Description

Wayfinding encompasses the information-gathering and decision-making processes people use to orient themselves and move through space; simply put, how people get from one location to another. Wayfinding design is a human-centered approach that builds on the findings of research in cognition and environmental psychology to design built spaces and products that facilitate the movement of people through urban settings and individual buildings. Successful design of wayfinding systems allows people to (1) determine their location within a setting; (2) determine their destination; (3) develop a plan to take them from their location to their destination; and (4) execute the plan and negotiate any required changes (Mayor's Office for People with Disabilities: 43).

Architectural Wayfinding Design and Information Wayfinding Design? are mutually reinforcing and complementary design strategies for creating successful wayfinding systems, which require the collaboration of architects, graphic designers, and management to achieve coordination of internal building and external site design features. Architectural wayfinding design addresses the built components of wayfinding design, including spatial planning, articulation of form-giving features, circulation systems, and environmental communication. Information wayfinding design encompasses all sensory-based information systems, and, more recently, GIS-based systems.

Importance

Successful wayfinding design is integral to universal design because it fosters easy comprehension and use of built entities (region, city, neighborhood, building, park, landscape feature). It includes overall spatial organization of the setting, articulation of form-giving features, individual architectural and environmental features, and information provision. Design of building features can assist users to find their way and maintain their sense of orientation, factors that contribute substantially to their satisfaction and frequency of use of a built setting.

Well-timed delivery of information is also critical to wayfinding, but new approaches concentrate on innovations in built form, architectural messages and wayfinding devices to reduce signage, which can be confusing or unsuccessful when layered on poorly designed site or architectural features. Signage is no substitute for good design; however it is often necessary as a post-occupational strategy or with the evolution of building usage (Peponis, Zimring, and Choi: p. 560). The designer should remember, however, that the wayfinder is concerned principally with how the route is structured rather than with the environment through which it passes, so that environmental features may only be learned to prompt turns or mark distances along segments (Golledge, 1999: 9).

Successful wayfinding systems increase user satisfaction and frequency of use. Additionally, reducing capability demands can widen the group of potential users by lowering the frustration and stress of users, increasing building friendliness and productivity, and reducing danger and hazard to users.

Good wayfinding design is directed at the broad universe of users: people with a variety of perceptual abilities, bilingual or multi-lingual populations, children and aging users. Global population trends have stimulated new interest in providing for reduced abilities related to aging in universal design generally, such as reduced visual ability, memory loss, physical deterioration (reduced endurance, strength, and balance, requiring motorized compensation in fast-moving environments like airline terminals.

Wayfinding strategies should communicate effectively to the broadest group possible, including people with a wide range of sensory, physical, language and intellectual abilities; social and cultural backgrounds; age, gender, and stature differences (Arthur and Passini, 1992, Chapter 8; Lavine, 2003: 54; Orleans, 1973; Stea and Blaut, 1973; Weber and Charlton, 2001; Allen, 1999).

Women tend to have less spatial confidence than men (Lawton et al, 1996 and 2001; Lawton and Kallai, 2002; Frank, 2002) and rely on localized landmarks for wayfinding, while men use globalized configuration strategies to find their way or give directions (Bever, 1992; Couclelis, 1996). Since many aspects of spatial cognition and representation are learned and shared by societies, age-related and cultural differences in spatial construction and description, representation, and wayfinding are also wide (Downs and Liben, 1985; Suzuki and Wakabayashi, 2005).

The designer needs to consider other, more profound human differences. For example, while humans learn routes unidirectionally in a laboratory, in practice they learn routes in both directions, coming and going. Unidirectional learning is the primary way moderately retarded persons learn routes (Golledge, Parnicky, and Rayner, 1980), and also more common in some mentally able blind or visually impaired persons because their orientation and mobility training teaches only route following rather than layout learning (Welsh and Blasch, 1980, cited in Golledge 1999).

Despite its demonstrated importance to building use, costs, and safety, wayfinding receives less than its due in planning, research and building evaluation. Often the investment in wayfinding systems is less than that devoted to amenities like art and furnishings. Planning for wayfinding systems begins at the earliest stage of design, and often incorporates participation of user groups. Similarly, post-construction evaluation can identify further problems of wayfinding, but wayfinding systems are often not evaluated until a serious problem occurs.

The documented cost of being lost is real: 1) lost staff time; 2) reduced staff concentration caused by the need to provide directions or other interventions; 3) lost business and dissatisfaction due to frustration and ill-will of users; 4) costly missed appointments or delayed meetings; 5) additional security staff and traffic management costs; 6) compensatory environmental communications systems; 7) potential law suits surrounding lack of safety and accessibility; 8) danger to users wandering into limited access areas of buildings; and 9) injury and death during emergency situations (Arthur and Passini, 1992; Carpman and Grant, 1993 and 2002; Zimring, 1990).

Finding one's way in a building or site is a critical task. The stress caused by getting lost and the potential impact on accomplishing one's goals makes this activity a particularly

important concern for all building users. Buildings should be designed to accommodate infrequent visitors as well as regular building users, and people with sensory limitations, an especially vulnerable group. For example, people with hearing losses and communications impairments may find it difficult to obtain directions from knowledgeable inhabitants, and people with visual impairments cannot rely on visual information. Enumerating the capability demands placed on the user by wayfinding features or products helps identify groups unable to use a system or its features no matter what the reason (Coleman, Lebbon, Clarkson, and Keates, 2003).

In his influential 1960 book, *The Image of the City*, architect Kevin Lynch first used the term "Way-finding" to describe how individuals navigate the city using its paths, edges, landmarks, nodes, and districts. Cognitive research in the 1970s expanded Lynch's static concept of spatial orientation into a dynamic, process-oriented understanding of wayfinding that is better aligned with the realities of human information gathering and decision-making. While Lynch's pioneering research on the spatial image of the city has been contested in its specifics by later researchers (see Downs and Stea, 1973: 79-85), most of the elements he identified as essential to the formation individual mental images of cities (or cognitive maps, to use the term coined by Tolman in 1948) are still acknowledged as important design considerations for architects and urban planners alike.

In the two decades following the publication of Lynch's book, researchers sought patterns in architecture related to human behavior and the formation of cognitive patterns and maps, researching how the layout of built structures influenced human emotions and movement. Christopher Alexander and his collaborators published two books in the late 1970s (*A Pattern Language*, 1977, and *The Timeless Way of Building*, 1979) that still find attentive audiences. In *Architecture: Form, Space and Order* (1979; reissued without much change in 1996), Francis D.K. Ching's describes the influence of built form and architectural design and space on human behavior and identifies patterns of movement in built structures motivated by qualities of architectural space. The enduring popularity of these works suggests that they succeeded in enunciating qualities of wayfinding design that are still valid. In a parallel trend, other researchers were developing principles of human-oriented product design (Norman, 1988), many of which are important to wayfinding design.

In 1992, University of Montreal architect and environmental psychologist Romedi Passini collaborated with the late Toronto designer Paul Arthur on *Wayfinding: People, Signs, and Architecture* in 1992 (reissued in 2002), a seminal work that the codified architectural and cognitive research on wayfinding. Arthur and Passini (1992) were the first to distinguish architectural and information components of wayfinding, compile relevant evidence, and translate it into design guidance.

The vast field of human cognition and cognitive mapping research has been covered by several recent literature reviews (see Kitchin and Freundschuh, 2000 for psychological and geographical literature, and Burgess, Jeffery, and O'Keefe, 1999 for neuroscience; also Golledge, 1999; Golledge and Stimson, 1997; Hart and Moore, 1973, Gould, 1973; and Tversky, 2003). These researchers subscribe to the theory that people form 'cognitive maps' of their surroundings, acquiring, storing, and refining information in a schematized and structured form.

Arthur and Passini found that wayfinding is more than generating a static mental map of a spatial situation as suggested by Lynch. Humans make decisions as they move through a space that depend on information and cues received as they move. Environments are complex entities perceived by a person through activities; "environmental perception is…directed and purposeful perception" (Arthur and Passini, 1992: 33). A wayfinding decision is behavior (turn right, go up, look for information) in response to an environmental entity (intersection, stairs, billboard) (Arthur and Passini, 1992: 31). Information that is not directly applicable or relevant information that is buried within a complex body of information may not be perceived at all or be screened out and not remembered, making "information at the wrong place is as good as no information at all" (Arthur and Passini, 1992: 34)

The analytical techniques developed since the late 1970s to identify and collect topological information and compare settings are known as {[Wayfinding.SpaceSyntaxAnalysis | space syntax analysis]]. While it was initially developed by Hillier and Hansen in 1984, it was first used for wayfinding research in 1990 (Peponis, Zimring, and Choi, 1990; Haq and Girotto, 2003). Prior research on the relationship between humans and their built environments had focused on how people acquire knowledge rather than on actual variations in their environment. As a result, there was "a scarcity of theories and analytic techniques to deal with the architectural environment as a knowable morphology" (Peponis, Zimring and Choi, p. 556). Space syntax researchers set about applying techniques of space syntax analysis "to describe and quantify structural properties of building layout" (Peponis, Zimring and Choi, pa. 556).

As early as 1990, these researchers determined that "after a relatively brief exposure to a building, people tend to consistently direct themselves toward spaces from which the rest of the building is more easily accessible. Thus, they seem to acquire an understanding of the configurational properties rather than merely relying on landmarks, signs, or other cues" (Peponis, Zimring and Choi, pa. 556). Additional experimental and observational studies of the relationship between environment and cognitive maps have determined that while three classes of spatial relations form the content of spatial cognition—topological; projective, and Euclidian or metric relations—cognitive space is primarily topological, dependent on relative location of places rather than their precise direction or distance (Penn, 2003: 30; Haq and Zimring, 2003).

Wayfinding research is complex for many reasons. While they rely on mental maps more than any other information for wayfinding, most humans are unaware of their wayfinding strategies, and find it difficult to report them (Golledge, 1999: 27, 34). Wayfinding is "purpose-dependent, and it is difficult to attribute any specific cognitive psychological process to wayfinding generally" (see Golledge,1999, p. 27-31 for a discussion of purpose-dependent variations in wayfinding criteria). Most current research focuses on consolidating information on general principles of wayfinding and space cognition; applications in specific building types; wayfinding issues related to specific impairments or population groups (visual, hearing, development, cognitive, situational, literacy, mobility impairment; aging populations, children, gender- and culture-based differences, people with dementia); and new developments in wayfinding products?.

Wayfinding issues surface at all levels of scale in planning: regional, city, neighborhood, street systems, public transportation, parking, building complexes, infrastructure and amenities, and individual building layout. Research has shown that wayfinding strategies are different at different scales. In outdoor situations, properties of spatial layout are more important than program in determining patterns of movement, while inside buildings, movement "can be understood primarily in terms of specific purposefulness rather than spatial regularity" (Peponis and Wineman, 2002: 280).

Urban wayfinding systems use such things as the design and organization of landscaping, urban amenities, and buildings as spatial indicators. In buildings, movement control can be "strong" or "weak depending on the nature of the building and the purpose of the organization, although spatial layout and signals play a strong role for first-time visitors (see Architectural Wayfinding Design for more information on these issues).

Human cognitive maps of countries, regions, cities, and buildings are discontinuous; distorted by experience that transforms distance and direction; schematicized by psychosocial and idiosyncratic factors; heavily invested with psychological and symbolic meaning; augmented by nonexistent phenomenon; and vary culturally and by group differences (gender, age, economics status). For example, urban residents of higher socioeconomic status tend to have more accurate and complete spatial maps than poorer residents or immigrants (Orleans, 1973).

Cognitive perception varies in its extensiveness, clarity and completeness, so it is important for the designer to research potential users whenever possible (Downs and Stea, 1973: Chapter 1). However, wayfinding is not just a matter of individual perception, cognition, and behavior, but "a macro issue involving the physical and operational environments in which it occurs" (Carpman and Grant, 2002: 427. While design is an art, wayfinding principles come from the user, from behavioral and psychological studies of real people (evidence). These evidence-based principles of wayfinding must be translated into built and graphic form through spatial planning and environmental communication.

Related Guidelines

Architects and designers are relative late comers to wayfinding, long a topic of concern to environmental psychologists, and can benefit from acquiring the more-specialized, in-depth knowledge that has accumulated in other and related fields. Guidelines are no substitute for more comprehensive research into wayfinding, spatial cognition, and space syntax, but can serve to orient the designer developing a wayfinding plan and maintaining it over time in the face of changes in the urban space, the building, and its occupants or users (Carpman and Grant, 2002: 427).

Donald Norman's *The Design of Everyday Things* is a good starting point for general design guidelines to make any product or space more user-friendly. Some general guidelines for wayfinding design are found below. For more specific guidelines, go to the architectural wayfinding? and information wayfinding? topic pages.

1. Facilitate wayfinding for all individuals, regardless of abilities, to expand the potential user group for any facility. Research and be aware of differences in wayfinding competencies in potential user groups, such as men vs. women, older vs. younger people, and people of different abilities (Arthur and Passini, 1992)

2. Wayfinding should be designed for the first-time visitor because repeat visitors can use their past experiences for navigation. (Lynch, 1960). Keep the mental state of the visitor in mind when designing wayfinding systems (e.g., distracted, tired, tourists with jangled nerves; worried patients at a medical facility) (VanderKlipp, 2006).

3. While comprehensive and collaborative planning should be initiated between architects and graphic designers early in the design process, designers need to acquire the specialized tools of good wayfinding design, including participant research, user involvement in design, and evaluative research and design assessment tools (Arthur and Passini, 1992).

4. The best-designed wayfinding plans change over time as urban space and building uses change, or buildings are added to, restored, or otherwise modified. They may also change in relation to exterior modifications and larger changes in cultural changes. One solution is to provide information in ways that are easily updated (VanderKlipp, 2006); another is post-occupancy studies, which can refine existing designs, as can studies prior to building renovation, redesign, or in response to user complaints (Garling, Book, and Lindberg, 1988; Brown, Wright and Brown, 1997).

5. Provide users with an ordered environment that has "a clear possibility of choice and a starting-point for the acquisition of further information." (Lynch, 1960: 4).

6. Provide users with a clear visual sweep of the site or building on entering to afford them an overview of their surroundings, so they can see a large number of elements and their relationships, at the same time giving them a sense of their relation to the whole (Lynch, 1960: 43). The panoramic experience not only "delights", but helps the user obtain a view of the larger spatial configuration that reinforces memorability. Distinctive views of plantings, water views, and views of shocking or unexpected sites such as large changes in scale or color variation, can also assist users to construct wider mental maps, as can strong contrasts of spatial configuration, materials, and landscaping (Lynch, 1960: 43-45).

7. Give visual dominance to pathways, with their own characteristics of space, view and motion, because they are the main influence in forming mental maps of a space (Lynch, 1960: 44-45).

8. Use design to reinforce already existing social meaning, not to negate it (Lynch, 1960: 46).

Research and Development Needs

Carpman and Grant call for broader research that explains how people use simultaneous wayfinding cues; how humans give and take directions; and how organizations make

wayfinding design decisions, and for real-world observation of common wayfinding strategies and correction of wayfinding mistakes (Carpman and Grant, 2002: 438). Continued research is needed on behavioral response to architectural features; for example, while Arthur and Passini consolidated research to the point of their 1992 book, they disagreed with principles put forth by other designer (eg. Ching on circulation systems).

While some designers assume that wayfinding principles are the same at all scales, more research is needed on the differences in interior and exterior wayfinding (Peponis and Wineman, 2002), on wayfinding differences between first time and regular users, and differences in strategies used by significant population groups. Newly emerging GIS-based wayfinding systems need more research, to determine how they are used and in what ways they are replacing more traditional wayfinding technologies. Material on various building types is uneven, and various impairments, like dementia, receive more attention than others.

Greater integration of environmental psychology, space cognition, and space syntax research into design programs would allow students to become familiar with basic principles of wayfinding design and incorporate findings into more experimental phases of design. On the professional level, detailed wayfinding-related reviews of site, building, and landscape designs would improve practice, as would post occupancy evaluations of existing buildings (Carpman and Grant, 2002: 438).

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