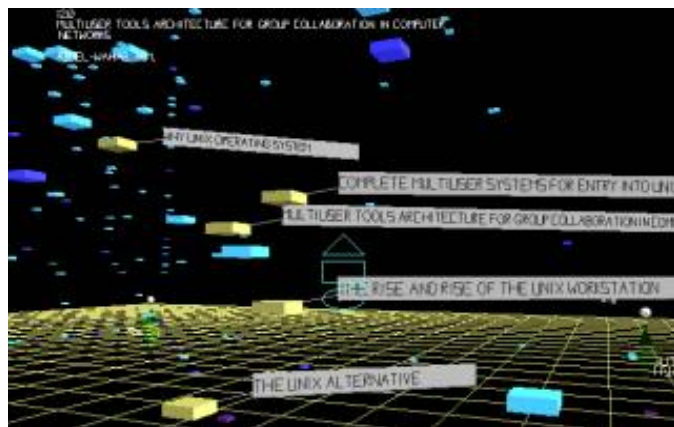
Note: In order to conserve space, the pictures below have been minimised. In the Interview Procedure, these pictures were blown up to A4 size. This ensured the participants saw the picture in enough detail to fully discuss it.
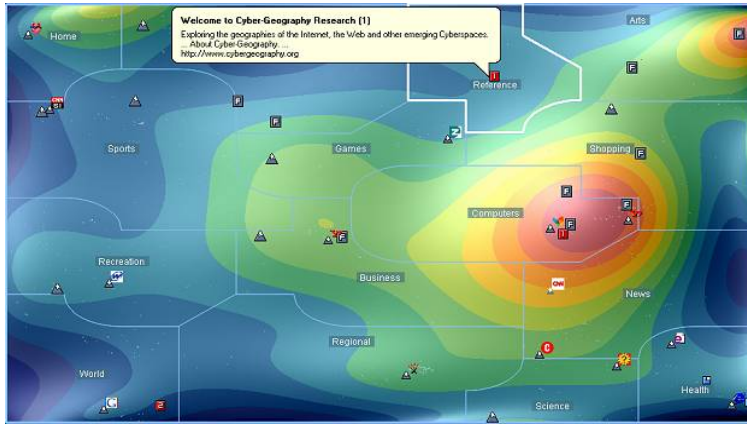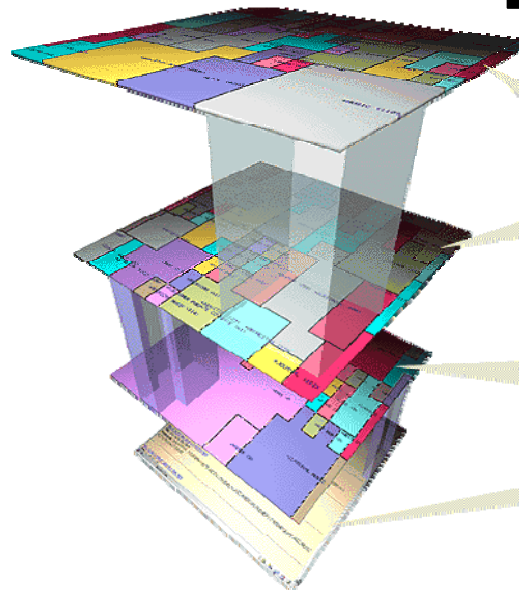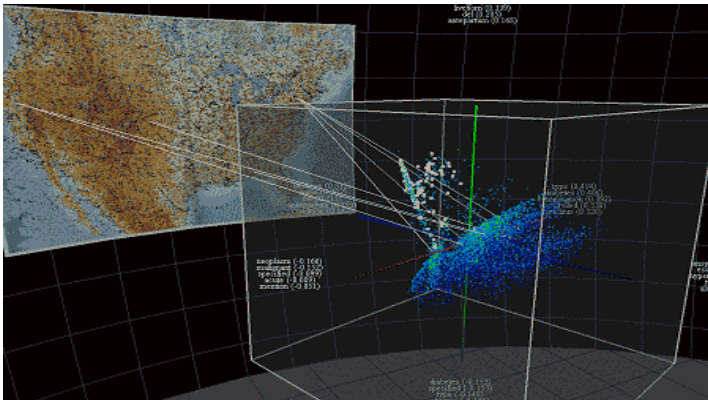
Figure 2. Web Pictures

1.
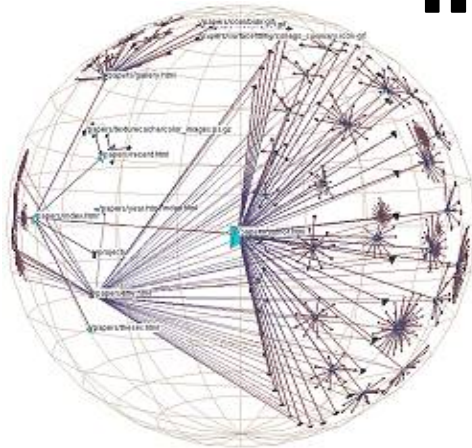
2.
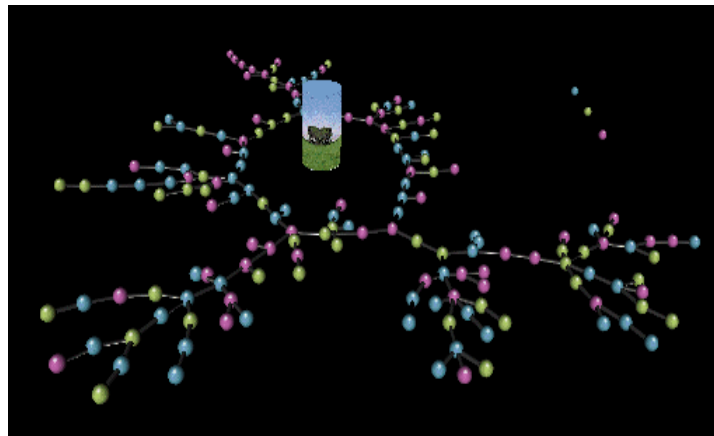
3.

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6.

Appendix 6: Participant Information Sheet

> Research Project – Understanding the Web

Q. What is this project all about?

A. The Web is everywhere. Popular films such as 'The Matrix', television commercials advertising Web site addresses, email and e-commerce would all indicate so. It seems the growth of the Web today has exploded into the latest craze. Everyone from academics to the popular press, from politicians to scientists, are noticing the massive changes taking place as the Web permeates every aspect of our lives.

The World Wide Web enables anyone to access a multitude of information at the click of a button. In just nine years since its debut, the World Wide Web has millions of users and this number is growing rapidly. The aim of this study is to simply investigate how people use and understand the **World Wide Web**.

Q. So, what do I have to do?

A. Prior to an interview, you will be asked to draw a picture or pictures of how you imagine the World Wide Web. These pictures don't have to be works of art, but you do need to be able to discuss and explain them. During an interview, which should last anywhere between 30-45 minutes, you will be asked to discuss how you use and understand the World Wide Web. It does not matter how much experience you have had using the Web – it is your opinions/views that matter.

Q. Will my answers be confidential?

A. The discussion will be tape recorded, but following transcription it will be erased, ensuring your anonymity and confidentiality. If you agree to participate in the study, you have the right to withdraw at any time for any reason.

Please do not hesitate to ask if you have any further questions. Thank you in advance for your time and patience.

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Appendix 7: Consent Form

Research Project: Understanding the Web	Consent Form

Name:……………………………………………………………………………

Please circle response

<u>Have you:</u>

Received enough information about the study?   Yes / No

Had an opportunity to ask questions about the study?   Yes / No

Received satisfactory answers to all your questions?   Yes / No

<u>Do you understand:</u>

What your participation in the study will involve?   Yes / No

That you are taking part on a voluntary basis?   Yes / No

That you will remain anonymous throughout the study?   Yes / No

That you have the right to withdraw from the study at any time?   Yes / No

I agree to take part in the above study

Signed …………………………………   Date ……………………………....

I agree for my interview to be tape-recorded for transcription on the understanding that the recording will be erased immediately following transcription.

Signed..   Date ....

Signed (researcher) ………………………………….

Date……………………………..…………………….

Appendix 8: Pilot Studies and Modifications

Pilot Studies

1. Between 12/8/01 to 28/8/01 an initial pilot study was conducted. It aimed to test the preliminary questions compiled for the Interview Schedule. It largely followed the method and procedure as outlined in this report, but with obvious omissions. Two participants (all in the user category) were interviewed and their interviews were transcribed. The preliminary results suggested that metaphorical descriptions were not being effectively elicited. Consequently, the pilot study prompted a more in depth search for more effective techniques to elicit metaphorical descriptions.

2. Between 14/11/01 to 21/11/01 a further pilot study was conducted. The study incorporated two major changes. Firstly, it contained modifications and additions to the Interview Schedule. Most notably, the schedule was changed so that it began with some general introductory questions to ease the participant into the interview. It also had a number of questions added: especially concerning the relationship between the user and their representation (Where are you in relation to the Web? Do you interact with the Web? How?). The most radical modification however was the partial incorporation of a new technique: ZMET or Zaltman Metaphor Elicitation Technique (The rationale for this can be found in Appendix 9). The study was modified so that participants would be asked to find a number of pictures prior to the interview and discuss these during the interview. Two participants (one 'user', one 'expert' user) were interviewed and their interviews were transcribed. The preliminary results reflected that the technique significantly enhanced the elicitation of metaphorical descriptions. However, as there is a growing body of literature on the Web about Web representation, the participants searched the Web for this information and provided pictures that analysts have compiled. It was thought therefore that participants might just mirror existing Web representation rather than think about their own. It was thought therefore that data might be even more enhanced if the participants actually drew their own pictures rather than select from images off the Web. In addition, it was thought that it might be effective if participants discussed the representations compiled by other users and compare them to their own representation. By discussing the dis/similarities between the pictures, this would act as a tool to concretise their own ideas.

3. A final pilot study was conducted between 29/11/01 to 14/12/01. It incorporated all the major changes that were a consequence of the previous pilot. Prior to the interview, two participants were asked to draw a picture(s) of how they imagine the Web. The interview was conducted as normal, but at the end, each participant was asked to describe a number of other peoples' representations of the Web. This turned out to be a very effective method and it significantly enhanced the metaphorical descriptions elicited. This pilot study became the standardised methodology for the current research.

Appendix 9: Drawing Pictures Rationale

The original idea for asking participants to draw pictures stemmed from the Zaltman Metaphor Elicitation Technique (ZMET):

ZMET Technique

Developed by Gerald Zaltman (1990), The Zaltman Metaphor Elicitation Technique (ZMET) is a patented research tool based on the idea that narrative and metaphor are central to human communication. Each participant is asked to collect and bring a number of pictures that metaphorically represent attitudes about research topic to the interview. Pictures can come from many sources such as family albums, catalogues, magazines, or photographs taken specifically for the interview. It is essential that people seek or collect their own pictures rather than select from images provided by a researcher. Most participants report spending about six to seven hours over several days thinking about the assignment and locating pictures. Thus they arrive for their interview at an advanced stage of thinking. The interview takes approximately two hours and involves several steps carefully designed to engage different aspects of a customer's thought process and allows deep, often hidden ideas to emerge. The interview procedure increases the likelihood of uncovering important ideas, provides convergent validation for ideas, and permits an assessment of their salience to participants. Thus, this technique, based on current thinking in several disciplines, helps people discover their own deep thoughts and feelings and the associations among them (Harvard Business School).

Rationale for using this technique

Cognitive scientists emphasise that human think in images as well as words (Kosslyn 1980 [21]). However, most research uses words, not images: It relies on surveys, questionnaires, and focus groups. Most research tools therefore are 'verbocentric'. In this way, 'people can give us only what we give them the opportunity to provide," (Zaltman). This technique enables the participants to present their mental representation in a visual format. This is beneficial for two reasons. Firstly, not all metaphors are linguistic or can be iterated in linguistic form (Ortony 1993). Secondly, due to the hypertextuality of the Web, it is a space that is hard to comprehend. A powerful way to understand and conceptualise the Web is to visualise it through graphical representation. Moreover, these visualisations convey meaning (Dieberger and Frank 1998). In this way, participants are able to represent their idea of the Web that other wise might be hard to describe.

Although the part of the technique was borrowed, it was modified for the current study. As there is a growing body of literature on the Web about Web

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[21] Kosslyn (1980) asserts that visual memories are stored in an abstract, propositional format. An image is formed in order to make accessible information about the local geometry of a shape. From this perspective, when images are created, they will literally be "pictures in the head."

representation, it was feared that participants would search the Web for this information and provide pictures that various analysts have compiled. It was thought therefore that participants might just mirror existing Web representations rather than think about and develop their own. It was thought therefore that data might be even more enhanced if the participants actually drew their own pictures rather than select from images off the Web. However, the importance of other representations of the Web is not undermined. Recall in the Introduction it was noted that metaphors are inevitably influenced by our experience of media characterisations of such technologies (Bruce 1999). To acknowledge this, the study incorporates a selection of representations provided by various analysts. By discussing the dis/similarities between the pictures and the participants' own ideas, this would act as a tool to further develop and concretise their own ideas. It can be noted that this section of the interview was deliberately conducted towards the end, for it meant that participants had already enunciated their own ideas fully. This ensured that participants were not overly influenced by the other representations.

In sum, by using a combination of both drawing pictures and discussing other representations of the Web, the research built upon 'the inherent nature of the mind to construct and manipulate mental images and use them to inspire creative thought' (Sam 1999: 49).

Appendix 10: Interview Questions Rationale

The Interview Schedule was formulated around a number of themes: two that are central to any study of the Web and one that is central to the metaphorical study of the Web.

Searching the Web

According to Waller (2001) 95% of users use the Web for information searching. The notion of searching for information is central to any study of the Web. Furthermore, information scientists have long been interested in what people think when they search for information (Bruce 1999: 187). By asking users to describe how they understand and visualise information on the Web, it was thought that a number of important metaphors would be elicited.

Linking/Structuring Web pages

Another key characteristic of the Web is its hypertextual, amorphous nature. It is an entity that is hard to comprehend. Thus, the ways in which participants metaphorically structure the Web is a key endeavour for this study.

Mental Representations of the Web

This is the central notion of the study and thus these questions are axiomatic to a study of Web metaphors. The probing questions to extend the participants' ideas were formulated from the numerous pilot studies. After briefly analysing the transcripts from the pilots, the most common themes that arose were formulated into questions.

Appendix 11: Elaborate Metaphorical description

Well I was kind of thinking, my whole idea about the air this picture this comes from Charlie and the Chocolate Factory the film, well and the book but the image I have is from the film. Mike TV is one of the boys that goes on the trip to visit Willy Wonka's Chocolate factory and Willy Wonka has created this thing, he's developing Wonka vision and he sets up this camera, the room is totally white and they all have to wear these white suits to go in there and there's this massive film camera in there and on the other side there's just this regular sized television and it doesn't have any glass in the television and Willy Wonka says 'watch this' and all the Oompah loompahs bring in this enormous bar of chocolate and they set it up in a stand, pull their goggles down and press a button and the camera zaps the chocolate and it breaks it into lots of tiny little particles, sends them up in the air waves across the room to this television where its beamed in to the television as a very small but very real bar or chocolate that you can eat. But the problem is because of the whole idea of a man being smaller in a television than he is in real life they've got this idea that the bar shrinks along the way and this boy, Mike TV is mad about the TV and wants to have a go. Willy Wonka tells him he cant but he does it anyway presses the button and is zapped up by the camera and thrown across the air in little particles and comes across very little in the television and the little bit of particles that you see in the film above the air is the idea of the boy and the chocolate bar going across the universe … is very much to me how I see the Internet.

So can you explain how that picture relates to the Web?

Well, its kind of how I see, like all these little bits of information kind of floating in the air and then if you call them up on your computer screen then they're all pieced together in the right order and they appear magically on your screen just like when the boy is pieced together but in smaller form and I guess that's how it works, it selects those bits of information.

(Low user 2: 161-193).