

Wayfinding in Complex Medical Facilities: The Indexicality of Directional Arrows

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Abstract

Objectives, Purpose, or Aim: The aim of this article is to contribute to the better design of wayfinding systems by explicating the indexical properties of directional arrows and their consequences for wayfinding behavior. **Background:** The challenges associated with designing for the wayfinding needs of the different groups of users continue to be documented with the poor design of built environments being largely to blame for the wayfinders' inability to navigate complex settings. Directional arrows have been found to be especially problematic in such settings. **Methods:** Ethnographic data were collected and analyzed over a period of 3 years in three overlapping phases. The unique adequacy requirement of methods, which stipulates that the methods used to produce a description of a situation should originate from the situation they describe, was adopted. **Results:** Directional arrows derive their meaning from the position they occupy within the physical environment and from three sources: the spatial configuration of the setting, the positioning of the sign within the setting, and the directional arrow itself. The affordance closest to the sign will be taken as the one which the sign refers to. Wayfinders treat that affordance as being indicated by the arrow until such time as it becomes apparent that it is not. **Conclusions:** In response to the need to find lasting solutions to the enduring problems of wayfinding, this article demonstrates how better design of wayfinding systems can be achieved by explicating the indexical properties of directional arrows and their consequences for wayfinding behavior.

Keywords

wayfinding, hospital, human factors, nurses in design, unique adequacy

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Despite the ongoing work of researchers and groups like the International Standards Office (ISO) to design and test graphic symbols, the problems that users encounter in deciphering designers' intended meaning persist (Patton et al., 2015). The problem is perhaps nowhere more acute than in the design of wayfinding systems for complex hospital facilities. Bubric et al. (2020, p. 19) point out that hospital visits can be stressful experience and that "hospitals need to allocate resources to optimize and simplify navigation within their facilities." They propose a user-centered approach to the evaluation of wayfinding systems which can be adopted by hospital managers to evaluate the navigability of their own hospitals. While Bubric et al.'s emphasis on user-centeredness is helpful, this article, rather than adopt a formal method of evaluation, reports on ethnomethodological research which seeks to derive generic principles for wayfinding design directly from user experience. The researcher, who is the lead author, participated as a wayfinder in complex hospital settings, experiencing for herself the difficulties of navigation. She also observed and interviewed other wayfinders in situ.

This article focuses on the use of the directional arrow, an element of the wayfinding systems investigated which was found in our research to be especially troublesome. Such arrows are ubiquitous, and wayfinders were found to regularly experience difficulties in interpreting them. The meaning of arrows which are identical in appearance will vary according to their placement; the meaning changing according to the spatial relationship between the sign and other features of the setting. Thus, settings with different features confer different meanings upon identical arrows, while changing the position of a sign within a setting can also change its meaning. However, little attention has been paid to the development of guidance for the placing of such signs. Current advice to designers is examined below and suggestions are given for improving it.

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Thinking About Wayfinding: Affordance and Indexicality

The architectural features of any built environment should communicate the relevant wayfinding information (Arthur & Passini, 1992), while good wayfinding design should consider the behavior of people in real time as they process the information needed to navigate complex settings (Passini, 1996). This advice resonates with Norman's (2013) concept of perceived affordance between artifact and user. The term "affordance" was coined by Gibson (1977) to refer to the actionable properties existing between the world and an "actor" (a person or animal). He viewed affordances as part of nature, pointing out that they do not have to be visible, known, or desirable. Norman adapts this thinking to design, arguing that the art of the designer is to ensure that the affordances which an artifact provides are readily perceivable by users.

It follows that the built environment should be designed in such a way as to communicate which features afford wayfinders with access to their destination; the basis of good place making is to ensure that people are always able to orientate and position themselves, irrespective of their location. Much work has been done on the design of self-explicating built facilities, which are easy to navigate. While it is unlikely that wayfinding signs will ever become completely redundant, the best designed buildings have succeeded in reducing their need to a minimum. However, these remain exceptional. Wayfinding needs remain low in the priorities of architects. Meanwhile, a legacy of old and complex-built facilities is likely to remain with us for the foreseeable future. Furthermore, constant changes in use, driven by technological advance and evolving healthcare needs, mean that wayfinding systems must be continually updated. It is common in the United Kingdom (UK) to find that new facilities are built as additions to existing ones in response to pressing need, adding to the complexity of already complex facilities. In consequence, clear wayfinding signs will remain an important element of medical facilities.

Wayfinding signs use words or symbols to convey information about affordances of access;

typically, the name of a destination, often in combination with a directional arrow. Our focus here will be on these directional arrows, which we have found in our research to be particularly troublesome for wayfinders. The concept of indexicality is employed as a way of describing how these wayfinding aids are understood by users. An indexical is a linguistic expression which changes meaning according to the context in which it is used (Braun, 2017). Peirce (2014) distinguishes between three types of expression or sign, according to their relationship with the object they signify: icons, or diagrammatic signs, which bear a physical resemblance to the object which they represent; general names, or symbols, which signify an object through an association of ideas or habitual connection; and indexes (more commonly called indexicals), such as pronouns, which direct attention to an object without offering any description of it. Each of these types is said to take its meaning from a different source: the icon, bearing some resemblance to the object of its meaning, contains that meaning within itself (think, for instance, of a map or a “children crossing” sign); names or symbols, having no inherent connection to their object, owe their meaning to convention alone. Indexicals, however, stand in a direct relationship to their object at the time and place of their use; if removed from that context, meaning is lost. Classic indexicals include such terms as “here,” “that,” and “I,” whose meaning has long been thought to be entirely dependent on the context of their use. Thus, the indexical directs attention to an object without offering any description of it. Without further information such signs convey little meaning, as compared to the visual representation embedded in icons, or symbolic meanings of terms such as “door,” “corridor,” and “stair.” Thus, while most linguistic terms have traditionally been considered to have a more or less objective meaning, indexicals do not have this property. This instability of meaning has created difficulties for formal logic, leading scholars to give it a great deal of attention; in addition to Peirce, philosophers as various as Husserl, Russell, and Goodman have striven to distinguish between indexical and objective expressions (Garfinkel, 1992). However, no

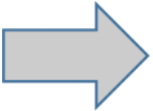

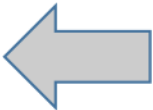





definitive list of indexicals is agreed among theorists (Braun, 2017).

We might treat directional arrows as indexicals, as they clearly point to something, albeit something as abstract as a direction, but this convenient classification is not so simple to achieve. On the one hand, they might also be characterized as icons, each being a diagrammatic representation of the direction indicated (see Table 1). On the other, it is not clear to what extent the interpretation of arrows relies on convention and may thus differ across cultures. While arrows are used to indicate direction in the Western cultures we researched, this is not necessarily true in all places at all times. Thus, each of Peirce’s categories might be applicable.

Kaplan (1989) points out that classic indexicals do indeed contain an element of constant meaning. Thus, “here” contains the concept of location; “now,” the concept of time. He distinguishes between two types: “demonstratives,” such as “there,” or “he,” which require a gesture of pointing to give them meaning, and “pure” indexicals, such as “here,” or “I,” which do not. Semiotic research into the directional arrow is limited. Fuller (2002) conducts a rare study. While she is concerned with broader cultural implications than interest us here, we can draw two lessons from her work: first, that directional arrows can indeed be treated as linguistic devices; second, the relationship between signs and objects remains a fundamental principle of semiotics. This is problematic when treating directional arrows, since they perform two functions: providing information and controlling traffic. This double identity as sign and action prompts Fuller to call for an “ontological revolution.”

Wittgenstein (1958) argues that to understand meaning in terms of the relationship between a sign and an object can be misleading and that greater clarity can be achieved by focusing on use. In a similar vein, Garfinkel (1992, 2002) points out that a term derives its precise meaning from the particular occasion of its use and that *all* terms thus have indexical properties. Terms are reflexive to the setting in which they are employed, they contribute to the constitution of that setting, and their meaning is simultaneously derived from it. These reflexive indexical properties are orderly

Table 1. Standard Positioning and Meaning of Arrows as per British Standard BS5499.

Directional Arrow	British Standard BS 5499 Definition	Directional Arrow	British Standard BS 5499 Definition
	Right from here		Right and down from here
	Left from here		Right and up from here
	Straight on from here, or straight on and up from here.		Down and left from here
	Straight on and down from here		Up and left from here

and thus amenable to study, consisting of “organizationally demonstrable sense, or facility, or methodic use, or agreement among ‘cultural colleagues’” (Garfinkel, 1992, p. 11). In treating directional arrows, Garfinkel’s (1992) observation on spatial indexical expressions has particular relevance, “...just what region a spatial indexical expression names depends upon the location of its utterance” (p. 5). The full implication of this approach to language cannot be explored here but has been rehearsed elsewhere (see, e.g., Button, 2019; Hutchinson et al., 2008).

Drawing on this background, we propose that it is possible to specify a spatial grammar which renders definitive meaning to directional arrows by giving due recognition to relevant features of the setting in which they are placed. The confusion caused by improper positioning of arrows will be examined to reveal the precise ways in which they draw their meaning from the context within which they are placed. Rather than look for the meaning of a sign by asking the question

“what does it represent?” we ask “what does it do in its current setting?” Our claim is that the answer lies in the directly observable *in vivo* experience of wayfinders, without the need for interpretative speculation. This claim is explored in the section on method below, but first we will examine current advice on the placement of directional arrows.

Current Advice on the Meaning of Directional Arrows *In Situ*

The Department of Health (DOH) guidelines (see Table 1) are currently viewed as best practice in the UK (DOH, 2005, p. 97). This work offers a useful formulation of rules on the placement of directional arrows for the purposes of wayfinding, in general, in addition to the standard fire safety regulations. Miller and Lewis (1998) derive these guidelines (see Table 2) from British Standard BS5499 designed for the purpose of fire safety and evacuation.

Table 2. The Department of Health Guidelines Derived From British Standard BS5499.

1. Directional signs must have clear direction indicators—usually arrows
2. Avoid using unclear or misleading arrows which may cause confusion
3. The direction the arrow is indicating should be easy to understand and easy to relate to the actual environment
4. Arrows should be positioned consistently on all directional signs at your site
5. Directional signs should be consistently positioned so people know where to look for the information
6. The destinations on directional signs should be consistently listed in a logical order, such as alphabetical, or by type of destination
7. Avoid trying to direct people back the way they have come. The types of arrow used to convey this message are often difficult to understand
8. There should be a directional (or locational) sign at each key decision point.
9. The direction shown by the arrow should be easy to understand and relate to the actual environment
10. If a route is not visible from a directional sign, additional reassurance signs may be necessary until the indicated route is visible

The DOH guidelines relating to directional signs distinguish a directional sign from other signs “in that it has an arrow or other directional indicator that shows people which way they need to go” (DOH, 2005, pp. 96–97). Table 2 contains reformatted guidelines to which numbers have been assigned for the purposes of reference (the original guidelines are presented as bullet points).

A close analysis of these guidelines reveals commonly cited qualities of directional signs, such as style, signaling, sequencing of information, limitations on the information conveyed, and traffic flow (see Guidelines 2, 5, 6, 7, and 8, respectively). It is made evident that consistency of meaning is crucial to the utility of directional signs. It is also recognized that the meaning of a sign varies according to where it is placed (Guidelines 3 and 9), though no guidance is offered as to how such variation occurs or can be controlled. Here, the guidelines emphasize general features of the environment, such as visibility and readability on approach; not

obscured or surrounded by clutter, not too high nor too low for people to read comfortably.

Researching Users Experience of Wayfinding in Complex Facilities

The research was guided by the unique adequacy (UA) requirement of methods (Garfinkel, 2002; Rooke & Rooke, 2015). The requirement consists of two criteria, one regarded as weak, the other as strong. The weak form requires that the analyst/researcher is familiar with the methods ordinarily known and used by members of that setting. This is proposed as a criterion for adequate ethnography, the most certain method for acquiring such knowledge being to participate in the practices under study. For the purposes of this research, the researcher visited unfamiliar hospital settings in order to understand firsthand the methods used by wayfinders in those settings.

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The strong requirement concerns the reporting of research; it requires that the methods of analysis used to report on a setting should be derived from that setting. This precludes the introduction of theoretical explanation such as those adopted by Scollon and Scollon (2003). In contrast, no theoretical interpretation can be offered of wayfinders’ behavior, and no hidden cognitive processes suggested. Rather, the aim is to provide a description of members’ methods as they are employed in practice. The research asks how do wayfinders select and understand relevant physical properties of a setting in order to make sense of that setting? The descriptions offered here are specific, temporal, and local. However, they provide for inductive, generic, and falsifiable recommendations, the veracity of which can be checked against the reader’s own experience in settings similar to those described.

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Ethnographic and auto-ethnographic data were collected and analyzed over a period of 3 years in three overlapping phases. First, a self-reflective retrospective study of the lead author's own wayfinding experience prior to commencing this research. Second, an in-depth study of the problems of wayfinding at an old and complex hospital in the UK; this was the main case study which constituted 10 separate visits over a period of 11 weeks. Finally, a series of brief ethnographic studies carried out in selected settings in other parts of the UK (Manchester, London, Birmingham, and Scotland) and the world (Denmark, Italy, United States, and Germany). In addition to hospitals, these visits enabled the study of other complex environments such as airports, hotels, the London underground network, and railway stations encountered during the field trips. Exposure to these settings ranged in duration from 30 min to 1 or 2 days in the case of hospitals and hotels.

In all cases considered, the researcher was able to study the way in which elements of the wayfinding systems in the various places are designed and how visitors to such settings make sense of the wayfinding information made available to them. Initially, all aspects of wayfinding were considered, and the topic of directional arrows was identified as one of particular importance, both for the ubiquity of such signs and the frequency with which they presented difficulties. It is findings from this aspect of the research which are presented here although the wider context of the research included the use of maps, directories and other wayfinding devices, and traversing actual routes from vehicle entry to destination. We can, of course, only present findings about the wayfinders we observed. Others may have had difficulties of which we cannot be aware.

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All phases of the research followed the methodological advice of Francis and Hester (2004) to

focus on an observable feature of a setting, ask how that feature has been produced and made observable, and describe the methods by which the feature has been locally produced and made observable. That is to say, in the case of a directional arrow, the researcher observes its meaning in particular settings and, in the course of analysis, identifies how that meaning is constituted by wayfinders in the context of its positioning. Two types of observable features are relevant to this research: first, the interpretive procedures used by wayfinders; secondly, the disorientation wayfinders display in their behavior when wayfinding communication breaks down. That these breakdowns occurred where the researcher had also found ambiguity or obscurity confirms that her interpretations were not idiosyncratic. Fulfillment of the weak requirement is crucial to establishing the accuracy of both these types of observations: in the first case, the researcher's own competence as a wayfinder; in the second, her ordinary social skills in recognizing, and confirming through conversation, the disorientation of others.

While it was not always possible to differentiate between good wayfinding communication and familiarity with the setting, wayfinders sometimes displayed observable confusion, such as walking in one direction and then another, standing and looking around, sighing, or tutting. Ambiguities in wayfinding communication were treated as naturally occurring breaching procedures (Garfinkel, 1992). Such procedures were artificially introduced into settings by Garfinkel in order to disrupt them, thus revealing the methods used by members of a setting to maintain the orderliness of that setting. In effect, the rules by which wayfinding successfully proceeds are most clearly revealed when breakdowns occur. In some instances, wayfinders could be heard sharing their frustration verbally with whoever happened to be around. The researcher was often a recipient of these communications. A feature of wayfinding difficulties is that a request for help constitutes a legitimate reason to engage a stranger in conversation, this provided the researcher with opportunities to conduct short spontaneous interviews with other wayfinders.

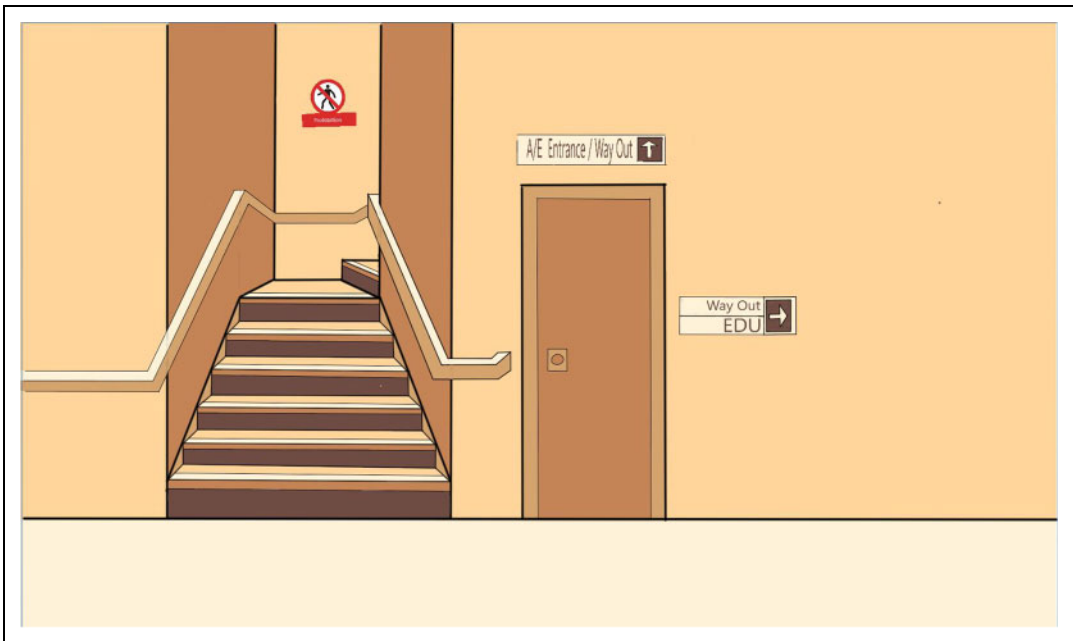


Figure 1. A setting with ambiguous and confusing wayfinding instructions.

Findings: The Interpretation of Directional Arrows

In the subsections that follow, the alternative meanings of three types of directional arrows—vertical, horizontal, and diagonal—are analyzed. Starting from the standard meanings currently championed as best practice, we demonstrate that additional meanings arise from the positioning of the arrow within the physical environment.

How Wayfinders Understand Directional Arrows

In reading a directional arrow, a wayfinder must first identify an arrow as one which points to their destination. This is possible because the arrow is either incorporated into the same sign—on the same line in a multideestination sign—or merely proximate to a sign bearing a destination name. They are then able to seek an affordance of access for which the arrow can be seen as a relevant indicator. This relevance is provided by the spatial proximity of the affordance to the direction indicated by the arrow.

Thus, the meaning of the arrow derives from three sources: the spatial configuration of the

setting, the positioning of the sign within the setting, and the directional arrow itself. As a general rule, the affordance closest to the sign will be taken as the one which the sign refers to. Affordance is treated as being indicated by the arrow until such time as it becomes apparent that it is not. Only in exceptional circumstances do these variations of meaning lead to confusion, on most occasions, wayfinding is a seamless activity and no breakdown of communication can be observed.

Vertical Arrows

As per the BS5499 definition given in Table 1, an upward pointing vertical arrows can mean either “straight on from here” or “straight on and up from here.” The setting represented in Figure 1 is what wayfinders used to encounter as they walked through a set of double doors at the end of a short corridor. Both the stairs and the door were in full view and on the sign above the door were the names of two destinations: A/E Entrance and Way Out. To the right of this text could be seen an upward pointing arrow indicating direction. The two signs on the wall to the immediate

right of the door indicated two destinations (Way Out and EDU), with horizontal arrow pointing to the right.

The first time the researcher encountered this setting she read the sign above the door as meaning straight ahead through the door, a reading that relies upon the understanding that a sign above a door indicates that the destination written on the sign is to be reached through that door (Rooke et al., 2010). Unfortunately, the door in question was a locked cupboard. A second interpretation, relying on the omission of the accident and emergency (A&E) destination from the signs on the wall, read in conjunction with the upward pointing arrow above the door was that the A&E is on the next floor up accessible via the stairs. However, at the top of the first flight of stairs was a sign forbidding entry. While the text on this sign was quite small, the pictogram was clear from the bottom of the stairs. When the researcher decided to follow the directions on the wall to the right of door, she then discovered that the A&E department was located outside the setting.

As a competent and knowledgeable wayfinder, the researcher returned to the setting on several occasions in order to observe the behavior of wayfinders encountering the setting for the first time. Those new to the setting could be observed walking up to the door and looking first at the sign above the door then immediately to the ones on the wall and back again. This would be followed by an expression of confusion once they discovered that going through the door and up the flight of stairs was not an option. They would then figure out (as the researcher had done previously) the only possible action to take. This ambiguous relationship between the physical properties of the built environment and the encoded information on the sign is apparent in the behavior of users of the setting, who issue spontaneous expressions of frustration or irritation, pacing up and down looking this way and that. The positioning of the arrow here leads to three observable interpretations which are clearly dependent on the physical layout of the environment at this precise point. The first interpretation, "through here," depends upon the proximity of the wayfinding instruction to the door. The second reading, "up a level," which

is clearly an effort to repair the breakdown of the first instruction, is determined by the proximity of the door to the stairs once it becomes apparent that the door in question is to a locked cupboard. The third interpretation, "right from here and out," is a reading that arises from realizing that entry to the next level via the stairs is prohibited. These findings show that the meaning of the arrow is, at least in the first instance, to direct the eye. The wayfinder first directs their gaze in the direction indicated. Noticeable features of the environment are then incorporated into the interpretation of the arrow to give it a definite meaning. This, of course, raises the question of what constitutes a "noticeable feature." We have noted several affordances here: a door, other signs, a flight of stairs, and a corridor. These features constitute perceived affordances (Norman, 2013) which invite the wayfinder to move toward them. This is consistent with the DOH guidelines derived from British Standard BS5499 (DOH, 2005) which emphasize the need for directional arrows to relate to the actual environment.

Following the analysis of the behavior of wayfinders at the setting described above, the replacement of the upward pointing arrow with one pointing to the right and removal of signs to the right of the door was recommended. However, the facilities management team's immediate reaction to both recommendations was complete removal of all the wayfinding signs followed by redecorating the setting. Further study of the refurbished setting revealed that wayfinders were no longer experiencing wayfinding difficulties.

In summary, a vertical arrow adjacent to a perceived affordance of access is read as instructing the wayfinder to proceed along that route (this was found in other settings to be equally true of arrows pointing vertically down). For example: when placed near a flight of stairs or a lift, it is read as either "up from here" or "down from here," depending on the nature of the affordance; when placed near a door, it will be read as "enter here, this is your destination" or "go through here." The first seen affordance determines the meaning of the arrow. When they find that an interpretation is not viable,

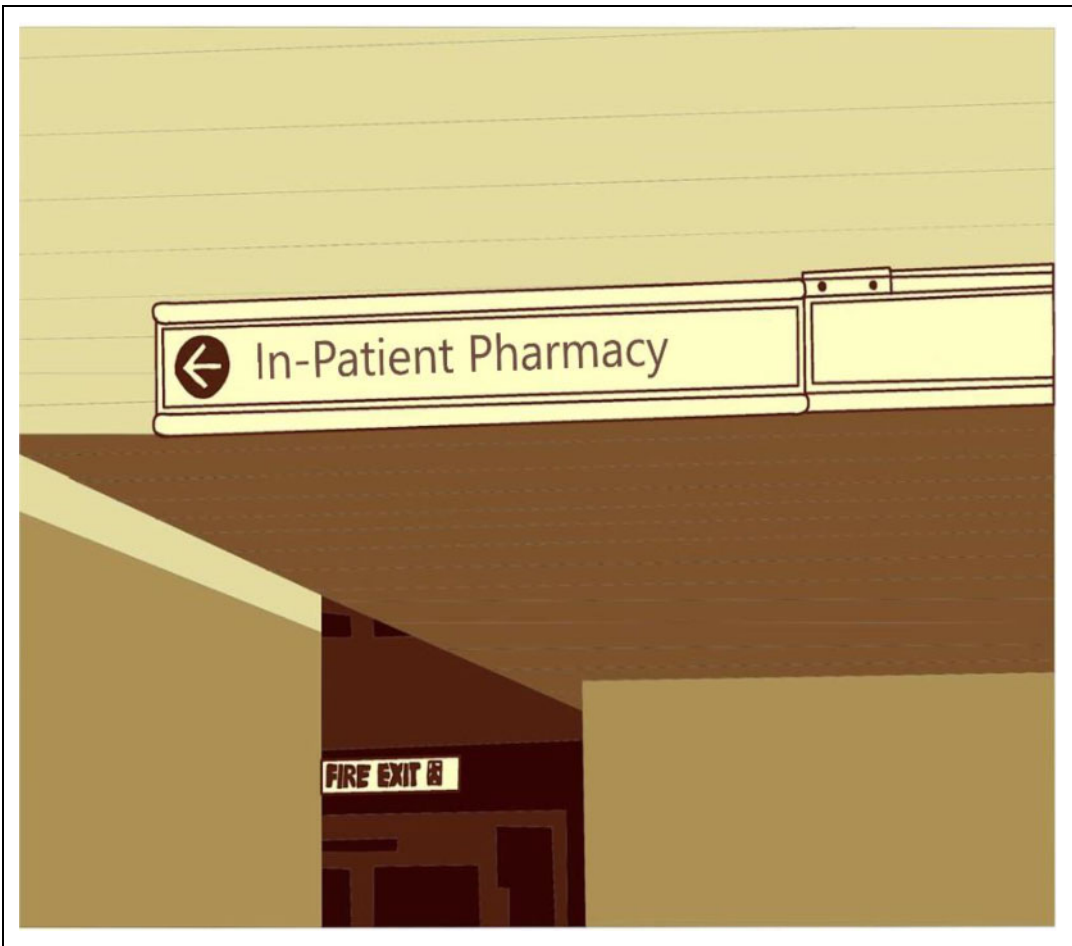


Figure 2. An example of an alternative meaning of the left pointing horizontal arrow.

wayfinders search for an alternative affordance in order to derive the meaning.

The first seen affordance determines the meaning of the arrow. When they find that an interpretation is not viable, wayfinders search for an alternative affordance in order to derive the meaning.

Horizontal and Diagonal Arrows

The setting represented in Figure 2 is of a left pointing horizontal arrow which announced the position of the destination immediately adjacent thus resulting in the interpretation of the arrow as “your destination is here.” Crucially, this was

found to be unproblematic for wayfinders. The wayfinders observed approaching this setting exhibited no signs of confusion as to what their next action was to be. They did not look for a left turn as might be supposed. As wayfinders approached the directional sign, they turned in the direction that the arrow indicates to see a further sign announcing their destination. Here, the spatial positioning of the sign, particularly its proximity to other potentially relevant features of the environment, was crucial to how meaning was constructed. The pharmacy operated from a counter positioned immediately below the second sign. Therefore, the message communicated here arises from the fact that the counter is recognized as a physical feature for services rather than one



Figure 3. An example of an alternative meaning to right/downward pointing arrow.

allowing entry. Also, there are no other features that would provide for an alternative interpretation. A feature such as a corridor or a door, for example, would have given rise to an alternative meaning. Again, the meaning of the arrow is, in the first instance, to direct the wayfinder's attention rather than to indicate a direction of travel. The nature of the perceived affordance thus indicated (the pharmacy counter) completes the meaning of the sign.

Figure 3 shows an example of an arrow communicating the intended message "this is your destination," despite the downward slanting arrow being situated on the first floor thus giving rise to the interpretation that the destination is on the floor below. Again, spatial proximity and the in situ production of meaning are key to the effectiveness of this sign. The door to the photobiology unit is immediately to the right of the sign. Wayfinders approaching this setting are not presented with any other feature such as stairs or lifts which could give rise to alternative interpretations and experienced no confusion.

An arrow pointing to the right or left, either horizontal or downward diagonal, can be read as indicating a direction of travel but also a destination. Wayfinders may not know which is the case until they are close enough to the arrow to discover the relevant affordance.

Proximity as a Principle of Spatial Grammar

Thus, proximity is a crucial concept in the spatial grammar of directional arrows. Wayfinders understand an arrow as referring to another feature of the immediate environment and look to see what that feature is. As the fieldwork shows, the closest suitable candidate in the direction indicated is taken as the referent, the nearest feature which offers a perceived affordance being selected as the referent. This will generally be to the right or left, depending on where the arrow is pointing, but for a vertical arrow (whether pointing up or down) the wayfinder will generally look first below the arrow.

The meaning of a directional arrow then can be seen to have two components: a directional

Table 3. Generic Rules for Placing the Directional Arrow to Take Account of Indexical Properties.

Applying to all arrows	<ul style="list-style-type: none"> • The arrow will be interpreted in relation to perceived affordances in the immediate environment (corollary: do not use arrows to indicate affordances that are not immediately visible) • The arrow will be taken to indicate a particular perceived affordance, depending on a hierarchy of interpretation relating to proximity and direction • The arrow will be interpreted according to the following hierarchy of rules, starting with the first and moving on to the next if that fails to supply a viable direction
A vertically pointing arrow will refer to	<ul style="list-style-type: none"> • The adjacent or nearest affordance • A vertical egress in the same direction as the arrow (up or down)
A horizontally or diagonally pointing arrow will refer to	<ul style="list-style-type: none"> • The affordance closest to the direction indicated

indication, derived from its graphical form and accepted use; and an indexical referent derived from its spatial proximity to a perceived affordance in its immediate environment.

Design Recommendations

A uniquely adequate approach to wayfinding requires that to understand the meaning of directional arrows, we place ourselves in the position of wayfinders on actual occasions of wayfinding activity. This is the approach we encourage designers to adopt. Generic advice to “pay attention” to the context in which arrows are placed is sound as far as it goes, drawing attention to the existence of indexical properties, but it does not provide guidance to how attention is to be paid. The detailed observation and analysis presented in this article is offered as an example to follow.

The alternative meanings of directional arrows arise from their indexical properties. Taking the methodological advice that these properties are orderly and stable, and therefore available for analysis, we have outlined a logical grammar of their actual use, showing that (1) perceived affordances in the environment contribute significantly to the meaning of directional arrows in situ and (2) the meaning of a directional arrow unfolds sequentially for a wayfinder during their journey. Using the two findings highlighted above, it is possible to reformulate some of the advice given to the designers of wayfinding systems. A logical extrapolation of the findings

suggests the set of rules for determining the meaning of directional arrows given in Table 3.

The alternative meanings of directional arrows arise from their indexical properties.

Rethinking the DOH Guidelines to Take Account of Indexical Properties

Great care must be taken when following standard guidelines such as those prescribed in British Standard BS 5499: 1990: Part 1. While such guidelines are useful, a blind adherence to them may lead to confusion, especially where the physical layout of an environment is too complex to explain with signs. Findings from the fieldwork reveal meanings that differ significantly from those indicated by the standard definitions. In particular, the meaning of the arrows in Figures 2 and 3 depart from the standard definitions, “left from here” and “down and left from here,” respectively. On both occasions, their meaning is “this is your destination.”

Findings from the fieldwork reveal meanings that differ significantly from those indicated by the standard definitions.

The best practice guidance recognizes the importance of context in that it advises that “arrows should be positioned consistently, and you should use standard positioning [...] (see

Table 4. Suggested Changes, Enhancement, or Additions to the Current Department of Health (DOH) Guidelines.

DOH Guidelines Underpinned by British Standard BS5499	Suggested Enhancement and Accompanying Advice	List of Revised DOH Guidelines Including Proposed Changes in <i>Italics</i>
<p>Guideline 4: Arrows should be positioned consistently on all directional signs at your site</p> <p>Guideline 5: Directional signs should be consistently positioned so people know where to look for the information</p>	<p>While this advice is in itself sound, it has been found to be of only minor importance to wayfinders. It is suggested that the guidelines be qualified with the phrase “wherever possible” A broader definition is to be given to the term “consistently” to include clarity of meaning</p>	<ol style="list-style-type: none"> 1. Directional signs must have clear direction indicators—usually arrows 2. Avoid using unclear or misleading arrows which may cause confusion 3. The direction the arrow is indicating should be easy to understand and easy to relate to the actual environment. When positioning the arrow be mindful of alternative meanings that could arise from its relationship with the physical features around it, take careful note of the environment in which it is placed
<p>Guideline 3: The direction the arrow is indicating should be easy to understand and easy to relate to the actual environment.</p>	<p>It is suggested that the two guidelines be merged as the instructions appear to be the same</p>	
<p>Guideline 9: The direction shown by the arrow should be easy to understand and relate to the actual environment</p>	<p>The following additional guideline is suggested: “When positioning the arrow be mindful of meanings that could arise from its relationship with the physical features around it. Take careful note of the environment in which it is placed”</p>	<ol style="list-style-type: none"> 4. Arrows should be positioned consistently on all directional signs at your site <i>paying close attention to possible changes in meaning due to the physical environment around them</i> 5. Directional signs should be consistently positioned so people know where to look for the information <i>paying close attention to the spatial layout of the physical environment</i> 6. The destinations on directional signs should be consistently listed in a logical order, such as alphabetical, or by type of destination 7. Avoid trying to direct people back the way they have come. The types of arrow used to convey this message are often difficult to understand 8. There should be a directional (or locational) sign at each key decision point 9. If a route is not visible from a directional sign, additional reassurance signs may be necessary until the indicated route is visible

British Standard BS 5499: 1990: Part 1 in Table 8) on all directional signs on your site” (DOH, 2005, p. 97). Given the consequences of indexical

properties examined in this article, we recommend the revision of current guidelines as detailed in Table 4. This should help make them

suitable for inclusion in any future ISO standard for effective wayfinding and/or evacuation.

Further Research

A further question which this research suggests, but is beyond its scope to answer, is: how is the decision made to place an arrow in a particular position—and who makes it? Possible scenarios include *inter alia*, precise instructions from a professional designer; ad hoc responses by estate managers to emerging problems; or on the spot judgments by maintenance operatives. Some of the wayfinding difficulties observed (see the setting portrayed in Figure 1 in particular) hint at an operative attempting to reconcile the instruction to place a particular wayfinding sign with intractable features of a setting which render the sign ambiguous. It may be that on many, if not most occasions, the operative is the only person to have considered the relation of the sign to an actual (rather than an imagined) setting. Notwithstanding these considerations, modern virtual technologies provide for visualization of actual settings in the design office and may allow for more realistic and precise instructions to be developed and communicated.

Conclusion

In response to the need to find lasting solutions to the enduring problems of wayfinding, this article demonstrates how better design of wayfinding systems can be achieved by explicating the indexical properties of directional arrows and their consequences for wayfinding behavior. It has been shown, using the concepts of indexicality and affordance, how the meaning of these signs changes according to the spatial relationship between the sign and other features of the setting and that changing the position of a sign within a setting can affect its meaning. A close analysis of current advice to designers relating to directional arrows reveals that insufficient attention has been paid to the dynamic role which arrows play in the design and operation of good wayfinding systems. This is clearly the case in the ISO standard whose interest is in general requirements and principles relating to the design and application

of location plans, maps, and diagrams used in public areas. Given the continued concern with the need for better wayfinding systems, a clearer guidance on how to manage directional and locational wayfinding signs is worthwhile. The observations, rules, and improvements proposed in this article should serve as a good starting point for those involved in the process of designing for good wayfinding. Furthermore, the ideas on indexicality of meaning in relationship to wayfinding affordances, coupled with research guided by the UA principle, offer a way forward into improving guidance for designers.

Implications for Practice

- Offers concepts and principles for the design and implementation of wayfinding systems in complex medical facilities, specifically regarding the use and placement of directional arrows
- Suggests specific improvements to the standard advice on the design and implementation of wayfinding systems
- Identifies common errors found in the placement of directional arrows


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