

# Wayfinding in Unfamiliar Public Buildings - Factors in Landmark Recognition

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## Abstract

This study was undertaken to help understand what helps people navigate into and within unfamiliar buildings. The aim is to arrive at a list of factors influencing wayfinding and to find which landmark and building element characteristics are most significant in the cognitive processes behind wayfinding.

Three studies were conducted for this research. A case study and an experiment covered navigation provision and entrance recognition in existing buildings. An experiment in landmark recognition and wayfinding within buildings was also undertaken. For this, the participants were split into three groups: A, to find out which elements within the building were memorable (also used as control group); B, to find out which elements previously considered as landmarks were used as such when wayfinding; C, to find out which element characteristics prove useful in wayfinding.

This information was analysed to establish characteristics of elements which identify landmarks. Consideration of how these elements can be emphasised will be put forward. In addition, it is hoped that the results will aid the understanding of wayfinding shortcomings in current building design and help provide pointers to ways of overcoming these.

**Keywords:** wayfinding, architecture, landmark, public building, navigation, spatial cognition

## Introduction

### *Human wayfinding*

Wayfinding is described as purposeful and directed movement from an origin to a specific distant destination and cannot be directly perceived by the traveller (Allen, 1999; Gluck, 1991 and Golledge, 1992). Wayfinding involves interactions between the traveller and the environment and also involves the ability, both cognitively and behaviourally, to navigate successfully through the environment (Passini, 1984). People use various spatial, cognitive, and behavioural abilities to find their way. The spatial abilities involve mainly four interactive resources: perceptual capabilities, information-processing capabilities, previously acquired knowledge, and motor capabilities (Allen 1999).

Raubal and Winter (2002) stated that human wayfinding research investigates the processes involved when people orient themselves and navigate through space. Many studies try to explain how and what people need to find their way in the physical world, how they communicate directions and how people's verbal and visual abilities influence wayfinding. Methods of describing a route usually involve the provision of sequences of instructions.

However, this kind of procedure does not pay attention to human wayfinding behaviour. Research in spatial cognition has shown that people do not only reference to sequences but frequently use landmarks during spatial orientation and communication of routes (Raubal & Winter 2002).

People rely on numerous types of environmental information to find their way within buildings. Weisman (1981) first introduced the concept of wayfinding in buildings and developed four groups of environmental variables which influence wayfinding: (a) visual access to familiar cues or landmarks within or exterior to a building, (b) the degree of architectural differentiation between different areas of a building that can aid recall (c) the use of signage to provide identification or directional information, and (d) building configuration, which can influence the ease with which one can comprehend the overall layout of the building. Of the above, landmark and configuration are key issues that this research focuses on.

#### *Wayfinding and landmarks*

Lynch (1960) defines landmarks as external points of reference - points that are not part of a route like the nodes in a travel network but a feature of the route. He describes their defining physical characteristic as “singularity, some aspect that is unique or memorable in context.” Singularity is derived from a clear form, contrast to the background and a prominent location and can be achieved by the form and volume of the space that define architectural and decorative elements, and by the use of finishes, light, colours, and graphics (Arthur & Passini, 1992). Landmarks may have particular visual characteristics, a unique purpose or meaning or may be in a central or prominent location that makes them effective as a landmark (Sorrows & Hirtle, 1999). Thus an object’s or structure’s status as a landmark does not depend on its individual attributes but on the distinction to attributes of close features hence being a landmark is a relative property (Raubal & Winter 2002). Studies show that landmarks are selected primarily as reference points for route directions, preferably at decision points, and are essentially used as sub-goals along the route: people progress along a route by orientating themselves towards a landmark (Michon and Denis 2001). In another study, landmarks were categorised in four different types: landmarks at a choice point, potential landmarks at choice points, on route landmarks and off-route landmarks. The research shows that for unfamiliar route directions landmarks at turning points and just on-route points are quite frequently used and the appearance of landmarks correlates

significantly with quality of route directions (Lovelace, Hegarty & Montello, 1999).

Landmarks are also frequently selected at positions where reorientations could occur, and are usually chosen in positions that pre-empt the decision point slightly rather than being at the decision point, so that someone following the route has time to recognize the landmark and decide which direction to take (Michon and Denis 2001, Tom & Denis 2003).

### **Context of research**

Most architects understand the importance of understanding wayfinding and producing buildings that are easy to navigate. This is of particular importance in buildings which are frequently used by ‘visitors’, i.e., people unfamiliar with the building. Despite this understanding, making a building easy and logical to navigate still tends to rank as a low priority compared to considerations of area, budget and aesthetic.

Many projects tend to be driven towards providing the maximum floor area on the minimum site area, particularly in overcrowded cities. Rooms and zones are organised within what is frequently an inappropriately shaped building envelope and resolving the jigsaw of room areas is often prioritised over organising them in a logical fashion. Sometimes this can lead to excessive circulation (e.g., long corridors) which could be put to better use elsewhere (for example to make a clear hub for the building to work around).

Budgetary constraints also affect area – for example a circulation zone deliberately sized so as not to get overcrowded may be omitted in favour of extra rooms.

Refurbishment and extension projects, with elements already fixed, are often considered too complex to produce a coherent navigation solution for.

This paper presents a study about wayfinding in complex public buildings from an architectural point of view. It focuses on the characteristics of landmarks and the relationship between landmarks and building configuration. This covers what helps people find their way into and within unfamiliar buildings, how landmark objects and structures etc. affect this navigation and what characteristics help define certain objects and structures as landmarks. The necessary characteristics and spatial factors of the landmarks’ surrounding space will also be considered.

This research started with an observation in Sheffield Train Station about how buildings work in terms of people's wayfinding. It was used as an early case study, with information collected largely on means and ease of access, links between spaces and the various methods provided to aid wayfinding and understand the building. An experiment was then conducted to find out what makes an entrance recognizable when people are approaching a building they are not familiar with.

Lynch (1960) suggests that urban elements such as paths, landmarks, and districts are used to divide the environment into smaller and more manageable pieces. Passini (1984) expands on these ideas applying them to architectural design. A space should have a basic organizational principle behind it.

The ultimate aim of this study is to provide guidelines for architects to be followed in the early stages of the design process of building projects. These guidelines will concentrate on making buildings inherently easy to navigate, utilising amongst other techniques the defining characteristics of landmarks in the design of the building. The idea that wayfinding is 'catered for' by signage will be avoided. The aim of this work is to arrive at a list of factors that influence wayfinding.

### **Research procedure**

Three studies have been undertaken as part of this research – a case study of Sheffield Station (Figure 1) undertaken with the aim of understanding how ease of navigation is presently catered for, an experiment in entrance recognition and an experiment in landmark recognition in unfamiliar buildings.

#### *A case study in Sheffield Station*

The study was made from the point of view of someone unfamiliar with the station navigating his/her way to a departure point and someone unfamiliar with the city navigating their way out of the station.



**Figure 1**, Concourse of Sheffield train station

Positive observations:

- The station is compact and based around a central ‘hub’ concourse. This aids orientation as the platforms are relatively close to the entrance.
- Once in the concourse, the most striking architectural elements include the stairs to the platforms, which helps to establish a hierarchy of the importance of the spaces.
- The platforms are visible from the bridge. The same bridge connects the concourse, platforms and Supertram link and functions well as a spine through the building.
- The quality of the materials used on the bridge help to denote it as a public space.
- The station is reasonably lit and makes use of sunlight when available. Dark stations tend to heighten the stress of wayfinding.

Negative observations:

- Though the building is part of a larger transport complex, it is separated from this by a busy road – interruption of route.
- The arches on the building’s façade are all the same shape and size but front different functions – taxi rank, entrance, drop-off point. Visitors have to walk past the taxis to reach the entrance and the entrance is not distinctive enough.
- The concourse is small, cluttered and without logic to its layout. The shops and their signs are too dominant; there is no defined space for people to read the displays and no defined thoroughfare.

- The dominant staircase hides both the lifts and the entrance to platform 1. Signage is relied upon to direct people to these.
- The platforms are narrow and cluttered. There is no logic to their layout with respect to the relationship between access to the platforms, waiting spaces and the platforms themselves. The platform organisation is also confusing as there is a mixture of through platforms and termination platforms without adequate information distinguishing each.
- Poor maintenance and inconsistent design undermine the effectiveness of tactile paving and other navigation aids.
- The station exits are not obvious from the concourse – the side exits lead to covered spaces while the main exit is hidden from view.

#### *Entrance recognition study*

Subjects were shown a series of photographs of buildings and asked to identify the entrance for each one. They were then asked why they felt that was the entrance. From these results, a set of characteristics was considered and their effect on the ease of which the entrance was found.

#### Characteristics for the building:

- whether the building's main façade is symmetrical or asymmetrical
- whether the building has a generally orthogonal or irregular form
- whether the building's main façade is made up of repetitive units
- whether the landscaping and surrounding means of access (stairs, ramps, paths, traffic access) influence entrance recognition

#### Characteristics for the entrance:

- whether recessed or projecting entrances are easier to recognise
- how effective contrast is in helping to identify the entrance: contrast of colour; contrast of scale; contrast of lighting quality
- what other unique elements aid entrance recognition – for example glazing or an entrance canopy.
- how frequently signage is relied upon to find entrances.

*Experiment in landmark recognition in unfamiliar buildings*

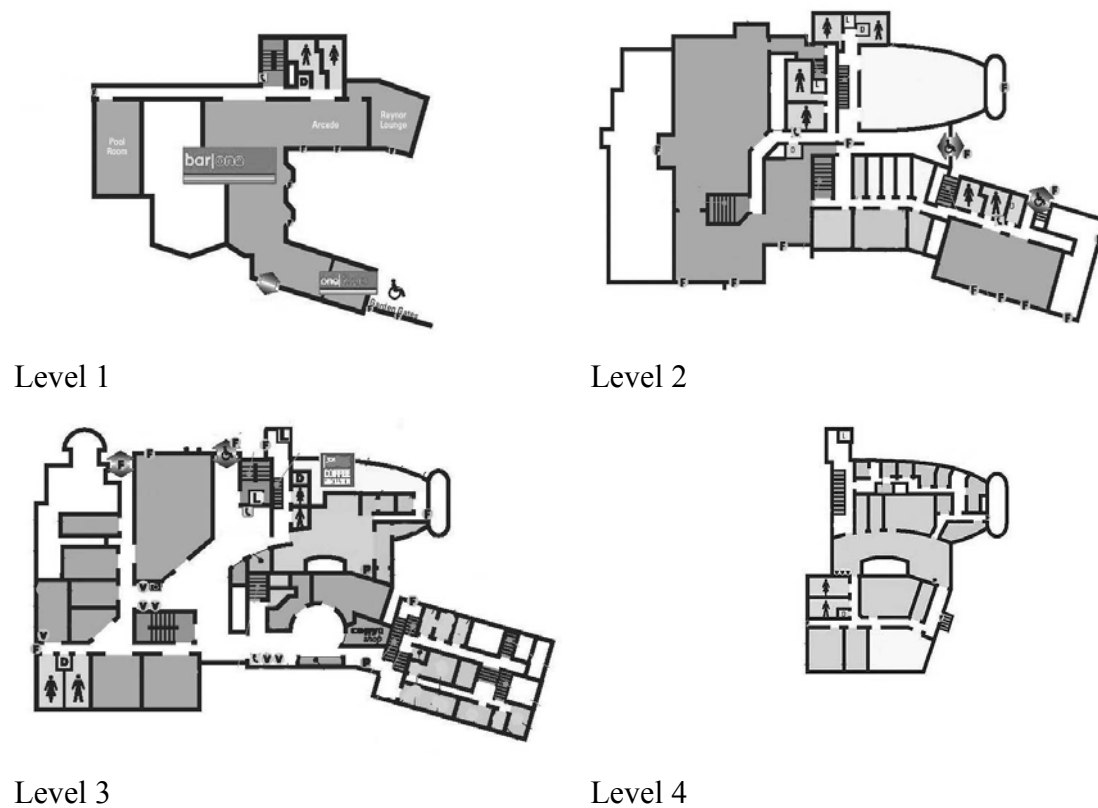
The experiment was conducted in the Students' Union at University of Sheffield (Figure2, 3). It is a large-scale complex building with spaces with a variety of functions such as auditorium, shops, café, offices and banks etc.



**Figure 2**, Students' Union, University of Sheffield.  
The highlighted areas are examples of landmarks

**Participants:**

The participants were 30 first year students who were new to the Union building. They were allocated into three groups - control group, landmark group and rule group. Each group had 10 participants. All the participants involved in the experiment were chosen randomly by the researcher and their qualifications were checked before the experiment was conducted. All participants were informed about the purpose of the study.



**Figure 3**, Floor plans of the Students' Union of Sheffield University

Experiment procedures:

The experiment was conducted from the 22<sup>nd</sup> to 27<sup>th</sup> September 2003. There was no time restriction for each of the participants in the experiment, though the time spent by each person for the whole experiment was approximately 10-15 minutes. None of the questionnaire responses were invalid since the researcher asked about the respondents' qualifications for the survey before implementation. In addition, time was allowed for the respondents to complete the experiment with a cognitive style test and for the immediate collection of results.

Instrument of the experiment:

Before commencing the experiment, an initial route through the building was drawn. This was based on the researcher's knowledge of the union building and aimed to take people on a varied, circular route. Notes were made of what was considered would be useful landmarks.

The participants were divided into three groups – a) Control group- when they first went round, they were asked which things they considered as landmarks. The second time they



were taken round they were asked to anticipate which landmarks would be round the next corner. They were asked what direction they are going to see if they recognise where they are; b) Landmark group - given a series of descriptions each consisting of a landmark and the direction to go in and asked to use these to navigate the building. Landmarks that are used are located on the initial route. The subjects were followed to see how reliable the information they were given is; c) Rule group- participants were given a list made up of building elements and object characteristics. These were all general – no specific landmarks or parts of the building were given. Each item on the list had a rule, which the participants were asked to follow whenever they saw something that matches the item.

The aim of the landmark group is to see if they follow the route that was initially chosen and to see what happened if they did not. In the rule group, rules were chosen to see what importance people placed on different object characteristics when presented with situations that matched more than one rule.

#### Results:

The landmarks followed and pointed out in the experiment were recorded. Each landmark was considered to have a certain set of characteristics, and the various landmarks were categorised by these. The rate at which each ‘characteristic’ was used was then obvious and demonstrated which landmark characteristics were of most use for this group. The notes written by the subjects on their cognitive maps were also considered and generally backed up the frequency with which each characteristic was used. The same basic method of recording and analysis was applied to each group.

In the control group (Group A), the subjects picked out objects and features with the brightest colours and greatest contrast. The second most significant result appears to have been recognition of the shape of the space that has the pasty shop and Natwest bank. People tended to follow a similar route to those in other groups.

In the landmark group (Group B), the size of the object and space were the most significant characteristic in the experiment and objects with an unusual shape proved easy for people to recognise. The participants recognised more landmarks compared to those in the rule group. Results showed that participants found it easier to recognise the landmarks which have certain functions or were next to places or objects such as shops, vending machines and cash

machines. Participants remembered and recognised objects with unusual shapes such as the triangular columns. Participants recognised bold colours such as the blue wall. However, recognition of the internal space from outside was unsuccessful.

The rule group (Group C) proved to be the most variable in term of the route chosen. The rules encouraged people to explore parts of the building they would not have done otherwise, e.g. the space with the long corridors that looks like an office area. People tended to not recognise the multi-storey space in the building and they did not remember the features of the building as much as control and landmark groups.

## **Discussion**

The following issues have emerged from the studies. Navigation is often considered to be adequately catered for by the provision of signs and maps of the building. This leads to building design that relies on signs for navigation instead of providing an intuitively easy to navigate layout. Furthermore, designing the building to allow easy navigation sometimes conflicts with pre-conceived ideas of the building's aesthetic. Even when ease of navigation is considered, it is often only at plan level. To successfully design an easily navigable building, its spaces and their relationships have to be considered three-dimensionally.

From the literature review, there would appear to have been very little research undertaken concerning the various characteristics of landmarks and how landmarks are defined. Furthermore, there is little research on building layouts, their associated navigation routes and nodes and the suitable positioning of landmarks along these routes.

Results from the wayfinding experiment showed that people in the landmark group remembered more about the various building features and objects than the rule group. In the rule group general characteristics were asked about instead of specific landmarks. It is possible that these are harder to remember than specific landmarks and do not in themselves aid people's memory of landmarks. The results for the landmark and rule groups suggest that providing specific landmarks is more helpful for navigation than providing general characteristics or building elements. There is a good correlation between landmarks noted when walking round the building and those noted on the cognitive map. This suggests that pointing out landmarks when walking round a building helps to reinforce them in the mind.

The rule group navigated routes that proved to be more variable than the other two groups. The control group was the only group to deliberately cover the same route twice. This proved advantageous to the participants' ability to remember building features and characteristics along the route – the features picked out in when walking round the building corresponded well with those pointed out on the cognitive maps. Results from the Control group placed emphasis on colour and contrast (contrast between space heights, shapes, sizes and brightness, not just light level contrast). This is backed-up by notes produced by the participants, both while walking round the building and written on the cognitive maps. Function and location appear significant, however, these are not backed up by participant notes, while smell and decor, despite not showing high rates of recognition, were picked up successfully in participant notes.

The signage result shown is low as it does not include direction signs, merely signs that could be classed as a characteristic of a larger object or space. If direction signs are included, the results are predictably higher, however these are not backed up by participant notes which suggests people did not remember them.

Although this experiment does not fully answer the question of whether landmark recognition is useful when wayfinding, it does provide information on object characteristics that are useful when using an object or building element as a landmark. The characteristics from the experiment hypothesis that proved most useful when recognising landmarks were contrast, shape and size. However, the bright red post-box contrasts significantly with the wall behind it, people tend not to point it out as a landmark. It may be because post-boxes are very familiar elements of the built environment suggests that uniqueness can be useful characteristic as a landmark. Views through windows did not show strong results in the experiment something which was probably influenced by the Union building's deep plan. A study of a largely glazed building or a building with many windows would be useful in this respect to see if participants pick landmarks inside and outside the building envelope or just inside the building envelope.

The location of landmarks was significant, however the most significant results were for those landmarks positioned in the middle of circulation spaces which is not desirable when designing new buildings. Landmarks with specific functions were often picked out too. Of

these many were brightly coloured so it is debatable whether it was the colour or the function that people recognised.

## **Conclusion**

Objects and structures may act as landmarks when they have the following characteristics:

- They are in an obvious and useful location (for example, at nodes where decisions on direction may have to be made)
- They fulfil a recognisable function
- The smell of an area or its décor are noticeable
- There is a contrast between the object/structure and its surroundings (colour, light and size)
- The object/structure is unique and unusual

It is confirmed that when people navigate in an unfamiliar building, following landmarks is easier for navigation than following rules. People are likely to remember the features of the building by its landmarks.

A further study about the relation between landmarks and building configuration is the next step of this research.

## REFERENCES

- Allen, G., (1999) Spatial Abilities, Cognitive Maps, and Wayfinding - Bases for Individual Differences in Spatial Cognition and Behavior. In: Golledge, R. (Ed.), *Wayfinding Behaviour - Cognitive Mapping and Other Spatial Processes*, Johns Hopkins University Press, Baltimore, 46-80.
- Arthur, P., & Passini, R. (1992). *Wayfinding: People, signs and architecture*. New York: McGraw-Hill.
- Gluck, M., (1991). Making Sense of Human Wayfinding: Review of Cognitive and Linguistic Knowledge for Personal Navigation with a New Research Direction. In: *Cognitive and Linguistic Aspects of Geographic Space*. D. M. Mark & A. U. Frank. Dordrecht, The Netherlands, Kluwer Academic Publishers: 117-135.
- Golledge, R., (1999) Human Wayfinding and Cognitive Maps. In: Golledge, R. (Ed.), *Wayfinding Behavior - Cognitive Mapping and Other Spatial Processes*, Johns Hopkins University Press, Baltimore, 5-45.
- Lovelace, K. L., Hegarty, M., & Montello, D. R. (1999) Elements of good route directions in familiar and unfamiliar environments. In C. Freksa & D. M. Mark (Eds.), *Spatial information theory: Cognitive and computational foundations of geographic information science*, 65-82. Proceedings of COSIT '99. Berlin: Springer-Verlag, Lecture Notes in Computer Science 1661.
- Lynch, K., (1960) *The Image of the City*. MIT Press, Cambridge.
- Michon, P.E. & Denis, M., (2001) When and Why are Visual Landmarks Used in Giving directions? In: Montello, D. (Ed.), *Spatial Information Theory. Lecture Notes in Computer Science*, 2205. Springer, Berlin, 292-305.
- Passini, R., (1984) *Wayfinding in Architecture*, New York: Van Nostrand Reinhold Company Inc.
- Raubal, M. & Winter, S., (2002) Enriching Wayfinding Instructions with Local Landmarks. In: Egenhofer, M.J. & Mark, D.M. (Eds.), *Geographic Information Science. Lecture Notes in Computer Science*, Vol. 2478. Springer, Berlin, 243-259.
- Sorrows, M. & Hirtle, S., (1999) The Nature of Landmarks for Real and Electronic Spaces. In: Freksa, C. & Mark, D. (Eds.), *Spatial Information Theory. Lecture Notes in Computer Science*, 1661. Springer, Berlin, 37-50.
- Tom, A. & Denis, M., (2003) Referring to landmark or street information in route directions: What difference does it make? In: Kuhn, W.; Worboys, M.; Timpf, S. (Eds.), *Spatial information theory. Lecture Notes in Computer Science*, Vol. 2825. Springer, Berlin, 384-397.
- Weisman, J. (1981). Evaluating architectural legibility: Way-finding in the built environment. *Environment and Behavior*, 13, 189-204.

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