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Subjective and objective dimensions of spatial legibility

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Abstract

Reading space means understanding, analyzing or evaluating a certain space. Yet spatial legibility differs from the concept of reading. Legibility is one of the principles of urban design. Legibility means the possibility of organizing an environment within an imageable and coherent pattern. Reading an environment is a process that evolves with the obtaining of spatial information from the environment and by mentally processing that information and using it in a way appropriate to its purpose. Two components play a part in the process of obtaining spatial information: the characteristics of the space and the characteristics of the observer. The observer's perception and understanding of the characteristics of a space occurs as a result of spatial-psychological processes that happen in the mind. At the same time, legibility is influenced by spatial characteristics. The degree of legibility of a space depends on the plan layout in the second dimension and its complexity, and on the saliency of architectural components in the third dimension. There are many concepts in the literature that define legible environments: simple, coherent, understandable, perceivable, etc. All of these concepts point to characteristics deriving from the structure of the space. However, it is impossible to measure legibility by these concepts. It is discussed in this article that there are two main variables to devise a definition based on characteristics deriving from space: 1. the complexity of spatial layout and 2. the saliency of landmarks. The complexity of spatial layout describes the two-dimensional information about a space, while the saliency of landmarks refers to the three-dimensional information about a space. These two variables are also the elements of spatial information used while employing wayfinding behavior.

Keywords: Spatial Perception; Spatial Legibility; Urban Form; Human Mind; Landmarks

1. Introduction

An urban environment consists of various layers. The first is the physical layer in which one can find buildings and complex topological relations. The second is the historical layer through which the physical settlement reflects the traces of historical evolution. The third is the layer which contains many forms (religious, individual, social) of cultural experience (Bell & Dourish, 2004). According to Carmona and his colleagues (2006), there are six dimensions of urban space: morphological, perceptual, social, visual, functional and temporal; many other dimensions could be added.

When the concept of reading space is described as observation, understanding, analysis or evaluation, it becomes possible to point to as many types or methods of reading space as the number of dimensions of space. However, the concept of spatial legibility is different from the concept of reading space.

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The aim of this study is to present some sub-components of spatial legibility and to discuss the subjective and objective aspects of legibility.

2. Spatial legibility

Kevin Lynch (1960) describes a legible environment as a place that can be organized in a coherent and recognizable pattern. According to Lynch (1960), the degree of legibility depends on the ability of space to form a mental image. Similarly, Herzog and Leverich (2003) describe legibility as the characteristics of the space that provide an understanding through helping create cognitive maps and wayfinding. Reading space is a process of using spatial knowledge appropriately after acquiring it and processing it in the mind.

There are two main features affecting the acquisition of spatial knowledge:

- Characteristics of space.
- Characteristics of user.

Users perceive and understand space through the psycho-cognitive processes in the human mind. These processes are influenced by the personal features of the user.

3. Spatial knowledge and human mind

Downs and Stea (1973) focus on the types of acquiring spatial knowledge and mention the relationship between sensory input and sources of knowledge (direct and vicarious). Sensory input provides an integrated environmental representation that is formed by the combination of visual, haptic, auditory, olfactory, and kinetic senses. This representation transforms senses to experience in a direct manner (Downs & Stea, 1973). In direct experience, senses are used effectively and precisely. On the other hand, in vicarious experience, senses as sources of perception are not used wholly and simultaneously. Vicarious sources mostly serve visual sense, so the output is mostly visual perception. Downs and Stea (1973) define vicarious knowledge as secondhand information; according to them, this kind of information both in actual meaning and metaphorically means “seeing the world from someone else’s eyes.”

Donald Appleyard (1973) noted that spatial knowledge (direct or indirect) is both concrete and abstract, schematic but disjointed, sometimes conventional and sometimes imaginative, also idiosyncratic and pluralistic. It results from both shapeless, complex, fragmented, inaccurate nature of cities (Appleyard, 1973) and the fragmented, hierarchical, subjective, dynamic nature of the mental processes and the mind itself (Carlson, 1996).

4. Spatial perception and mental image

Perception can be described as a process in which sensory input are transformed into meaningful experiences and interpretations (Sartain et al., 1967). The interpretation part is especially important; receiving sensory input and processing it is somehow a static function. However, what makes perception is that this process is subjected to inner and outer influences. As a result of these factors, perception is combined with interpretations.

A mental image is identified as the picture-like representation of the perceived phenomena in the human mind (MacInnis & Price, 1987).

5. Spatial variables of legibility

5.1. Recognizability of buildings: landmarks

Why do people choose a certain building or object as a reference? Or why is a building known? These questions are important to conceive both in the human mind and the position of designed buildings/spaces in the human mind.

Kevin Lynch (1960) noted the landmark (an object whose salient physical feature is uniqueness) as one of the five image elements (landmarks, paths, districts, edges, nodes). According to Lynch (1960), if any landmark has a clear form, clearly contrasts with its background, and has a crucial location, then it can be considered important.



Fig. 1. Image elements: paths, edges, districts, nodes, and landmarks (Lynch, 1960)

Steck and Mallot (2000) classified landmarks in two groups: global and local. Global landmarks are those that are visible from great distances. Local landmarks are smaller in scale when compared to global landmarks and are only visible when observers approach them. Raubal and Winter (2002) listed three items for the salience of landmarks: visual salience (facade, form, and color), semantic salience (cultural and historical value), and structural salience (location).

5.2. Spatial configuration: urban forms

Spatial layout not only affects movement and circulation, but also helps one to understand the relationship among spatial elements and to form the mental image of this relationship. When it gets harder to perceive how one space is connected to the other, wayfinding becomes weaker (Faria & Krafta, 2003; Hillier, 2003).

According to Young (1991), the typological connections in decision points are critical. A decision point is where a person has to choose among more than one direction, for example, nodes in urban space and corridor intersections in buildings. In history, most cities are formed by a “deformed” grid, which is also called an “organic” grid. These patterns are spontaneously constituted settlements, rather than planned or designed patterns (Carmona et al., 2006).

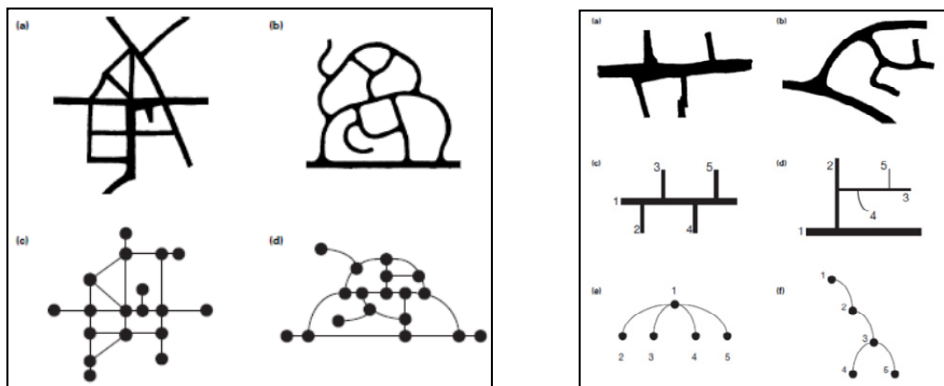


Fig. 2. (a) Urban patterns and conventional graph; (b) Urban patterns and topological relations (Marshall, 2005)

In Figure 2 (a), two different urban patterns are compared. Both patterns have 23 links and 18 nodes. Although these patterns are different from each other, conventional graph representations do not differ and cannot present the structural differences of the patterns (Marshall, 2005). Syntactical relations and syntactic graph representations properly demonstrate topological relations and features of spatial patterns (Hillier & Hanson, 1984) (Figure 2 (b)).

6. Discussion

The complex, fragmented, hierarchical, subjective and dynamic nature of urban spaces and the human mind demonstrate that spatial knowledge and mental images cannot be acquired/formed in a precise and holistic way. As a result, measuring or understanding spatial knowledge will remain reduced, complicated and ambiguous. Studies have shown that the human mind works in a way that computers do (Cangoz, 2005). On the other hand, in addition to keyword and schema usage, the human mind has “emotional meaning” (Sacks, 2007). Being defined as an advanced mental processing peculiar to humans, emotional meaning is beyond perception, which is defined as a “conscious activity” (Cangoz, 2005) and beyond abstract attitude (Sacks, 2007) which means defining/seeing objects in an analytical way.

Despite the conscious nature of perception, the process of perceiving space is both influenced by the background of the subject and by unconscious subjective factors. The output (verbal expressions or behaviors) are highly subjective. The nature of perception relies on a mental “spontaneity” (resembling proprioception) combined with unconsciousness, instinct, needs, and attention.

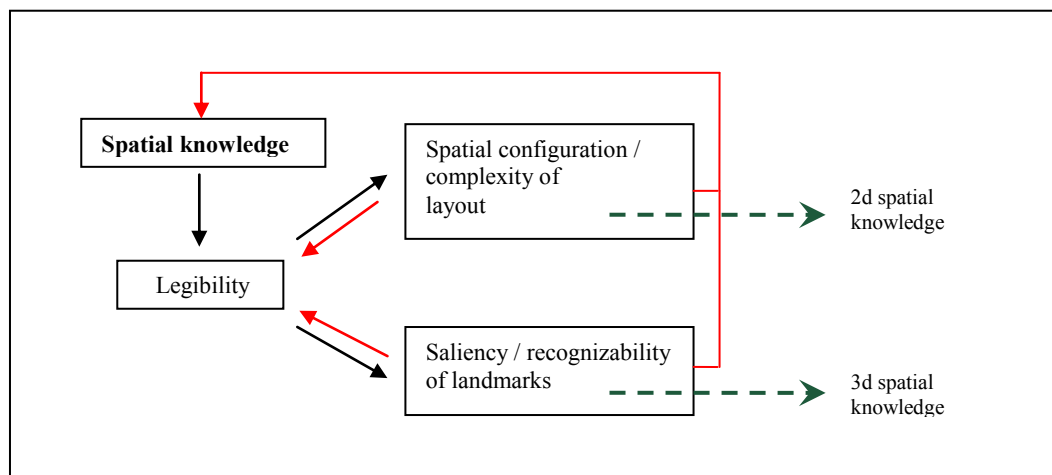


Fig. 3. Components of the concept of legibility

Spatial legibility depends on spatial layout (Abu-Obeid, 1998; O’Neill, 1991; Hunt, 1984) and its degree of complexity (2d knowledge) and on saliency of spatial elements (3d knowledge) (Herzog & Leverich, 2003; Baskaya et al., 2004; Abu-Obeid, 1998). In the model in Figure 3, spatial legibility is related to spatial knowledge, as legibility is one of the factors affecting the acquisition of spatial knowledge. Legible environments are coherent, understandable, simple, and organizable. These features provide faster and easier acquisition of spatial knowledge.

In literature, many concepts are used to define legible environments, such as simple, coherent, understandable, organizable, etc. These features point to the characteristics of space; however, it is not possible to measure legibility through these concepts. Two variables are determined to measure spatial dependencies of legibility: 1. the degree of complexity of spatial layout and 2. the recognizability or saliency of landmarks. Spatial layout refers to a two dimensional knowledge of space, whereas landmarks point to a three dimensional knowledge of space. These two variables are used during wayfinding behavior as well.

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