Chapter 17:
Problems in Visitor
Orientation and Circulation

Stephen Bitgood
Jacksonville State University

Introduction

The topic of orientation and circulation was not my first choice for this paper. I would much rather have chosen subject areas that I know more about. For example, exhibit labels or exhibit design. I chose orientation and circulation because it is, in my opinion, the most neglected area of visitor studies. It is also one of the most important areas since it influences whether or not people actually visit a museum/park/zoo/aquarium, whether or not visitors see particular exhibits, what they learn from their experience, what they tell friends and relatives, and whether they will return.

Considered broadly, visitor orientation and circulation is related to all aspects of the museum experience. Orientation problems do not start at the front door. They begin long before people enter the facility and continue long after they are home again, since visitors pass on their experiences to their friends and relatives who in turn develop their own expectations (see Adams, 1988; Hayward & Brydon-Miller, 1984). Thus, orientation and circulation play a key role in marketing/public relations, education, audience research, exhibit design, and visitor services. In a sense, systems of orientation and circulation tie these various areas together.

We have all experienced the slings and arrows of outrageous orientation systems – when we can't find our way to our destination; when we can't find our way inside a building; when we can't find the rest rooms; when we can't find our way out of a building; or when we can't find where we parked our car. Most of these slings and arrows can be avoided if our orientation and circulation systems are carefully designed. In this paper we will identify some of the major problems in orientation and circulation and make some suggestions for minimizing these problems. While systems of orientation and circulation are most critical for first-time visitors, it would be a mistake to ignore the effects of these systems on repeat visitors. Recently, we evaluated user orientation in a

medium-sized shopping mall and found that a high percentage of users did not know what was located in the back corridors of the mall, despite the fact that the vast majority of these shoppers used the mall at least once or twice a month (Bitgood & Hulac, 1987). Repeat visitors may also need orientation if the facility has changed since their last visit. We recently found at the Alabama Space & Rocket Center (Bitgood, 1988) that many of the repeat visitors had not visited in the last three or four years. Since substantial additions have been made in the Center during that time, visitors were surprised to find that there were many new areas.

There are three major elements to visitor orientation and circulation: conceptual orientation, wayfinding, and circulation. Conceptual orientation (also called "thematic" orientation) includes an awareness and understanding of the themes and subject matter organization of the facility. Although visitor expectations and prior experiences play a key role in conceptual orientation, the most important factor appears to be on-site orientation systems. The role of both 'off-site' and 'on-site' orientation will be discussed below.

Wayfinding, or "topographical" or "locational" orientation, involves being able to find or locate places in a facility. Orientation devices such as maps and direction signs are critical for wayfinding. Other factors such as the complexity of the facility can also have a profound impact on wayfinding.

Circulation describes how visitors make their way through the facility. What pathways do they take? Do visitors circulate the way the designers intended? Do visitors miss key exhibits because of the architectural design of the facility? Which direction do visitors turn when they reach choice points? Do visitors have a circulation strategy (e.g., "Turn right and follow the perimeter") or do they simply wander more or less aimlessly?

It is obvious that orientation and circulation are intimately tied to one another. Factors that affect one are likely to affect the other. Because of this close relationship, we believe that it is extremely important to consider these two factors together. Orientation will influence the circulation patterns of visitors and circulation designs influence the users' orientation.

For purposes of this paper, problems of orientation and circulation will be divided into seven problem areas. Each will be discussed individually. These problem areas are:

• Pre-visit or off-site

- Arrival at the facility
- Finding support facilities (restrooms, food, gift shop, etc.)
- Orientation and circulation during exhibit viewing
- Exiting or leaving the facility
- Measurement of visitors' orientation and circulation behavior

Literature on Orientation and Circulation

Readers unfamiliar with the literature on orientation and circulation are referred to several sources. The classic studies of Melton (e.g., Melton, 1935; 1936) are a must for all professionals dealing with visitors. In a series of observational studies, Melton demonstrated that visitors have a strong tendency to turn right when they enter an exhibit gallery and that exits compete with exhibit objects such that visitors often walk out an exit, whether or not they have viewed all or even most of the exhibit objects in the gallery. Melton showed that these results occurred in both art museums and science museums, and replication was obtained in several galleries. It should be noted, however, that the right-turn bias depends on several factors such as placement of attractive exhibits, signs that prompt turning in a particular direction, etc.

Literature on environmental cognition and cognitive mapping are relevant to orientation and wayfinding (e.g., Fisher, Bell, & Baum, 1984). Lynch (1960) suggested that one can describe such cognitive pictures in terms of five components: landmarks, paths, boundaries (edges), districts, and nodes (intersections). Designers of orientation and circulation systems would be wise to explicitly consider these components in the development of their systems.

Levine's (1982) work on You-are-Here maps also provides useful information for the designer of orientation and circulation systems. He suggests that a viewer must have two items of information in order to relate the map to the environment. A "You-are-here" symbol telling the visitor where he/she is provides one useful piece of information. Signs and labels on the map can also provide important information. Distinctive landmarks (asymmetrical structures) can aid the viewer in identifying location, and providing redundant cues is helpful. The map should be arranged so that it parallels or is aligned with the environment ("forward-up equivalence"). He suggests the "two-item theorem" for producing effective orientation: Either two pairs of points or one pair of points and a direction need to match in order to produce an overall figure match. Some of these principles were demonstrated in a later study (Levine, Marchon, & Hanley, 1984).

After studying a display at the British Museum (Natural History), Griggs (1983) formulated 13 recommendations for developing systems of conceptual and topographic orientation (wayfinding). While these suggestions are not exhaustive, they do identify some important areas of consideration. For example, Griggs advises that orientation be integrated into the development phase of exhibit areas instead of after-the-fact. Although it should not have to be said, Griggs insisted that orientation devices should be 'user-defined' instead of being 'defined' by the museum professionals. Many museums/zoos still appear to have a 'visitor-be-damned' attitude about their orientation systems.

Hayward and Brydon-Miller (1984) published an article that is unique in that it studied 'off-site' as well as 'on-site' orientation at Old Sturbridge Village, an outdoor history museum in Sturbridge, Massachusetts. They surveyed visitors in four areas of 'off-site' (pre-visit) orientation: personal recommendation (discussion with friends and relatives); school field trip (information from a child's visit or museum education program); read about facility (travel guides, books, advertising, brochures, newspaper articles); and visited a similar place (experiences at other museums). Over 70 % of the sample of visitors stated that they visited a similar place; 58 % stated that they had discussed Old Sturbridge Village with friends or relatives; 41 % had read about the facility; and 10 % received information from school trips.

Loomis (1987) reviewed most of the writing on visitor orientation in a separate chapter of his book, Museum Visitor Evaluation. This chapter has some very practical suggestions on how to evaluate museum orientation. Sample checklists and outlines are included and these materials should be useful to the novice evaluator. In addition, Loomis reviewed some of the literature on orientation in non-museum settings.

Cohen, Winkel, Olsen, and Wheeler (1977) evaluated board maps and direction signs in the National Museum of History and Technology. Both board maps and direction signs were found to improve visitor orientation, but each was used in a different way. Board maps were used primarily for conceptual orientation, while direction signs were used more for wayfinding.

Shettel-Neuber and O'Reilly (1981) studied orientation and circulation of visitors at the Arizona-Sonora Desert Museum in Tucson, Arizona. They used both direct observation and survey methods. Among other findings, they demonstrated that the circulation route of the visitor determined, to some extent, how confused visitors became during their passage through the Museum. One of the many points of interest

in this report was a rationale for obtaining visitor circulation patterns. First, people prefer a suggested path. Knowledge of visitors' preferred path can aid in selecting a suggested route since people may be more likely to follow a route that is freely chosen. Second, circulation knowledge can aid the facility in planning for exhibits and programs. Interpretive talks, special presentations, etc. can be timed and physically arranged to coincide with visitors' circulation patterns. Third, this circulation knowledge provides a basis for museum staff to alter visitor behavior.

Falk (1988) discussed several issues related to orientation and circulation in his book, The Museum Experience. For example, Falk cites a study of public school student groups visiting the National Zoo. This study showed that students who were given pre-visit orientation (what they would see, when they would eat lunch, when they would visit the gift shop, etc.) learned more than other groups of students even when they were given a more learning-oriented pre-visit preparation.

The above review only scratches the surface of writings available. The interested reader is encouraged to examine a special issue of Visitor Behavior (Volume 1, Number 4, 1987) for further information and references. Other references that readers may wish to look at include:

- Yoshioka (1942)
- Parsons & Loomis (1973)
- Pollet & Haskel (1984)
- Carpman (1986)

Pre-Visit Orientation

The first type of problem occurs before visitors get to the facility. As Loomis (1987) states: "Orientation begins with the images and messages that inform the public of the existence and location of a particular museum" (p. 165). Such pre-visit or off-site experiences are often not thought of as part of orientation by professionals in visitor studies. However, it is obvious, after a little reflection, that this aspect of visitor orientation is extremely important. We see three areas of possible difficulty during this stage of orientation:

- Prior visitor experiences and expectations
- Obtaining directions to the facility
- Following directions

Prior experiences and expectations. Visitors hold diverse
expectations of what they will experience before they visit an exhibition-
type facility (Hayward & Brydon-Miller, 1984). How do prior visitor
experiences and expectations influence orientation? Hayward and Brydon-
Miller found that about one-half of the visitors to Old Sturbridge Village
received information from friends and relatives. In addition, one-half to
three-fourths had visited similar facilities. These experiences clearly had
some impact on whether or not these people visited. At the present
time, we don't know how much these prior experiences and expectations
influence visitors. This is an important question -- one that should be
studied more thoroughly. The public has some stereotyped beliefs of
what museums, parks and zoos are like. We need to know these beliefs;
we need to change some misconceptions and foster the development of
more positive attitudes.

We also need to study the nonvisitor (e.g., Hood, 1983; 1987). Why
do people choose not to visit a facility? Hood (1983) suggests that
visitors do not perceive the facility as providing their desires.

Don Adams (1988) points out the importance of word-of-mouth in
public relations. Such word-of-mouth obviously provides pre-visit
orientation experiences to the visitor. Often the information from this
experience is inaccurate. Hayward and Brydon-Miller (1984) found that
visitors had misconceptions about what they would experience at a
historical village. On the other hand, Bitgood (1988) found that first-
time visitors were often knowledgeable in describing what they would
see and do at the Alabama Space & Rocket Center. Much of their
information came from friends and relatives who had previously visited.

*Suggestion: Evaluate word-of-mouth experiences and earmark
orientation experiences to your public relations efforts. This evaluation
can be accomplished through self-report measures (i.e., interview,
survey); but, remember that people have a tendency to tell you what
they think you want to know.*

Obtaining directions. I believe that visitors usually get their
directions from brochures, from road signs, from tourist information
centers, or from family and friends. To thoroughly evaluate an
orientation system, I think you need to know where visitors received
their directions. It is common for museums to ask where visitors heard
about the facility; but, it is rare for museums to ask where they obtained
directions. In our study at the Space & Rocket Center in Huntsville,
Alabama, we did ask such questions. We found that 78.5% of visitors
attempted to use the special Space Museum/Space Center road signs

directing people to the Center. Unfortunately, 18.9% found these road signs confusing because of conflicts in the signage, a lack of signs at critical points, and the size of these signs was relatively small.

Suggestion: Ask visitors where they obtained their directions and find out what problems they may have had in following these directions.

Following directions. You also need to know whether or not these directions were effective. Were visitors able to easily follow these directions? If visitors have difficulty following directions, the difficulty should not be attributed to the stupidity of the visitors, but rather to the inadequacy of the directions. When street signs are confusing, street numbers not easily read, and buildings not clearly marked, wayfinding can be difficult and frustrating. I recently gave up looking for a science museum in a Southern city because it wasn't where I thought it should have been and there was too much traffic to stop and ask.

Suggestion: Ask visitors if they had trouble finding the museum/zoo. You might also role-play a naive visitor and see if road signs and other types of directions are easy to follow. Type of transportation may also be important to investigate, since brochures that give directions should include public transportation and/or parking directions.

Arrival Orientation

Three common problems associated with arrival are: parking, finding the entrance, and entrance orientation.

Parking. Parking is often a problem in an urban facility. If finding parking spaces is a problem, it may be worth attempting to solve this problem. I have been discouraged several times from visiting a facility because of parking difficulties. Although I know of no empirical reports concerning visitors, I would not be surprised if this is an important reason for not visiting.

Suggestions: Determine (by survey) if visitors have difficulty parking. If so, provide directions to park or ride mass transit to your facility.

Finding the entrance. This can be difficult in large facilities. Many large museums have multiple doors, only one of which is the correct entrance. The entrance is not always clearly marked.

Entrance orientation. A more obvious problem and one that is discussed frequently in the literature (e.g., Loomis, 1987) is orientation (or lack of orientation) at the entrance to the facility. Screven (1986) suggested that there are three types of advance organizers that play a role in orientation: conceptual pre-organizers (brief information about exhibits); topographic organizers (e.g., simplified maps); and overviews (what can be seen and done; what can be learned). These advance organizers can be presented in several ways. Some facilities (such as Colonial Williamsburg) have an orientation center separate from the main exhibition area. Others have a small area as one enters the facility; others have orientation displays in each theme area of the facility; and others have little, if any, orientation. Skeptics might argue that each of these approaches is equally ineffective. However, I think there is evidence to suggest that orientation systems do work, if they are designed carefully. Both the placement and the content of these orientation areas is critical.

Suggestions: Entrance orientation should be designed to meet the following criteria: (1) attracting power (displays should elicit a high percentage of use); (2) holding power (visitor should use the displays for a sufficient amount of time to process necessary orientation information); (3) comprehension (visitor should easily understand information presented). To meet these criteria orientation devices should: be easily accessible to visitors (preferably in the visitors normal pathway); information should be concisely displayed (since visitors won't spend much time in an orientation area); involve multi-media (visitors seem to prefer a variety of devices including film, slides, posters); and not compete with exhibits (if exhibits are visible from the orientation area, visitors tend to bypass the orientation displays).

Orientation to Support Facilities

In times of need, locating restrooms may reach crisis importance. Why do some facilities appear to hide their rest rooms? After traveling in their cars to reach your museums/zoo/aquarium, families are likely to head for the rest rooms immediately upon their arrival. In addition to rest rooms, one must consider the location of gift shops, food concessions, and resting places for weary visitors. We have observed that in some facilities, people visit the museum specifically to purchase items or browse in the gift shop. If possible, it is a good idea to allow visitors to shop without paying entrance fees.

Suggestion: Visitors should be given information about the location of restrooms and other support facilities as they enter the building.

Orientation and Circulation While Viewing Exhibits

Exhibit viewing problems can be divided into three areas: (1) conceptual orientation; (2) wayfinding; and (3) circulation. Conceptual orientation and wayfinding will be considered together.

Conceptual Orientation and Wayfinding. Orientation devices come in many forms. Floor directories, wall maps, hand-held maps, direction signs, information kiosks, and information desks are some of the most popular. Many questions can be asked regarding orientation.

- What information do visitors want before they circulate through a facility?
- How can you design orientation devices that will be attended to?
- How would they like this information presented?
- Which orientation devices are actually used by visitors and how often?
- Where should these devices be placed in order to be most effective?

What kind of information do visitors want? Shettel-Neuber and O'Reilly (1981) studied orientation and circulation at the Arizona-Sonora Desert Museum. They asked visitors what information would have been most helpful before starting their visit. Most people (55.6%) wanted information on conceptual orientation (i.e., information about the exhibits and what to see). Only 18.5% wanted wayfinding information. It remains to be seen whether this data is typical of other facilities or not. If so, facilities need to do a better job giving information on conceptual orientation. Shettel-Neuber and O'Reilly also asked how visitors would like this information presented. Visitors were more likely to state that they prefer a short film (45%) or signs and posters (33%) than any other device. However, based on this data, we don't know which device they actually choose when confronted with a real situation. Self-report information can be misleading.

Designing orientation devices that will be attended to. Introductory orientation devices are often ignored, perhaps because visitors want to get right to the exhibits. Griggs (1983) found that visitors did not use orientation devices as they were planned by the museum staff. Only 49% of visitors were observed using the orientation exhibit and no

visitor spent long enough to experience the entire content. Griggs suggested that the orientation material was in competition with the exhibits. If orientation material is to be attended to, it must be designed in such a way that it is not competing with exhibits.

What devices are actually used and how are they used? Several studies have asked visitors which orientation devices they actually used. These studies suggest that hand-held maps are the most-used device for wayfinding. For example, Shettel-Neuber and O'Reilly (1981) found that 64.7% reported using the hand-held map, 44.1% used exploring; 32.4 % used knowledge from a previous visit; and 35.3% used direction signs. In a study at the Birmingham Zoo (Bitgood & Richardson, 1987) we found that 77% of visitors who received hand-held maps were observed using them. We also found that visitors who were given hand-held maps viewed a greater percentage of the exhibit areas (86%) compared with a group who were not given a map (78%). Hayward and Brydon-Miller (1983) found that 99% of visitors used the hand-held maps at Old Sturbridge Village, a facility with much greater circulation complexity than the Arizona-Sonora Desert Museum from the Shettel-Neuber and O'Reilly study.

The evidence is strong that hand-held maps are used extensively for wayfinding. However, we don't know how often hand-held maps are used for conceptual orientation. Casual observations suggest that hand-held maps are important contributors to conceptual orientation if enough information is provided.

Wall (board maps vs. direction signs). Cohen and her colleagues (Cohen, et al, 1977) found that wall maps and direction signs seem to serve a different function. Wall or board maps were used primarily to determine which exhibits to visit. Direction signs, on the other hand, were used primarily for wayfinding.

Visitors' understanding of exhibit themes is another area of conceptual orientation that must be carefully considered. We asked visitors at the Anniston Museum to match specific exhibits with theme areas of the Museum. Only four out of 15 exhibits could be accurately placed in their correct theme area. By "accurate" I mean that visitors were able to match the exhibit with the theme area above the 60% level. The average level of accuracy for all 15 exhibits was less than 40%.

Suggestion: Use formative evaluation in the development of a complete orientation system. Include visitor input at all stages of this evaluation.

Another common wayfinding problem occurs when visitors look for the location of scheduled events such as demonstrations, bus tours, etc. Wayfinding cues must consider such problems. Since staff are bombarded with wayfinding questions if the cues are not adequately provided, this is not a difficult problem to diagnose.

Circulation. It is generally assumed that visitors will circulate through most or all of the exhibit areas. Studies have shown that this is not the case. Whether or not visitors actually do circulate through particular exhibit areas depends upon three factors: (1) visitor characteristics (e.g., tendency to turn right; fatigue; boredom); (2) architectural characteristics (e.g., placement of exits) ; and (3) exhibit characteristics (e.g., size, movement).

Visitor habits appear to play a role in circulation. The classic studies on visitor characteristics were conducted by Robinson (1928) and Melton (1935). Melton (1935) described a series of studies showing that, in the absence of more powerful factors, visitors have a strong tendency to turn right. Many people when faced with a complex environment such as a museum or large shopping mall develop a strategy that follows the rule: "Take a right when entering the facility and follow the perimeter until you reach your starting point." However, at other times visitors appear to "browse" (c.f., Loomis, 1987). Loomis states: "Most visitors' movement through exhibits is closer to what Downs termed as a 'random walk process', where visitors move about without a clear pattern of progress toward any specific destination." (p. 162).

The architectural characteristics of facilities also play an important role in determining circulation patterns. As noted above, Melton convincingly showed the effects of exits in a series of studies. Obviously, physical barriers and direction arrows are useful devices for directing the circulation flow of visitors. In one study (Bitgood, Benefield, Patterson, Lewis, & Landers, 1985) we found that less than one percent of visitors violated directional signs in the Birmingham Zoo's Reptile House when the traffic flow was changed from two-way to one-way.

The role of lighting should also be noted (Loomis, 1987). Visitors are reluctant to enter dark areas. They are more likely to follow lighted pathways.

Finally, exhibit characteristics must be considered. Visually salient exhibits will draw the attention of visitors and influence their

circulation. Melton (1936) showed that introducing movement (from a gear-shaper machine) in a museum gallery changed the circulation pattern. Originally, most visitors turned right when entering the gallery. Movement from the gear-shaper, however, drew their attention and resulted in visitors travelling straight ahead toward the source of movement instead of turning right.

Suggestion: Take all factors (visitor characteristics, architectural characteristics, and exhibit characteristics) into consideration when designing circulation pathways. It is often important to provide visitors with a suggested circulation pathway.

Exit Orientation

Two problems can exist in exiting a facility. First, it may be difficult to find the exit. Occasionally, a facility is well-marked for finding a specific location, but not for returning. Recently, I have had two disorientation experiences trying to find my way out of hospitals. I was called to consult with some hospital administrators to study their orientation system (or lack of it). Finding the administrator's office was bad enough. Trying to find my way out of the hospital was even worse since there were no direction signs. A second experience occurred when I took my daughter to a hospital for X-rays. The direction signs to the X-ray department were easy to follow. Unfortunately, there were no return signs. We had to wander until we found someone who could tell us how to get out of the hospital.

Suggestion: Make sure orientation cues are provided both in to and out of the facility.

A second problem is finding your car or other source of transportation. Parking lots are usually carefully marked with number and color codes. In addition to these cues, facilities like Epcot remind visitors as they board a tram from the parking lot where they have parked their car. If visitors do not have their own transportation, problems can arise finding public transportation or a taxi.

Suggestion: In a large facility, it may be necessary to provide locational cues and reminders to visitors while they are still in the parking lot so they can find their way back.

Measurement of Orientation and Circulation Behavior

Measurement of visitors' behavior requires knowledge of assessment methodology that may not always be obvious. One of the first problems encountered is what measures should be included. It is my feeling that both self-report (surveys, questionnaires, interviews) and direct observation (tracking, etc.) should be used. The specific form of the questions and the particular instruments depend on the situation. Multiple measures of orientation/circulation are generally necessary because of the complexity of the problems. One instrument or device is unlikely to produce all of the information necessary to understand orientation/circulation problems. In general, such measures should probably include: pre-visit knowledge, an understanding of theme areas, wayfinding knowledge, ability to use orientation information to plan a visit (especially with respect to time), knowledge of visitor services (restrooms, food, gift shops, etc.), and circulation pathways taken by visitors.

In addition to the questions of what measures to include, important questions of reliability and validity must be considered. If visitor evaluators are not aware of possible measurement problems, faulty conclusions can easily be made.

Reliability. Reliability refers to the consistency or stability of the measurements. For example, if two observers are recording the same visitor, will they count the same behaviors? While this question may sound trivial and the answer "yes" in most cases, studies of reliability among independent observers are often quite surprising. It is more difficult to obtain such agreement between observers than is often thought. This is particularly true if behaviors must be coded into different categories. For example, while studying the relationship between visitor behavior and animal activity in zoos, we found it difficult to code different categories of animal activity (Bitgood, Benefield, & Patterson, 1988). Yet we have not found one visitor study that suggests reliability among independent observers may be a problem. We must take care to ensure that our measurement systems are standardized and used in the same way by all observers in research and evaluation projects.

Self-reports. In the hands of a skilled practitioner such as Marilyn Hood (see Chapter 9), self-reports in the form of surveys and interviews can be very useful. But, there are pitfalls to this method as there are

with any other. People do not always report events accurately. For example, it has been observed that visitors tend to overestimate time at an exhibit or at the facility (Bitgood & Richardson, 1987; O'Reilly & Shettel-Neuber, 1980). In addition, Bitgood and Richardson found that visitors were only 60 percent accurate in retracing their steps through the zoo.

   Direct observation. Direct observation has at least two major problems. First, it is labor intensive and thus costly in terms of observer time. Secondly, if visitors know they are being observed, reactivity may result.

   Interpretation of data. Not only must the validity of the measures be questioned, but the interpretation of data must be carefully considered. In one study (Bitgood & Patterson, 1986b) we found that visitors responded differently to the question: "Which method would best help you find your way around the museum?" If visitors were asked this question before they entered the exhibition hall, they were less likely to indicate "self exploring" and more likely to indicate "direction signs". However, if visitors were exiting the museum, they were more likely to check "self exploring". How should this be interpreted?

   Another problem of interpretation is overgeneralizing a result. At this stage of visitor research, we must be cautious in assuming that a result found in one setting will generalize to another.

Conclusions

   In conclusion, although we know much about visitor orientation and circulation, we need to know considerably more if we are going to design our facilities in the most effective manner. I believe that research and evaluation need to focus on several aspects of orientation and circulation.

   • We need a systematic study of visitor orientation and circulation. Thus far, we have had a few hit-and-run projects, but these projects have lacked a long-term systematic thrust.
   • We need to integrate all of the literature into a consistent conceptual scheme – a scheme that will give us working guidelines or rules for designing effective orientation and circulation systems.
   • We need to pressure museums, zoos, parks, etc. to apply what is already known about orientation and circulation.

- We need to look critically at our measurement procedures to ensure that they are reliable, valid, and inclusive of all the important orientation/circulation elements.

References

Adams, G. Donald (1988). Understanding and influencing word-of-mouth. In Bitgood, S., Roper, J. T., Jr., & Benefield, A. (Ed.), Visitor Studies - 1988: Theory, Research and Practice. Jacksonville, AL: Psychology Institute, Jacksonville State University. pp. 51-60.

Bitgood, S., Benefield, A., Patterson, D., Lewis, D., & Landers, A. (1985). Zoo visitors: Can we make them behave? Annual Proceedings of the 1985 American Association of Zoological Parks and Aquariums. Columbus, OH:

Bitgood, S. & Hulac, M. (1987). People in public places: A study of Quintard Mall users. Technical Report No. 87-20. Jacksonville, AL: Psychology Institute, Jacksonville State University.

Bitgood, S. & Patterson, D. (1986a). Principles of orientation and circulation. Visitor Behavior, 1(4), 4.

Bitgood, S. & Patterson, D. (1986b). Orientation and wayfinding in a small museum. Visitor Behavior, 1(4), 6.

Bitgood, S., Patterson, D., & Benefield, A. (1988). Exhibit design and visitor behavior: Empirical relationships. Environment and Behavior, in press.

Bitgood, S. & Richardson, K. (1986). Wayfinding at the Birmingham Zoo. Visitor Behavior, 1(4): 9.

Bitgood, S. (1988). Summary Report: Visitor orientation at the Space & Rocket Center. Huntsville, AL. Unpublished report.

Carpman, J. (1986). Wayfinding in hospitals: Solving the maze. Annual Proceedings of Society of Environmental Graphics Designers.

Cohen, M., Winkel, G., & Olsen, R. (1977). Orientation in a museum -- An experimental visitor study. Curator, 20(2): 85-97.

Falk, J. (1988). The Museum Experience. Unpublished manuscript.

Fisher, J. D., Bell, P. A., & Baum, A. (1984). Environmental psychology, 2nd Edition. New York: Holt, Rinehart, & Winston.

Griggs, S. (1983). Orienting visitors within a thematic display. International Journal of Museum Management and Curatorship, 2, 119-134.

Hayward, G. & Brydon-Miller, M. (1984). Spatial and conceptual aspects of orientation: Visitor experiences at an outdoor history museum. Journal of Environmental Systems, 13(4), 317-332.

Hood, M. (1983). Staying away. Museum News, 61(4), 50-57.

Hood, M. (1986). Beware of catch-22. Visitor Behavior, 1(2), 10.

Levine, M. (1982). You-are-here maps: Psychological considerations. Environment and Behavior, 14(2), 221-237.

Levine, M., Marchon, I., & Hanley, G. (1984). The placement of you-are-here maps. Environment and Behavior, 16(2), 139-157.

Loomis, R. (1987). Museum visitor evaluation: New tool for management. Nashville, TN: American Association for State and Local History.

Lynch, (1960). The image of the city. Cambridge, MA: M.I.T. Press.

Melton, A. W. (1935). Problems of installation in museums of art. New Series No. 14. Washington, DC: American Association of Museums.

Melton, A. W. (1936). Distribution of attention in galleries in a museum of science and industry. Museum News, 14(3), 6-8.

Parsons, M. & Loomis, R. (1973). Visitor traffic patterns: Then and now. Washington, DC: Smithsonian Institution, Office of Museum Programs.

Robinson, E. S. (1928). The behavior of the museum visitor. New Series No. 5. Washington, DC: American Association of Museums.

Screven, C. G. (1986). Exhibitions and information centers: Principles and approaches. Curator, 29(2), 109-137.

Shettel-Neuber, J. & O'Reilly, J. (1981). Now where? A study of visitor orientation and circulation at the Arizona-Sonora Desert Museum. Technical Report No. 87-25. Jacksonville, AL: Psychology Institute, Jacksonville State University.

Yoshioka, J. G. (1942). A direction-orientation study with visitors at the New York World's Fair. The Journal of General Psychology, 27, 6-9.