

Special Issue

**ORIENTATION IN THE
BUILT ENVIRONMENT**

Edited by Richard E. Wener

INTRODUCTION

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This special issue of the *Journal of Environmental Systems* is devoted to problems of orientation in the built environment. In particular, it is concerned with the human and social consequences of disorientation, and with the capacity of careful planning and design to reduce the likelihood of disorientation. The articles in this special issue attempt to demonstrate that: 1) the consequences of disorientation can be important and severe; 2) in many highly used public and private facilities, orientation issues have been largely ignored or inadequately considered; and 3) environment-behavior research can help develop strategies which can significantly improve environmental orientation.

The articles by Nelson-Shulman [1] and Hayward and Brydon-Miller [2] demonstrate the effects of orientation systems on comfort, stress, information gained, and satisfaction with the setting. Nelson-Shulman's study was conducted in a hospital admissions area during periods of very high and low density. She documents the role of information systems on patient and visitor stress—among other variables—in a setting in which the occupants are already often very tense. The Hayward and Brydon-Miller article, on the other hand, looks at a very different kind of environment—the recreational setting of an outdoor museum. More central to their study is the ability of the orientation systems in the museum to augment the entertainment and educational nature of the environment.

The articles by Carpman, Grant, and Simmons [3], Zimring and Templer [4], and Bronzaft and Dobrow [5] focus more on the way in which environment-behavior research can serve as a planning tool to establish an orientation system for general or for special users of an environment. Carpman, Grant, and Simmons report on a study of an ostensibly straightforward question—What do you call the below grade floors of a new hospital building? Their research shows that some traditionally used names do a poor job of helping visitors identify locations within the building, while other designations significantly reduce wayfinding errors. Zimring and Templer report on a series of studies designed to observe the way in which the blind use environmental cues to navigate. They provide a set of design guidelines for planning spaces which the blind can use and move through with greater safety and independence. Bronzaft and Dobrow discuss the state of information systems in modern transit systems, and present the results of several studies which describe methods for improving the quality of rider aids.

It is important to note that orientation is not simply a geographical exercise. Orientation also refers to developing programmatic knowledge about a space. We can feel just as lost by ignorance of what to do as by ignorance of where to go. As Hayward and Brydon-Miller indicate, orienting in a museum means knowing where exhibits are, but it also means having sufficient background information to be able to assimilate the educational experience [2]. Nelson-Shulman's study assesses the impact of providing informational pamphlets which described *how* the hospital intake procedures worked, as well as *where* facilities were [1]. In a similar fashion, as Bronzaft and Dobrow show, being oriented in a transit system means *knowing how to use* the bus (i.e., what it costs, what are the rules of transferring between buses, etc.) *as well as where* the stations and stops are [5].

When environmental complexity, combined with poor informational aids results in inefficient orientation, the consequences may be an increase in the time and effort required to reach a goal. The act of getting lost, however, usually entails something qualitatively more severe than that. As Lynch notes [6, p. 4]:

“ . . . let the mishap of disorientation occur, and the sense of anxiety and even terror that accompanies it reveals to us how closely linked it is to our sense of balance and well being. The very word “lost” in our language means much more than simple geographical uncertainty: it carries with it a tone of utter disaster.

In many areas and kinds of settings, from the urban scale to interior spaces, planners appear to have treated orientation issues as less than critically important. Bronzaft and Dobrow for example, note that transit systems have typically devoted relatively little time, effort, or financial resources to the development of unified and cohesive orientation aids [5]. There is much evidence to show that this level of inattention is clearly inappropriate. The nature of the problem with respect to orientation can be imposing for severity of effects and the incidence of “being lost.”

BEHAVIORAL EFFECTS OF DISORIENTATION

There is empirical evidence that insufficient use of orientation systems can result in significant human stress. Wener and Kaminoff studied the severely overcrowded public lobby of a jail in which there was very little help for visitors in identifying where to go or how to use the facilities [7]. They found a relatively high level of disorientation, confusion, crowding, and anger among visitors. Although orientation problems were considered secondary to the severe crowding, the only intervention possible was the addition of signs indicating where facilities were, and how to complete the visiting process. They found that this simple intervention significantly reduced perceived crowding, anger, and confusion, and reduced the number of navigational errors and requests for help. Nelson-Shulman also shows that increasing orientational aids in high density conditions reduces the number of requests for direction, the level of perceived crowding, and even physiological indices of stress [1].

Other studies have shown that disorienting environments can be a particular problem for the elderly, who may suffer from visual, physical, or mental impairments which make orientation and navigation more difficult. For example, Osterberg found that elderly institutional residents were visibly upset when trying to negotiate areas with confusing layouts, but were less upset in areas which had more regular floor plans [8]. In the most severe case, Pastalan and Bourestom have shown that improving the orientation of the elderly to a new home during forced relocation can reduce the death rate which results from the stress of the move [9].

In addition to the stress on individuals, disorientation can lead to stresses for organizations. Seidel has reported that in the sprawling new Dallas/Fort Worth airport the problems passengers have in finding terminals and baggage claim areas has led the airlines to hire thirty-four additional employees to provide directions [10]. Bronzaft and Dobrow mention that orientation problems can lead to the ultimate hardship for a service organization [5]—they can cause the customer to stop using the service! There are copious other anecdotal examples which describe the stress and frustration that can result from severely disorienting environments (see references [11, 12, and 13] for more detail).

DISORIENTATION AND LOSS OF CONTROL

One theoretical position which can be useful in helping to understand the nature of stress from disorientation deals with the aversive consequences of loss of control and predictability over the environment. In this context, the concept of control refers to the ability of an individual to adjust or regulate the presence or absence of significant environmental or social events. The presence of environmental control implies that the individual can obtain positive

contingencies or avoid unpleasant ones by regulating his or her own behavior. When these consequences are “non-contingent” it means that their occurrence is unrelated to the individual’s behavior.

There is ample evidence that the availability of real or perceived control is a critical parameter in many forms of environmental stress. Glass and Singer, for example, have demonstrated that the psychological and physiological effects of most forms of noise are minimal except when the noise is unpredictable and uncontrollable by the subject [14]. When the noise cannot be controlled by the subject, exposure can result in increased behavioral and physiological measures of stress and reduced tolerance for frustration. Baum and Valins found that dormitory designs which allowed for increased control and predictability of social contacts led to reduced perceived crowding, more tolerance for frustration, and more openness to social contact [15]. Control has been found to be an important variable in determining the level of stress resulting from exposure to many kinds of environmental factors, and in many situations [16-18].

Seligman has suggested that repeated exposure to “uncontrollable,” aversive events can lead to a state he called “learned helplessness.” [19] This syndrome has behavioral, emotional and cognitive consequences, and can be characterized by stress, withdrawal and depression. Helplessness learned in one setting may generalize to other settings, so that the subject may act as if there is no control available over the situation, even when that is not objectively true. Averill has suggested a distinction between three kinds of control [20]: behavioral, cognitive and decisional. Whereas behavioral control has to do with the manipulation of events, cognitive control refers to the ability to process information in such a way as to reduce the stress, while decisional control refers to the ability to make choices in the selection of outcomes. Langer and Saegert suggest that cognitive control can allow people to reduce stress where behavioral control is lacking, by changing the way in which they focus on and attend to the situation [17].

These models can have some straightforward implications for understanding the stress of disorientation. In attempting to orient in and navigate through a space, control can be seen as accruing when: 1) people can identify where they are, where they are going, and how to achieve their goal on their own, without referring to others for help; 2) the environment allows them to make clear choices about where to go and what to do; and 3) the information available removes uncertainty and ambiguity from the situation.

For example, the individual may be able to easily determine his/her own actions when the setting provides sufficient cues as to the location and operation of critical elements, through layout or aids such as signs and maps. Lacking this kind of environmental clarity, the individual can turn to other, although less clear, environmental sources of information. The other users of a space can provide cues as to what to do and where to go. One can simply observe these others to gather the necessary information. By seeing where others go and how they act we can glean information about the location of facilities and/or how

those facilities are meant to be used. These strategies can carry with them some other unpleasant consequences, however. While observing others can be useful, it is usually an ambiguous, indistinct, and occasionally inaccurate source of information. By following the crowd on its way out of the subway station you may find the exit to the street you want, but you could also end up at an unwanted subway transfer point.

Asking others for help as a strategy involves a different set of problems. It forces the subject to make social contact with strangers. While strangers can be very helpful in some situations, they may not be in others. Their response is unpredictable, and therefore can in itself be a potential source of stress. Saegert has theorized that dense situations in which individuals are forced to interact with others can lead to "social overload," and the perception of crowding and stress [21]. Studies of crowding and dormitory design have found that this kind of unwanted contact leads to helplessness and withdrawal [15]. In the Wener and Kaminoff study one of the main behavioral consequences of the addition of signs to the lobby was the reduction in the level of looking to others, and overtly asking others, as a way of obtaining directions [7].

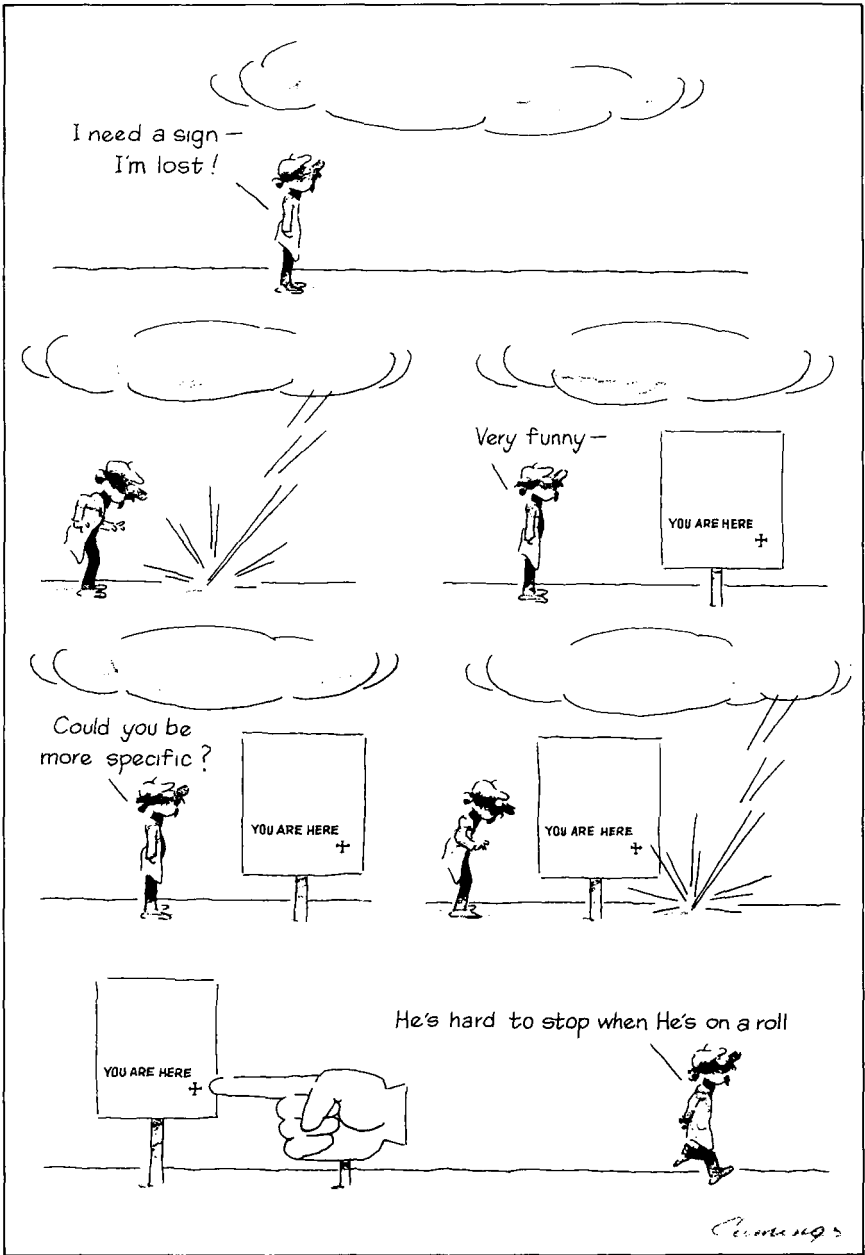
The remaining possible strategy for the disoriented traveler is to avoid others and attempt to find "where" and "how" through exploration and wandering. This is at best effortful and inefficient (though occasionally serendipitous), and at worst confusing, stressful, and potentially panic producing, and in itself can be the kind of uncontrollable aversive situation which can lead to helplessness.

Increasing the legibility of spaces, then, can serve to reduce or avoid stress by placing the means for orienting and navigating within the grasp of the individual. By observing the "latent" as well as the "manifest" cues of the environment [13] the traveler can identify necessary locations and routes through a setting.

Providing information can help reduce stress in other ways. Passengers on an airplane waiting at the gate, or on a subway stopped in a tunnel may feel less anxious when told the cause and likely length of their delay, than if, as commonly occurs, no information at all is provided. The reduction of the ambiguity of the situation may itself provide a means of establishing some cognitive control on the situation, and may allow the passenger to make decisions about this or future trips.

THE INCIDENCE OF DISORIENTATION IN THE "REAL WORLD"

It is increasingly clear that the effects of getting lost can be severe. There is growing evidence that the incidence of getting lost in large scale public and private settings may also be high. A number of studies and anecdotal reports have documented the fact that getting lost is a significant problem, at times almost the norm, in many settings, such as in homes for the elderly [23, 24], academic buildings [13, 22], or airports [10]. Seidel for example found that



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Figure 1

20 percent of passengers arriving at Dallas/Fort Worth airport had difficulty finding their way to the baggage area, and 75 percent did not understand the layout well enough to be able to help direct others. With 15,000 passengers a day, this can lead to problems of major proportions.

Bronzaft and Dobrow show that having difficulty finding ones' way around the New York City subway system is common for non-work trips [15], which account for approximately 50 percent of all trips on that system. If only a small fraction of those trips (say 1%) result in a misdirection, the outcome would be hundreds of thousands lost per day. Again, even if most of those merely took inefficient routes and only a small fraction of this population was truly lost, there would still be thousands of lost souls wandering through the subway system daily.

The potential stress effects, and system inefficiencies from riders monopolizing staff time with directional questions, are staggering and may be repeated in many other transit systems, and other large scale settings. There is evidence, for example, that many of the ubiquitous "You Are Here" maps are ineffective. Levine studied "You Are Here" maps in laboratory settings, and found that for these devices to be effective they must show several points of correspondence between map features and structures in the environment [25]; and they should be aligned with the users' own perspective (that is, straight up on the map should be straight ahead for the user as he/she faces the map). If these features are lacking, as is true for many "You Are Here" maps, they may be worse than useless. They may actually increase the likelihood of the user making a wrong directional choice.

Lerner and Collins have studied fire safety egress symbols and found that these symbols are not always effective in communicating meaning [26]. Many international symbols may be singularly ineffective in showing the user, for example, what doors should or should not be opened in case of a fire. The critical nature of these behaviors demand especially careful attention to issues of how people respond to information which can guide them to safety through life threatening situations. For example, do the "Heimlich Maneuver" signs in many restaurants, which try to show how to aid people choking on food, provide information in a format which an otherwise naive customer could use to help a fellow patron in an emergency?

IMPROVING ORIENTATION IN BUILT ENVIRONMENTS

It is clear then that disorientation can be stressful, inefficient, and dangerous to the individual and to an organization, and that the scope of the problem is significant. What kinds of responses can social science and environmental design research make to ameliorate the situation? Research in this area, as represented

by the articles in this issue, has identified features in environmental design which affect orientation, toward the development of guidelines for planners.

It is important to consider these issues and plan for them early in the design process. Carpman, Grant, and Simmons have been involved in the early stages of planning for the University of Michigan Replacement Hospital, for example, and have conducted detailed studies to identify behavioral choice points where signs should be, what terminology should be used in signs [27], as well as what kinds of names should be given to floors [3].

With Weisman, we agree that inherent legibility of a space is critical [13]. The use of signs is not likely to be able to overcome the confusion of an incoherent space. There is some evidence as to what environmental characteristics lead to "inherent legibility." Winkel, et al. [28], and Bronzaft and Dobrow [5] note that regularity and simplicity of plan are helpful in quickly learning the nature of a space. Sivadon suggests that the presence of perpendicular axes in a layout aids orientation [29]. Weisman notes that Lawton's research in geriatric hospitals support the notion that open visual access of a space aids orientation and willingness to explore [13]. Being able to see the available options allows for easier directional choices. This is supported by Archea's theoretical model [30] which suggests that people tend to prefer areas which are high in visual access and low in visual exposure. That is, there is a preference for places from which much can be seen without giving up personal privacy.

Lynch developed a set of principles which attempt to identify features which contribute to the "imageability" of a large scale setting [6]. He suggested five critical elements whose presence can increase the ability of a user to identify the layout and navigate through it:

- landmarks (clearly memorable, distinctive, identifiable features).
- paths (major routes through a space).
- nodes (intersections of major paths).
- edges (distinct boundaries of identifiable areas).
- districts (socially or physically distinct, cohesive neighborhoods).

The importance of these features in generating clear spaces has been supported by several studies [11].

Lynch's landmarks are not unlike the "latent" features Weisman notes can be critical in differentiating spaces to make it easier to find one's way around. Elevators, plants, artwork, distinctive furniture, color coding, can serve to distinguish spaces and serve as internal landmarks to aid wayfinding. Weisman also suggests that training can be useful in helping users, especially the elderly, learn to use features to orient in a setting. He found significant positive effects of a simple slide presentation training method in a geriatric setting in helping residents find their way around. Similarly, Hanley found that the use of signs coupled with behavioral training in orientation was more effective than signs alone in helping elderly, mentally impaired patients successfully navigate through

an institution [31]. Hiatt indicates that latent, often very subtle cues, may be particularly important for orientation in the mentally impaired elderly, who typically use “. . . actual shapes, air currents, smells and tactile cues to orient themselves” more efficiently than color coding or large graphics [p. 11, 32].

The kinds of design or training procedures used to aid orientation should of course, vary with the nature of the problem. Winkel, et al. found that different kinds of orientation devices had different effects [28]. In their study of museum visitors, they found that signs were generally more effective aids than maps. Signs were more efficient in helping visitors avoid backtracking and unwanted exhibits, and in conveying the sequence of exhibits. Maps, on the other hand, did better in informing visitors about what exhibits were in a particular section, and helped to reduce the number of missed exhibits. Hayward and Brydon-Miller also describe the different kinds of effects and levels of usefulness of various kinds of orientation devices in museum settings [2]. Some of the orientation devices they observed were singularly ineffective in aiding visitors.

CONCLUSION

As with many areas of environment-behavior problems, the first requirement for achieving design which is more responsive to orientation problems is for those responsible for planning settings to recognize that there is a problem. Confusing and disorienting settings are pervasive in this society, and result in considerable individual and organizational stress. As the articles in this special issue show, environment-behavior research can respond to this situation by identifying ways to improve orientation systems for general and special populations. It can also play a vital role by systematically testing proposed solutions to see how well they really work, and where improvements can be made.

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