Architectural Wayfinding Design as a Means of Communication in Environmental Perception

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Abstract. From prehistoric times, Signage was a means of visual communication helping people reaching out different environments (internal or external). Long before paper’s invention, humans made marks on objects, such as cave walls, in the surrounding environment, for their communication. As cities grew and mobility increased, making the built environment more complex, people requirements for better information concerning spatial perception and navigation, also grew. Thus, the necessity of proactive, systematically planned, visual unified signage and wayfinding programs have been emerged. Wayfinding is how people get from one location to another, including their information-gathering and decision-making processes for orientation and movement through space. Wayfinding design builds on research in cognition and environmental psychology to design built spaces and products that facilitate the movement of people through urban settings and individual buildings. Despite its demonstrated importance to building use, costs, and safety, wayfinding receives less than its due in planning, research and building evaluation. The aim of this study is to provide a “clear” reading of the environmental space and city’s routes to the users, through architectural wayfinding design. Also, architectural wayfinding design addresses built components, including spatial planning, articulation of form-giving features, circulation systems and environmental communication.

1. Introduction
The external environmental space includes a total of natural and anthropogenic factors and elements that interact and affect the quality of life, historical and cultural tradition as well as aesthetic values. The outer environment is considered the built environment of every city, where tableboards with word signs, special colors and symbols give information, defining routes and directions within the city itself.

Figure 1. Wayfinding System in a smart city.

As it is known, at least every major city on planet earth is inhabited by people of different racial, ethnic, cultural origins, who speak different languages. In order the difficulties concerning the
seamless communication and movement of users in internal or external environments to be solved, it is investigated whether the creation of a communicative language based on visual communication is an important factor of operation (Figure 1).[1]-[2]

The ultimate goal is to help all users of indoor and / or outdoor environments through design innovations in the study of spatial signage both in architectural and visual communication so that accessibility and movement within them are easy. In general, the intended subject of the presentation is the "pure" reading of the space and directions of both the city and the public buildings, by their users, through the marking of space. According to current theories, the human mind organizes human perception to capture first the "essential form" and secondarily the exact copy. Thus a schematic arrow is more effective as a direction indicator than a realistically painted hand with outstretched finger (Figure 2). As visual communication scientist Rudolf Arnheim claims, "The human mind may be forced to make exact copies of things, but it is not by its nature to be inclined to this" – which means that he can learn it, but it does not come by itself. As a result, it is easier to communicate with signals that convey the general characteristics, rather than the specific and detailed ones.[3]

Figure 2. Direction’s indication by a realistic hand drawing.

2. Historical Data of Signage and Wayfinding
Spatial marking is a means of visual communication of people in general, helping them to approach different environments (internally or externally). Long before the paper invention, people created images of symbols on objects surfaces, as well as in the inner surroundings of the caves, in order to exchange information through visual communication. Therefore, environmental graphic design, which can also be defined as visual communication of information in the structured environment, is one of the world's oldest professions. From the invention of paper and electronic television or computer screen, most people think that graphic communication takes place mainly in the two media. But, just as the people of the caves created important images, object symbols of communication, as well as, in the surrounding space, huge quantities of information are being transmitted today through the signage of other objects in the structured environment. The modern reincarnation of Environmental Graphic Design (EGD) is a relatively new, multidisciplinary field that has been recognized over the last 30 years. Sure, there were signs before, but it was revealed in an unplanned, almost reactionary way - in other words, as a second thought. [4]

As cities became larger, in the course of time, their mobility was also increased, making the structured environment more complicated. At the same time, people's need for information has been up sized, in order to understand better the structured environment and navigate through it. This created the necessity to design dynamic and unified visual signage and guidance (wayfinding) systems. If anybody thinks that Environmental Graphic Design (EGD) is not important, must ask himself: Could he understand how to use a major international airport or an urban rail system if there were no clues or if the spatial marking was just a mass of messages, graphics and natural forms? The answer is definitely not! Consequently, modern signage and guidance systems (wayfinding) give a unique, unified voice in an environmental space. [1]-[5]
Spatial semiotics and orientation (wayfinding) are more often expressed in uniform signage systems, which both in terms of information and visualization are linked together in a space. Environments that support this successful orientation behaviour can also be of spatial interest, sophisticated and complex. In fact, "the challenge of designing wayfinding is to create interesting signs that allow satisfactory space experiences and are safe, accessible and cost effective, despite the complexity they may have." Although signage and orientation search are often used interchangeably, it is very important to make this special distinction: usually the primary objective of a signage system is to help people find their way through an environment, and often effective orientation solutions are required from a simple signal or symbol. Clear, well-defined paths and other visual signs, such as landmarks that stand out in the environment, help to find one's orientation, like printed maps, people guides, and more recently portable GPS systems.[6]

As a matter of fact, the good architectural design of wayfinding is important for global planning, because it facilitates users access, increases their satisfaction, while reducing the users isolation with disabilities. It also reduces visitor confusion and employee mistakes, saving time and money, preventing accidents while reducing stress, enhancing health and productivity. Moreover, according to the designer Jerry Weisman in 1981, "the ability to find a destination inside and outside a building is clearly a prerequisite for achieving higher goals". [7]

Weisman, also, claimed, that "the readability of an environmental space - the extent to which the wayfinding detection is facilitated" has serious consequences for behaviour, referring to the following example: the readability results of the surrounding space to the happiness of some elderly people, who were housed in groups. Lynch also says that the readability of an environmental space means the convenience with which it can be perceived, while the offered choice degree depends on how readable it is. The main features that affect the readability are the paths, edges, nodes, milestones and areas. [8]

In 1990, Arthur and Passini introduced the term "environmental communication", ie the orientation transfer, direction (wayfinding), and other information within the structured environment through signage and other means of communication or architectural features that allow people reaching different destinations (Figures 3,4). [9]

![Figure 3](image1.jpg) **Figure 3.** Floor wayfinding signage, USA.  
![Figure 4](image2.jpg) **Figure 4.** Wayfinding System in Seattle roads, USA.

For example, in the city of Dublin in 211, an elaborate, bilingual search system was installed in the town, including more than 100 individual elements, which made the city readable to its numerous cultural tourists. The first integrated public space signage system with over 100 bilingual panels and information poles was installed, creating signal chains for pedestrians seeking to reap the cultural benefits of the Irish capital (Figure 5). [9]
Figure 5. Wayfinding Signage System in Dublin City, Ireland.

In 2001, CIDEA (Center for Inclusive Design and Environmental Access) states in New York that "spatial semiotics is the organization and communication of people's dynamic relationship with environmental space. Lynch (1960), the author of the book: The Image of the City, is the founder of spatial semiotics research about people’s orientation in the surrounding area (the term "wayfinding" was devised in the 1970s). Lynch, therefore, in this book defines that spatial semiotics is based on a consistent use and planning of specific sensory indications from the outside environment. [11]-[12]

Also, Lynch, in his own book, refers to maps, street numbers, directional signals and other elements as "spatial devices". This terminology, of course, has evolved into the five following main architectural elements:

1. Directions and traffic (paths). Recording of roads that are near or crossing an area, classifying them according to their importance in the area.
2. Landmarks. Recording any separate elements that differentiate into shape, meaning or location.
3. Nodes. Recording of central points such as squares, junctions and crossroads, as well as buildings that attract people like cinemas and shopping centres.
4. Edges. Recording any intense linear barriers and distinct boundaries in areas with different using modes or visual character.
5. Zones or districts. List of areas that differ in character and identify the factors describing these differences, such as material and form. [12]

It should be noted that landmarks, points of interest, as Lynch calls them, to the contrary to the nodes that can be introduced, are individual characteristics that behave as reference points. Additionally, milestones vary according to each person's personal experience. They are usually static (or they can also be movable objects such as the sun) and unique objects (physical structures or geographic features), which can be distinguished from a number of different objects. Landmarks are very important signs in the orientation process when they are distinct and not too many. [12]-[13]

Many people with different types of cognitive abilities, as well as those who cannot read at all or who cannot read their mother tongue are based on milestones to mark and remember a path. The landmarks are distinguished by the dominance and peculiarity of shape, colour, size, height, position and visibility, and ultimately intense contrast to the surrounding area. Still, milestones must be in harmony with their surroundings and not too many, 'as already mentioned, like many milestones may
undermine their usefulness. For example, a landmark may be a modern building amongst other classical buildings, or it can still be admirable for its cleanliness in a dirty place or something unforgettable for its prominent position, either from a distance or a short distance, as well as a spatial reference point when located centrally along a path. [13]

The characteristics of successful landmarks may be their visual, semantic or structural differentiation in the surrounding area:

- **Visual attraction**: refers to the physical characteristics of an object which enhances it as a landmark, and these are: a) *the façade*, reflecting the degree of contrast between the object and the surrounding area, b) *the shape*, measured consider the shape coefficient, as well as the deviation of the shape from a rectangle. For example, tall buildings have a high coefficient of shape and vice versa; c) *the colour*, where an object can be marked by its colour as an undisputed landmark, such as a red building in the middle of a total white, is very easy to be distinguished, d) *visibility*, when an object is in a prominent position, it has great visibility, as it can be seen either close or off, and during the day and night.

- **Semantic attraction**: It refers to the importance of the landmark object, as it may be not something of its own but it has a great value to the observers, which may be coming from cultural or historical memories.

- **Structural attraction**: refers to an object’s main role when it is located at a key spatial point of reference, such as intersections. Ultimately, different situations can change a particular point in the city, for example, when a motorway can be a path moving a vehicle or edge moving a pedestrian. Similarly, the city centre is considered as a district relative to the city’s scale and as a node relative to a higher level. It is worth noting that all the elements of the city are not isolated from one another but are in series of integrated links. [9]

![Figure 6. Identity building signage.](image1.png)  ![Figure 7. Digital Wayfinding System.](image2.png)

Spatial semiotic is effective for communication in the surrounding area and refers to a series of successive communication indications provided through human sensory system, optical, acoustic, and olfactory and touch elements. Each visual spatial semiotic system is more than just a set of points because it includes architecture, landscape architecture, lighting, landmarks and wayfinding (Figures
According to Passini, a spatial problem’s solution involves:
1. Making decisions - drafting an action plan
2. Decision to implement the project
These decisions require information processing where it implies proper perception and knowledge of the surrounding environment. This action provides the user with the necessary information about these two procedures related to taking the above decisions. [9]-[13]

3. Spatial Semiotics Systems
Spatial semiotics systems are informative visual orientation systems, consisting of signals, maps, arcs, color codes, infographics, and various typographic elements. These spatial systems differ from other methods of presenting information, as they are usually used to guide people’s transfer in natural environments. Traffic signs of a highway, identification signs of a metro station, and hanging signs at an airport are common examples of spatial semiotics systems. The action, which is followed by a spatial semiotics system, is also known as wayfinding, waysigning, or signposting. [9]

![Figure 8](image)

**Figure 8.** Contemporary Signage at Leytonstone Station, London Underground.

One of the most frequently cited examples of a well-designed signage system is London Underground Railway. Underground station signals consist of a red circle and a horizontal blue bar that contains the name of the station. Because they are readily recognizable to all London's underground passengers, it is impossible to be confused with other brands. Also, these labels can be present at the same time in printed materials, inside the stations, as well as at the street level, as they are part of the corporate identity of the underground railway. It is worth noting that the New Johnston font, used in the London Underground signage, was designed in 1913 specifically for the Underground, in order to provide readability from a distance (Figure 8). [14]

4. Basic Functions of Wayfinding
Wayfinding, whether external or internal, always serves to inform people in their incomprehensible, structured environment. Therefore, it is important information to be placed on strategic points in order to guide people to the right direction. The fact is that the complex constructions of environs are
interpreted by humans and stored in their memory. But distances, locations, and time can be recorded in humans memory very differently than they actually look. [15]

An effective signage system is based on human behaviour and is consisting of the following features:

• Extinction of thought.
  Create an integrated, visible and coherent visual communication system with concise messages.
• Appearance of the necessary items.
  Recording of information relating to space, position and / or navigation path.
• Removing excessive information.
  Remove unnecessary data to create a clear visual environment. [9]-[13]

4.1. Signage Functioning
In order to understand how signage works on humans, the following questions should be answered:
How do people navigate, browse or remember the structured environment? Why will people recognize or understand a place easier than the other? As it can be seen from the images on the left, geographical map vs. a cognitive map is equal in reality with human cognitive memory (Figure 9). The following attributes affect the way in which the structured environment is interpreted when creating a wayfinding. [15]

![Figure 9. Geographical map, on the left, vs. a cognitive map, on the right.](image)

• Landmarks
  In order to create a legible environment, it is necessary to identify specific sites and / or locations that will serve as landmarks in the wider region.
  Using urban landmarks in a region is being visualized and imprinted better in human’s mind. Landmarks can be sculptured artwork in the outer surroundings, monuments, large-scale buildings or museums, or other public buildings. The combination of all these elements shapes the identity of an unknown area of the potential user.

• Orientation
  The suitable user’s orientation within a structured environment helps him to understand the different destinations using urban landmarks.
  Parallelly, using maps is a high manner an environment space to be visualized and navigated, as long as the user is identified with the right direction to which he is heading toward, for his convenience.

• Navigation
  When navigating, the coherent reference to a specific area or destination is completed using directional static signs, which guide users to the desired destinations (Figure 10). [9]-[13]
4.2. Signage Strategy
When creating a signage system for an area, building, or generally a large or small scale architectural construction, it is necessary to develop a design approaching strategy. At this stage, a modular spatial semiotics system, which is adapted to the structured environment and human orientation and navigation requirements, is being produced. An important point for understanding the structured environment is a research informing where spatial signs must be placed. [9]-[13]

Color codification is also a very useful strategy for any indoor or outdoor space design. It should be obvious and easily recognizable and further visible in any circumstances. Investigations were showed that as much as two-thirds of coding systems are not understood (Figure 11). For example, colors should be severely adapted to people’s needs with limited vision, in order to confirm their effective use. [9]-[13]

5. Basic Design Elements for Signage
There are four major types of signage:

- **Signage information**, for example a signboard which is containing a destination and/or orientating the user through natural and build environment.
- **Direction signage**, where location targeting information is displayed, located at various strategic points in the natural and built environment.
Identity signage, or ID, where information about individual settings is displayed, such as buildings, locations and public facilities.

Warning signage, indicating security procedures, such as fire protection routes, non-smoking areas and other regulations that are or are not allowed in a specific area. [9]-[13]

6. Conclusion
Concluding, Spatial semiotics (wayfinding) allows people to navigate and orientate easily from place to place. Also, spatial semiotics is more than only signs, since in collaboration with other elements of public space, such as street lounges, sculptures of art etc., names, landmarks, maps and new technologies are included.

Because, an efficient spatial semiotics planning requires a multidisciplinary approach in terms of its conceptualisation and execution, spatial architecture, graphic design and product design are necessitated to create spatial narratives for people who are going to use them. Often, the build environment is trying to be readable for its users, concerning the way they must move through it, but the use of a coding-wayfinding system helps this readability to be enhanced.

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