

# THE REPRESENTATION OF INFORMATION STRUCTURE IN THE CYBER WORLD

*A space cognition approach*

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**Abstract.** The Internet, the place that people called “cyberspace”, is a new place that people can explore in now. But we usually fell “astray” in there because there are no signs like roads, bridges, like it is in the physical world. This paper tries to cite the Lynch’s (1960) urban design theory, then to develop a new Internet search mechanism’s graphic user interface, and tries to help people explore in Internet more effectively.

## 1. Introduction

The presentation of the cyberworld is based on text, constructing space cognition of Internet. (Wertheim, 1999) The mechanism of this kind of presentation is “node to node”. Users can not get much experience from the website finding process. The inexperience leads users “astray” in cyberworld. It is different from the experience of path finding in physical world.

Lynch(1960) have brought forward the theory which band the psychology and urban design together. It is explain some key element for citizens to construct the structure of city in mind. Strong(1998) thinks that the cognitive mapping is the major reason of environment representation in human mind.

Human relies on accumulating experience of finding the right way to construct the associative memory between recorded images in mind and the identifying images (Passini, 1984). Deiberger (1994) have proposed the idea of “the information city”. He attempted to construct the Internet users’ cognition of the structure of Internet document by the method of urban design in the physical world. But this environment is short of identity, therefore users never

construct the cognitive map of the text information structure by the finding process (Strong 1998).

Based on these past research, this paper wants to use key words in Lynch's urban design theory to be identifiable signals of the presentation of Internet information construction, and discusses that whether is it helpful for users to build up their experience on internet? Furthermore, this paper wants to develop a model of presentation of Internet information that is more effective than the textual interface.

## 2. Problem Statement

We find in Passini's research that the method that human constructs spatial cognition is mainly from the relative memory to other images while finding the right paths. We can understand that the experience accumulating this time in exploring process can improve the searching efficiency next time.

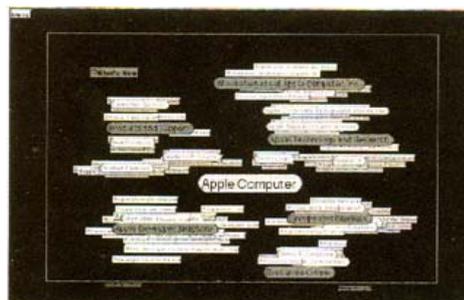
Lynch's key words of environment cognition are functionally reminders of the concrete image in the physical world. Under these reminders and their mutual effects, human constructs reminding network without memorizing the whole space but only need to memorize the reminders. It can break the limitation of short-term memory.

The structure of internet information at present consists of textual reminders, but the real situation is that users can't build their database of exploring experience effectively. This paper wants to discuss some questions: Does the graphical presentation of internet information help users build up their cognitive concept of information structure model effectively? Can we quote the concept of reminding networks from Lynch's urban design theory to develop a more efficient information presenting system?

## 3. Research Background

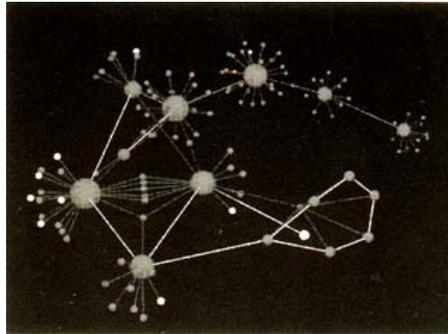
Lynch mentioned in his book "The Image of the city" that to construct human's psychological maps for urban structure need some key elements: paths, edges, area, node, and landmark. These elements make urban sight becoming a constructed strictly and readable maps. Besides, according to Passini's view, human relies on psychological maps made from the experience of finding correct paths while exploring the environment. Regarding the exploring of new environment, we can find in the above-mentioned that accumulative experience that comes from sensational stimulation can make the familiarization of the environment more efficient. The stimuli may be a place name, a landmark, an area with special visual characteristics, and even a sense of direction identified by vision.

Strong mentioned that the mechanism of search engines nowadays decreases the opportunities of building database of experience on Internet. Kurmann(1999) compared Apple Computer's Hot Source with the ordinary presentation on



internet. He concluded that it is not the fantastic multimedia presentation but the exploring process can help people find the past message without repeating the same hierarchical searching actions.

*Figure.1* Apple Hot Source



*Figure.2* Space relationships of information construction.

Nevertheless text or the media based on it still have necessity of communicating on internet. The topic of this paper is to discuss that how to use urban reminders and every kinds of media at present to draw the outline of psychological maps of internet information structure in human's mind.

#### **4. Research Objective**

Normally, the former research directly put the exact item in the physical world into the internet space, and attempt to use this way to help users produce the similar identifying methods on internet with that in the physical world.

#### **5. Methodology**

This paper hypothesizes that human has limited long-term memory and recognizes graphics more easily than text. This paper postulates that there is some similarity between human's cognition of space in the physical world and database in the cyber world. The methodology to achieve this research objective used Lynch's theory of urban design. It included two aspects of observation. One was on the instrument employed by human when dealing with urban data; and, the other was by Internet users when comprehending data on Internet. Both observations were compared by protocol analysis to make a conceptual model.

In order to discuss the importance of space concept to comprehending internet information structure, this paper decides the experiments and analysis of the following three steps.

The first step:

Purpose:

Testing Lynch's theory in 1960 for people's (including architectural professionals and amateurs) space cognition nowadays.  
It makes Lynch's theory suitable for the present and also for this paper.

Hypothesis:

After 40 years Lynch's theory published, there have been great changes in urban environment and spatial form. People's space cognition may be a little bit different from Lynch's theory.

Method:

1. Select one person with architectural professional background and one person without that background, and do the test on them.
2. The test is to walk in the campus of NTHU to get familiar with the environment firstly, and then back to the initial point, again walk in NTHU to find a selected building which was met before.
3. Ask the testees to draw the route chart and mark the reminders around the road.
4. Compare the difference between the two maps drew by the two testees.

The second step:

Purpose:

To test human's spatial concept of information structure to the current presentation of Internet information structure.

Hypothesis:

That people analogize the node-to-node relative relationship on Internet to the spatial concept helps for searching web sites.

Method:

1. Select the same persons in the first step as testees. Ask them to find the 10 chosen web sites on internet and a piece of designated information on each chosen web sites, and think loud through the searching process.
2. These ten web sites have relevance with each other. It means that it is possible to hyperlink to each other.
3. The whole experiment need phased time counting, and to record the sequences of ten searing processes. The standard of phase time counting is based on the beginning and ending point of each piece of information searching process.

The third step:

Purpose:

To inherit the result of the first step, find out the suitable parts for the present of Lynch's theory, and check it against the result of the second step to induce the matched parts. Use the matched parts to produce a searching mechanism of simple graphic interface for the testees to search. The above is used to prove that whether Lynch's theory is appropriate to the presentation on Internet.

Hypothesis:

Combining the urban spatial cognitive theory with the presentation on Internet nowadays can make Internet users search information more effectively.

Method:

1. Let the same testees to use the searching mechanism based on the conclusion of the prior experiments to find another 10 chosen web sites on internet and a piece of designated information on each chosen web sites, and think loud through the searching process.
2. These ten web sites have relevance with each other. It means that it is possible to hyperlink to each other.
3. The whole experiment need phased time counting, and to record the sequences of ten searing processes. The standard of phase time counting is based on the beginning and ending point of each piece of information searching process.

## **6. Significance & Expected Results**

The conclusion is supposed not to make the searching process more efficient, but to let users to understand the relationship between each piece of data. It is helpful

to the interface design of the Internet environment and the research of the social phenomenon of Internet groups.

This paper focuses on applying the cognition of the physical world as the way of presenting the cyber world. The study does not cover the correlated issues of interaction phenomenon of Internet groups and the efficiency of data searching. These issues will be included in the farther studies.

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