

Wayfinding and Airport Terminal Design

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Human wayfinding in the natural environment has been practised for thousands of years. In the urban or built environment, few natural cues are available and other aids to wayfinding are needed. This paper considers the problems of wayfinding in airport terminals, what cues are available and how passengers use them to reach their destinations. The use of signs and maps is discussed, and conclusions are drawn on how wayfinding in airport terminals could be improved.

KEY WORDS

1. Human Navigation.
2. Airport Design.
3. Signage and Maps.

The principles of wayfinding are simple; the practicalities are very complex.

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1. INTRODUCTION. The origins of wayfinding can be found in the historic voyages of the Polynesians across thousands of miles of ocean without sextant, compass, clock, radio or satellite reports. The wayfinder (or navigator as indeed he was) depended on observations of the stars, the sun, the ocean swells, and other signs of nature and the environment for clues to direction and location of a vessel at sea. Wayfinding was used for voyaging for thousands of years before the invention of European navigational instruments threatened the very survival of this skill. Likewise, similar principles of basic navigation were used for early land exploration across the vast Asian landmass.

Time has moved on, but the principles of wayfinding still apply albeit with a different emphasis. Wayfinding now includes the process of finding one's way in the geographical or built environment; that is, being able to identify one's present location and knowing how to get to the required destination. Wayfinding has been the subject of increasing focus for specialists in the environment and behaviour fields and, in this context, is described as 'the influence of the physical environment on the performance of individuals in finding their way under various environmental conditions.' Therefore, the process of finding the way to a destination essentially involves a string of decisions. These decisions are made in response to where the person wishes to go and what clues are given by the environment in order to determine what direction to take.

This paper is based on a project (Jones, 1998) that looked at signs in airport terminal buildings and how the placing of these signs influenced passenger flows under different conditions. However, during the course of the study, it soon became apparent that signs were just one of a number of factors that influence airport users

as they find their way around the terminal building. Other factors include building design, internal layout and internal design features.

2. **AIRPORT TERMINALS.** Until recent years, the subject of wayfinding – or finding one’s way around an area or building – has been somewhat neglected as far as airports are concerned. Terminal buildings are constructed to meet a passenger throughput but are often extended later in a fragmented and uncoordinated fashion. Many have become so large that they resemble a small city. Consequently, for the infrequent traveller, the process of moving through the terminal building can be a traumatic experience in terms of either reaching their destination (a departure gate or access to landside transport systems) or knowing exactly where they are within the building at any point in time.

Some airports have a reputation for being particularly confusing. Dallas Fort Worth airport was found to be so disorientating that, on its opening in 1974, the airport immediately had to hire 34 passenger service agents just to direct passengers around the terminal building. Many other international airport terminals have proved to be just as confusing to the infrequent traveller. During observations on passenger flows and occupancy at Heathrow airport in 1996, it became apparent that a large proportion of passengers travelling through the airport were in fact uncertain of their position within the terminal building and did not know where they should be going. This type of evidence indicates that wayfinding in the airport terminal environment deserves more consideration than it has been afforded in the past.

Airport planners and designers have rarely been concerned about passenger wayfinding. Normal practice at airports has been to consider wayfinding as an afterthought and then, for financial reasons, only basic layouts of directional and facility signs have usually been installed. However, with the sharp increase in passenger numbers, airport terminals are now under pressure. Financial considerations are changing because improving passenger flow indirectly increases airport capacity. Getting lost is quite a traumatic experience for a passenger – especially if ‘fear of flying’ is also present. Furthermore, the perceived level of customer service and satisfaction is influenced by the extent to which passengers can easily find their way through the terminal building. This leads on to the human factor aspect; do all air travellers ‘wayfind’ in the same way and what techniques are actually used by people to find their way? Once these questions have been answered, it may be possible for airports to identify ways and means to improve their user-friendliness.

To cover all of the above points in detail would require a small textbook on the subject. The remainder of this paper will therefore focus on the types of wayfinding and demonstrate the applicability of modern wayfinding not only to passenger movement inside airport terminal buildings but also to other scenarios.

3. **PRINCIPLES OF WAYFINDING.** On a basic level, the principle of wayfinding may be split into two different types for route decision-making. Where the choice of route for a journey or trip is to and from a given or known set of options it is a *static choice* problem. An example of this might be a choice of routes and transport modes from one’s home to an airport. Where the route selection involves searching for – or being given information on – new routes, it is termed a *dynamic choice* problem. This is the type of problem faced by first-time travellers on entering an airport terminal.

There is a difference between how individuals wayfind depending on their reasons for needing to reach a destination. The three techniques that have been identified are *recreational*, *resolute* and *emergency* wayfinding.

Recreational wayfinding offers an individual the opportunity to solve problems (where to go next, for example) that itself can be a source of satisfaction and enjoyment. Wayfinding problems, in the form of labyrinths and mazes, have existed continuously from prehistoric times to the present day in various forms, all cultures and across every geographic area. The motivation gained by successful problem solving is very evident in society; for example, family games such as jigsaw puzzles and Rubik cubes or television programmes such as the Crystal Maze. Wayfinding techniques are also used to explore, to seek change or to find new information or knowledge. An example is walking or driving for pleasure, where the traveller has to reach a destination while not in a hurry and therefore the experience of wayfinding takes priority over the functional aspect of getting from A to B.

Resolute wayfinding is used where the main purpose is to find one's way in the most efficient manner; for example, the need to find the way around a new office building or having to find items (usually recently relocated) in a supermarket. The complexity of the environment may have positive or negative aspects depending on the type of wayfinding being undertaken. For example, a tourist may find the quaint narrow winding streets of a Cornish coastal town pleasurable to explore. However, a parcel express driver trying to find a delivery address in the same town may find the wayfinding process frustrating – especially if he has time constraints. A more appropriate example is the problem faced by air travellers in finding their way initially to the check-in for flight 'ABC123' and from there to departure gate 'D324' via security, immigration, and the commercial zones of the departure lounge in an airport terminal environment in which the signage is not in either the traveller's first or second language.

Lastly, under *emergency* wayfinding conditions, the only important factor is reaching the destination as quickly and as easily as possible. Due to pressures of time, and possible human factor elements such as stress and panic (fire evacuation of a building), wayfinding must be as simple as possible. Emergency routes should be those that are the most familiar and commonly used, as people will instinctively seek to use these under traumatic conditions. However, a fire in an unfamiliar environment (for example, as happened in the Düsseldorf Airport Terminal Building) can result in casualties, as the natural inclination is to use a familiar, but not recommended, route such as a passenger lift.

It is evident that wayfinding conditions can vary the meaning of the environmental experience. The functional dimension of wayfinding that involves reaching the destination is at one end of the scale, and the evaluative dimension that involves the experience of wayfinding itself is at the other. Wayfinding for recreational purposes, such as wandering around a national park, will involve an experience that is mostly in the evaluative dimension. However, evacuating a building in an emergency would be wayfinding at its most functional where the only consideration is reaching a place of safety in as short a time as possible.

How individuals wayfind can also depend on whether they are outside or indoors. For example, the five principal clues used by people to wayfind in cities have been identified as landmarks, paths, nodes, edges and districts. Landmarks are environmental features that stand out from the environment and are easily recognised.

Good examples of landmarks include the Eiffel Tower and Canary Wharf. Paths are recognised routes that people take to reach destinations, for example, roads and motorways. Nodes are places where a number of different paths or routes come together, for example, Trafalgar Square or a motorway interchange. Edges are environmental features that appear to separate different areas, such as railway tracks, streets or rivers. Districts are definable areas in a city such as Chinatown or the inner part of a walled city. The use of geographic features, or features from the built environment, provides the main source of information for decision-making.

Paths and nodes, which form networks, provide the most significant key to choosing routes. The type of network determines the complexity of the wayfinding experience. The simplest network type is the grid pattern commonly found in the United States where Los Angeles provides a good example; an example in the United Kingdom is Milton Keynes. However, landmarks also have a role. In the centre of Milton Keynes it is actually quite difficult to orientate oneself, as all the buildings and street layouts are similar and difficult to distinguish from one another. Here the principal landmark is the central shopping area that is located on top of rising ground.

Wayfinding inside buildings also involves using environmental clues and, just as some cities and towns are easier to find their way around than others, some buildings are easier to wayfind than others. Airport terminals by and large tend to be rather difficult because of the complex nature of a building that often has three separate levels, several types of processing (check-in, security, immigration) and many different types of passenger 'storage' areas. Similarly, just as city planners can affect the ease of wayfinding by designing a definable layout, so architects can affect the ease of wayfinding in the building environment.

Wayfinding indoors also follows the same intrinsic process of a series of problem-solving tasks that allow the traveller to reach his or her destination. In other words, when trying to get to a destination, the traveller tends to make a decision to go to an intermediate destination, such as stairway, hallway or intersection point. Often, this may be simply to get to the end of their line of sight and to see what the next set of options may be. In a large airport terminal, some decisions are made for the traveller in that intermediate destinations have to be sequential; for example, check-in, security, passport control and departure gate in that order. In smaller terminal buildings, the traveller can immediately see the aircraft parked on the far side of the terminal but the same intermediate 'obstacles' still have to be negotiated.

Inside buildings, people use several cues or visual and spatial variables in order to find their way around. These variables include visual access, architectural differentiation and plan configuration. Internal design features also have an impact on wayfinding performance. Starting with visual access, when a person is trying to find a facility or location, or trying to get orientated within a building, it is easier to manage if there are landmarks associated with specific areas or zones. In addition, wayfinding is eased if there is direct visual access to the location that they are aiming towards; for example, as already mentioned, parked aircraft that are visible when passengers enter the terminal. Therefore, the extent to which different parts of the building can be seen from other parts of the building can have a direct effect on the ease of wayfinding within that environment.

Architectural differentiation occurs when one part of the building looks different from the remainder. The ability to recognise places is affected by how varied the

interior features of a building are. If all corridors and rooms look similar, as can occur within a school or hospital, then wayfinding can be very difficult. However, if varied size or architectural style differentiates areas, then spatial orientation and wayfinding are made easier. For example, the wide-open spaces of airport departure lounges, after traversing the low ceiling corridors containing security and immigration, indicate to the passenger that their final destination has been reached. It also induces a sense of relaxation that encourages (time permitting) the passenger to spend money in the commercial areas of the terminal building.

Lastly, the plan configuration or layout of the building can influence the ease of wayfinding. If a building has a simple grid, or a circular or symmetrical design, then it is easier to navigate than a typical airport terminal building that has been constructed in stages to match the growth in traffic and that, at the same time, must cater for different types of traffic (domestic versus international, for example).

4. SIGNS. Signs provide a form of one-way communication for the supply of information to the users of a building, road network or city. Generally, the kind of information given will be directions or identification. Signs should convey facts without ambiguity and at the time and place such facts are required. Signs should also direct, inform, control and identify, and it should be possible to distinguish between directional, identification and reassurance types of signs.

Directional signs are the most common types found in buildings and cities. Normally they are used to direct people to a place (i.e. Milton Keynes), object (i.e. Nelson's Column) or an event (i.e. local festival). Often, these signs include a symbol, an arrow or both. When indicating a path to a destination, directional signs should be placed so that there is an identical sign at each decision point. Identification signs are the simplest kind of sign naming an object, destination or a place. Industry or commercial signs can also be identification signs; for example, signs above hotels and shops. The function of reassurance signs is, not surprisingly, to reassure people that they are headed in the right direction. Therefore they are not found at decision points but at points beyond where they act as confirmation indicators to the user that they are going in the right direction. An example is a distance sign to the next major town(s) seen shortly after passing a major road junction.

Sign perception is improved if the person is familiar with the overall form and design of the sign and placement methodology. For this reason, a sign system that involves a consistent design in terms of size, colour, lettering and possibly symbols is more likely to be noticed by users. The symbol for the London Underground is very well known and can be picked out quickly from other signs in the local urban environment. Having a specific sign colour assists the recognition and perception of specific signs. A good example of this can be found in the United Kingdom where motorway signs have a blue background, major roads a green background and tourist destinations or leisure facilities have a brown background. Therefore, if car drivers are searching for a motorway junction, their perception of the correct turning can be improved by colour coding. As a good example of placement methodology, in a shopping centre in Montreal all of the directional and location identification signs are situated on the ceiling. Users of the shopping centre found this reassuring since they always know where to look for information.

Some airports have used signage to portray a corporate image as well as to provide directional assistance to passengers. For example, BAA (Heathrow, Gatwick etc.)

favour black lettering on a yellow background whereas Manchester has pink lettering on a mauve background. Provided the lettering is clear, and the directional and location signs take precedence over retail and advertising, then the colour scheme is probably less important (except for those who are colour-blind) than the quality and quantity of signage.

People tend to prefer a well-lit environment, and these are easier to wayfind as the eye can see further than in a dim environment. Lighting can also help to identify particular areas. Many signs found in public buildings are backlit so that they stand out more from the surrounding environment. People also tend to move naturally towards well-lit and open areas as this gives them a sense of security and relaxation; a technique long recognised by retailers.

Where seating, fencing or barriers are provided in buildings, their position can be located to subtly affect through-movements. For example, in a museum, seating can be used to create an artificial path for people to follow when the direction of travel might otherwise be unclear. Likewise, seating and barriers are used to direct arriving passengers leaving the customs area and to discourage anyone except departing passengers from approaching the security zone.

Colour pathways or other forms of colour co-ordination can also be used in order to direct the flow of people. For example, the Metro Centre shopping complex in Newcastle-upon-Tyne is split into coloured sections where the signs are different colours so that shoppers can locate what part of the complex they are in. This system is also extended to the car park. Similar examples have been spotted in airport terminals to guide, for example, passengers to departure gates. A colour scheme (actually, coloured lines) was used at Luton airport to guide passengers in appropriate directions. Unfortunately, when the terminal was expanded, the colour lines were no longer appropriate but had to remain in place (giving out-of-date directional information) until the floor tiles were replaced.

5. **MAPS.** There are other ways of providing information to people about the environment in order to improve the ease of wayfinding. Maps of the area or building can be provided in order to facilitate wayfinding. Most large public buildings, retail complexes, educational facilities, exhibition areas, urban housing areas and hospitals provide the user with some form of a map. These are usually provided in either a portable leaflet form or on a larger scale diagram positioned within or outside the building or area. For example, Lewisham Hospital (London) provides users with a large map of all of the hospital buildings for patients to find the area they require. It is positioned so that patients or visitors who have parked their car would walk past it, together with those who have arrived at the hospital on foot. Some shopping centres have leaflets with the location of the retail outlets on them; a good example of this being Milton Keynes shopping centre. Simple maps of airport terminals are now available on the Internet and can be downloaded and printed off for personal use, although the level of detail is rather limited. Mail shots contain similar information, although the emphasis is on facilities available rather than a detailed guide for 'lost' passengers.

Despite the level of map usage, there appears to be very little in the way of map theory. There are several different types of maps: plans, views and, lastly, fantasy drawings. Sometimes plan and view maps can be combined. You Are Here (YAH) maps are considered as a separate entity. The simplest and most useful types of YAH

maps are found in large cities and show a street plan of the local neighbourhood. They are usually plan maps located on the wall of a building or a flat area that give the user an idea of their position in relation to the immediate environment and an idea of how to reach their intended destination. There are two main systems of presenting YAH maps; those requiring mental rotation and pre-aligned. Mental rotation maps are those that are drawn with respect to fixed directions, such as with North at the top. They do not take into account the way that the map will be positioned in the area or building that it represents.

The pre-aligned map is one that has been drawn or placed so that the top of the map matches the direction that the user is facing when using the map. One problem with YAH maps is that often users do not know if they need to rotate the image to make it fit the real situation; therefore, in some instances, the maps can be misread. In one study, it was noted that one in three people walked away in the opposite direction to the one they intended when faced with a YAH map. Moreover, the task of mentally rotating a map can be quite hard, if the user is unfamiliar with the local area or buildings and the landmarks. Thus an aligned map is often a clearer option, though even these can be sources of possible confusion. The orientation of YAH maps can vary and therefore does need to be considered very carefully. In general, however, maps can provide the user with many different types of information and thus do not lend themselves to further classification. A good example of an airport terminal YAH map can be found at Madrid Barajas Airport. The map is correctly aligned and shows the different levels of the terminal. It is not a map for those in a hurry but contains a wealth of information for those with time to spare.

Plans show similar information to YAH without indicating the location of the 'reader'. There are two main types of plans: true-to-scale plans and schematic plans. True-to-scale plans are drawn up to indicate the exact metric characteristics of a place, object or system, for example, architectural plans for a building. Therefore, they often contain planning symbols of some sort. Schematic plans indicate the relative positions of the places on the map without the distances being correct with respect to scale. The diagram may be simplified, or the scale altered in order to give a better overview. The classic example of a schematic plan is the London Underground map. It was designed in 1932 and, in updated form, is still in use today. The map is not geographically accurate; if it were, the central London stations would be indistinguishable. However, its message is very clear.

6. VISUAL IMPAIRMENT. For those of the population that are visually impaired or blind, wayfinding is somewhat more complicated. The user group is surprisingly large as in the UK alone there are over one million adults whose sight is so bad that they cannot read signs placed in the external environment or inside buildings. In addition to this number, there are others who are dyslexic or who cannot read. Statistics from the USA Bureau of the Census puts the figure for those who are unable to read printed signs from a normal viewing distance at nearly 10 million people.

Although their ability is limited to information provided by other senses, such as hearing, touch and smell, blind people do not like to be dependent on others for information. Because of this, recent technological developments have aimed to provide alternative means of identification and direction information. For example, new systems have been designed that convert a written message or visual display into

speech. The information is available in a number of languages. However, airport terminals are still an unfriendly environment for the visually impaired, primarily because of the noise levels and multiplicity of signage and also because the high-roof architectural style of a terminal results in the signs being fixed or suspended a considerable distance above floor level.

7. CONCLUSIONS. Different environmental cues are used depending on whether wayfinding is undertaken outdoors or indoors, and whether the wayfinding conditions are recreational, resolute or emergency. Many different visual or spatial variables are used in order to wayfind indoors and, for those who are visually impaired, other options are becoming available to aid wayfinding. Thus, wayfinding in an airport terminal building is a complex issue. The building structure itself appears to have a strong impact on performance, and this must be considered further.

To determine how successful an individual airport terminal building is in terms of wayfinding efficiency, it is worth considering the following:

- (a) What use is made of visual guidance systems and how effective is it?
- (b) How do such systems 'blend or match' with the overall architecture of the building?
- (c) Are there sufficient and appropriate signs placed at decision-making areas (departures, toilets, emergency exits, gates etc.)?
- (d) Are the signs appropriate and understandable for children, elderly people and visually impaired travellers?
- (e) Are the graphics clear, relevant and visible from a reasonable distance?
- (f) Are the graphics standardised in terms of international accepted signage and the corporate identity of the airport operator?
- (g) Do the signs 'clutter' the view of the terminal such that some signs become 'invisible' to the eye and therefore useless?
- (h) In overall terms is there an effective wayfinding strategy that establishes clear routes throughout the terminal building?

With the major growth in civil aviation, and increasing number of passengers using airport terminals, the issues are becoming increasingly important. The airport operators can no longer allow passengers to get lost and just follow the crowd.

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