Environmental Rating Scale for Orientation and Mobility

Bruce B. Blasch, Steven La Grow, and William Penrod

This paper presents the concept of an environmental rating scale for Orientation and Mobility for blind and vision impaired persons. Such scales currently exist for describing the level of difficulty associated with ski slopes, white water rapids, mountain climbing, and golf courses, to name but a few. These scales serve as the basis for proposing a system which could lead to the standardisation of ratings of difficulty and complexity for this purpose as well. If successfully developed, such a system could serve to inform choice concerning both routes used for travel and environments selected for instruction. In addition, the student's present level of performance, environments of travel and routes travelled may be more easily and effectively conveyed to others.

Orientation and Mobility (O&M) instruction has evolved as a profession since its inception during and immediately after World War II. The demographics of the population served by the profession and the needs they present have changed during that 60-year span (Uslan, Hill, & Peck, 1989). In addition, the built environments in which persons who are blind and vision impaired live, work, play and conduct their daily lives have undergone radical change, as have the transport systems used to access them (Blasch, La Grow, Bowen, & Baker, 2000; La Grow & La Duke, 1990).

There are many factors that have influenced these changes, both micro and macro. At the macro level, increasing population size and urbanisation; the cost of fuel and cars; the role of the automobile; the practice of commuting to and from work; changing demographics and living patterns; and changing expectations of the population have all played a role. La Grow and La Duke (1990), for example, assert that the movement away from the centre of the city to outlying areas, and a subsequent growth of businesses along major traffic arteries has posed significant problems for pedestrians as the means for accessing these areas has increasingly relied on the automobile. Furthermore, technological advances have resulted in literally thousands of changes on the micro level, including increased levels of traffic, quieter automobiles and the introduction of lighted and actuated traffic/pedestrian control devices (Wiener & Lawson, 1997). All of these changes have resulted in more complex patterns of streets and intersections, and ultimately a more demanding environment in which to travel. These changes have impacted on the blind and vision impaired traveller, as has the increased accessibility to and availability of qualified O&M specialists.

Modern urban environments are in constant transition due to such factors as the

increased complexity of environments and changing demands from heavier but quieter traffic flow. These factors are even more complicated for the non-visual traveller who must rely on audition for successful wayfinding and safety in street crossings (Ashmeade & Wall, 2000; Strelow & Brabyn, 1982).

Independence and safety in travel for those who are blind or vision impaired are dependent upon the interaction between one's abilities and the demands of the environment in which travel takes place (Blasch, 1981; Blasch, La Grow, Bowen, & Baker, 2000; Blasch, La Grow, & Peterson, 1997). It would certainly, therefore, be beneficial to have a standardised method of rating those environments by the demands they place on safe and independent travel for the purposes of instruction, assessment, and route determination. Because of the diversity of ability present within the population now being served, there has also been a greater emphasis on evaluating one's ability to travel in a safe and efficient manner following the provision of service. In some cases, an instructor's assessment of travel ability may play a significant role in the recommendations made about selecting the location for residence which may be considered best for a given client (Blasch, La Grow, Bowen, & Baker, 2000; Blasch, La Grow, & Peterson, 1997).

To be accurate in making such an assessment, selecting routes, or planning a program of instruction, the instructor must consider the demands of the environment in which the client will travel, as well as the individual's abilities as demonstrated in the environment of instruction and/or assessment. When these two differ, there may be a problem (Blasch, 1981). This may be due to the fact that there is currently no effective or uniform method for classifying or even describing the degree of difficulty found in environments of travel for blind and vision impaired persons (Blasch, La Grow, Bowen, & Baker, 2000).

There are existing taxonomies that describe the sequence of instruction designed for teaching O&M to adventitiously blinded persons, which uses environmental terms. These taxonomies categorise groups of skills and techniques taught in a hierarchical order which has been variously identified as including indoor, residential and commercial environments (Hill & Ponder, 1976); indoor, residential, semi-business and business environments (La Grow & Weessies, 1994); and indoor, residential, small business, intermediate business, large business and downtown districts (Jacobson, 1993). These hierarchies seem to assume a linear progression in both environmental demand and complexity across these various environments and the skills required in the graduated curriculum of instruction identified.

It appears that this assumption is only really applicable to teaching environments that are under the direct control and selection by the O&M instructor (Jacobson, 1993; La Grow & Weessies, 1994) and refers to the level of experience, strategies and skills required to travel in these environments rather than the difficulty these environments pose for the traveller who is vision impaired or blind. For example, environments that require the traveller to cross busy streets at light controlled intersections consistently come later in the instructional sequence than residential environments in which the student is required to cross at uncontrolled intersections (Hill & Ponder, 1976; Jacobson, 1993; La Grow & Weessies, 1994). Yet, it is often easier, safer and less demanding for a

pedestrian who is vision impaired or blind to cross at a busy light controlled intersection than at a less busy but uncontrolled intersection once she has gained the skill and experience to do so. This is especially true if the uncontrolled intersection is just after a curve or hill which blocks the traffic sounds from reaching the traveller.

Such intersections are generally not included in the typical residential sequence of instruction if they are too demanding or threatening to the traveller even though they are not uncommon to residential environments. These intersections simply aren't selected as being appropriate to the traveller's present level of skill at the point that she is being taught residential travel. Thus, they are removed from the sequence at that point. The instructor certainly may come back to these intersections once the student has the skill to deal with them. However, they would not be thought of as typifying the residential environment used within the instructional sequence described above since that designation refers more to a set of specified conditions used for teaching a series of skills. Thus, these taxonomies, although useful for describing a series of skills and techniques taught for travel, are not necessarily useful for rating travel environments and/or determining their difficulty.

The goals set for clients in mobility instruction clearly reflect this belief. They are generally stated in terms of both the level of independence to be expected (i.e., route travel, semi-independent) and the type of environment in which it is to be achieved (i.e., familiar or unfamiliar, indoor or outdoor, urban or rural). If set for outdoor travel, urban environmental goals are generally described further using the same terms used for the instructional sequence e.g., residential, semi-business or business (LaGrow & Weessies, 1994). As one would expect, this practice logically describes the point in the instructional sequence one expects a traveller to reach. If a person is able to travel independently in an outdoor environment we could anticipate that he would be able to do so in an indoor environment as well. Likewise, if a traveller can negotiate unfamiliar environments it is assumed that she can also get about comfortably in familiar environments. The logic also follows that if the traveller is capable of handling business environments then he can also deal with residential and semi-business environments as well.

Although there is currently no standardised means to assess environments of travel and rate their degree of difficulty for blind and vision impaired travellers at this time, there are a number of systems that may be used as models for developing such a system (Blasch, La Grow, Bowen, & Baker, 2000). For example, trails for skiing and hiking, rivers for rafting, wind for sailing, and mountains for climbing are currently all rated in terms of the environmental difficulty with varying degrees of precision (Axelson, Thomas, Chesney, Coveny, & Eve-Anchassi, 1994; Graydon & Hanson, 1997; Lessels, 1994). Trails rated for difficulty, however, are usually assessed via subjective evaluation (Axelson et al., 1994). White-water rapids are also classified according to difficulty and danger from I to VI, with VI being extremely dangerous. Yet this too, is a relatively subjective measure with experts warning us never to rely too much on a classification given in a book or by others (Lessels, 1994). Rating systems for climbing are also somewhat subjective, but are probably the more sophisticated rating systems mentioned so

far. There are different systems for alpine, rock, and ice climbing. Rock climbing is further broken down to free climbing, aid climbing and boulder climbing. Ice climbing has both commitment and technical ratings as well (Graydon & Hanson, 1997).

In the opinion of the authors, one of the most comprehensive and objective environmental rating methods is the USGA Course Rating System Manual and Guide for golf courses. This method, now used in 40 countries, had its beginnings in the US in about 1900 when the first course rating system was developed by the Ladies Golf Union. Since that time there has been continuous modifications and refinements. The USGA Course Rating System uses evaluations such as Effective Playing Length Correction. The effective playing length of a course is the measured length corrected for: Roll, Changes in elevation, Forced lay-ups, Doglegs, Altitude above sea level and Prevailing winds. Another category is Obstacle Rating Factors including: Topography, Fairway, Green Target, Recoverable and Rough, Bunkers, Out of Bounds/Extrinsic Rough, Water Hazards, Trees, Green Services and Psychological. These obstacles may have further breakdowns for example, trees are further evaluated by age, type and height to mention a few. There is also a Green Surface Rating Table and Adjustments to the Green Surface Rating. It is the authors' opinion that this USGA Course Rating System Manual best represents the model or concept of environmental analysis and rating scale for orientation and mobility.

Establishing a model to describe and assess environments for the vision impaired traveller

Blasch, La Grow, Bowen, & Baker (2000) suggest that a model similar to those described above, particularly the rating system for golf courses, may be established for both specifying environments of travel and assessing them for difficulty for vision impaired persons. This system would depend upon both a systematic evaluation of the environment of travel, as done for golf courses and other rating systems. To follow the golf course example, a handicap score for a specific golf course would be derived, and in like fashion a risk or safety prediction would be derived for the blind or vision impaired traveler. A system to evaluate the environment may be established that (a) classifies space by primary function, (b) quantifies the density, complexity and quality of that space and the paths of travel within it, and (c) modifies those descriptors by time of day, day of the week, season, weather and other shifting variables.

One hurdle to be faced in developing a model for rating environments of travel for vision impaired persons is deciding if routes, environments or separate environmental features (i.e., unit measured) should be rated. Whole environments may be classified by function and quantified with some ordinal feature in terms of density and complexity. However, using density or function to rate environments for difficulty may be meaningless as the difficulty of travel in any given environment is dependent upon the route used. The difficulty of a given route is dependent upon the specific environmental features that are traversed (e.g., sidewalk, intersections, stairwells).

Routes may be described with precision but assigning a single rating to a given route may be problematic as difficulty can change on a route depending upon the direction of travel, the side of street on which one travels and/or the time of travel. The difficulty of any given environmental feature may also be affected by the direction from which it is approached, as well as the time of day this is done. Thus a fairly high degree of specificity including an indication of direction of travel may have to be used when defining the environment and/or route to be assessed. One would assume that a major feature of any environmental rating system for vision impaired travelers' would proceed along a continuum of detail from general to specific and macro to micro with meaningful descriptors being available at various levels along this continuum.

All of these factors make it challenging to establish a single rating system for a given environment, route or environmental feature, but this does not preclude the possibility of doing so. A system for O&M would start with defining the bounded area to be rated. These environments may range from the micro (e.g., one's place of residence, the side of the street on which one lives, a given intersection or platform in a subway station) to the macro (e.g., a metropolitan area, an urban area within a metropolis, a town or city, a borough or neighborhood within a town or city, a campus, mall or hospital complex). The feature of concern must first be defined and bounded (i.e., boundaries established). The bounded area may then be described using a meaningful title (e.g., city, village, campus, street) and/or by identifying the primary function (e.g., commercial, residential, industrial, mixed).

An ordinal rating may be established by identifying the size, density and complexity. Other descriptors may be used as necessary to specify the environment, route or feature in question. For example, a given section of Main Street in Palmerston North, New Zealand bounded by Botanical Road on the West and Pitt Street on the East may be described as a two-way, four lane street, in a low density commercial area with strip malls, no sidewalks, low density pedestrian use but with a relatively heavy traffic flow and few, uncontrolled intersecting streets (Blasch, et al., 2000).

Blasch, et al. (2000) offers the following conceptualisation of an environmental rating and classification system that is based upon three basic procedures: classify, quantify, and modify. Although incomplete, the description provides the basis for developing a more complete taxonomy of travel environments.

Classify

The first step would be to classify the environment and environmental features by using common names or primary functions. The following descriptors may prove to be useful in developing this model: metropolitan, urban, rural, city, town, suburb, village and then subdivided by use including commercial, industrial, residential, educational and recreational. The type of businesses present including department stores, retail stores, discount stores, malls, strip malls, plazas, restaurants, supermarkets, and grocery stores may further identify commercial environments. The type of dwelling including single family, multiple families, detached, semi-detached, multiple story, apartment complex, and high-rise apartments

may define residential areas. Industrial environments may be identified as light, medium or heavy industrial. Educational environments may include schools and campuses and recreational areas may be identified, for example, as parks, playing fields, and golf courses. Environmental features may include such items as buildings, streets, intersections, streets, and sidewalks. Each of these may be named and specified further by identifying their relative size, complexity and density. In doing so an ordinal nature can be added to the descriptor so one will be given an indication of the relative size of an environment, as well as, an indication of the complexity of its layout and the busyness of its streets and sidewalks.

Quantify

The second problem is to decide which features should be considered and how difficulty should be determined. It seems that the relative difficulty of traversing any environment is dependent upon the route taken and environmental features encountered in relation to one's personal (i.e., sensory, cognitive, motor/psychomotor, psychosocial) abilities. Thus, the route or routes of travel used must be assessed relative to the population for which the rating scale is being devised. In doing so, the path of travel and the intersections crossed as well as the means of travel used (i.e., transport systems) must be assessed. The features considered may include the presence or absence of sidewalks, the quality of the surface to be traveled upon, the consistency of the surface, the width of the sidewalk, the presence of obstacles along the path, crowds or the amount of room available to traverse a route, the availability of shorelines, the presence of curbs, drop-offs, ramps, elevators, escalators and stairways, the visual and auditory characteristics of the environment to be travelled and the signage within it. The width of the streets to be crossed, the configuration of the intersection to be crossed, the amount of traffic on the parallel and perpendicular streets, the presence and type of traffic control devices, the pattern of traffic moving through the intersection, the amount of time available to cross, the acoustical nature of the environment and the presence of objects in the path of travel (e.g., islands, tram tracks) may all be quantified in some manner and used to describe the environment, path or environmental feature.

Modify

The complexity, density and/or difficulty of travel in a given environment may vary by time of day, and from day to day due to variables in the environment. Other modifiers include seasonal patterns of use and factors that are associated with weather conditions. Time of day may affect the volume of pedestrian and/or automobile traffic in some environments and may greatly affect their degree of difficulty. Thus, modifiers may have to be considered when assessing the difficulty of given environments.

These procedures could be applied to any environment to develop an Environmental Rating Scale for O&M. While many mobility specialists do an informal environmental assignment that incorporates many of these same procedures, a systematic model has yet to be articulated.

Conclusion

A concept and environmental rating scale model for O&M have been proposed

to systematically describe and rate environments of travel for vision impaired persons. Like the models used for rating winds, rivers, trails, mountains, and golf courses, this model first classifies a bounded environment using descriptors. The environment is then specified further by quantifying the classification used to describe it in terms of its complexity and density. The routes of travel within a given environment may then be assessed for difficulty by quantifying the features of the path and the environmental features relative to the direction of travel. Finally, the assessment of the difficulty posed by that route would be modified in terms of the time of travel or other shifting environmental conditions that may affect difficulty.

This model remains at a conceptual level at the moment. To make it operational, an exhaustive list of terms used for classifying environments by function must be developed and defined for use. That list would then need to be examined to ensure the categories identified are both exhaustive and mutually exclusive. Terminology must be established to make the system of classification accessible nationally and internationally with the opportunity to clarify terms by using locally acceptable terminology. The environmental features to be quantified must be identified and agreed upon as being meaningful modifiers for the class identified. A method for quantifying each variable to be used must be determined and its reliability established. Finally, the modifiers must also be identified, defined and a means for quantifying them established as well. Obviously, a system for specifying environments of travel for vision impaired persons is a ways off. The development of a conceptual model for doing so is a first and important step. This first step has culminated from the thoughts and inputs of many.

Acknowledgement

The authors would like to express appreciation to the following individuals for their valued input:

Patsy Baker, Center for Aging, Birmingham, Al, USA

Janet Barlow, Center for the Visually Impaired, Atlanta, GA, USA

Susan Bowen, VAMC Center for Rehabilitation R&D, Atlanta, GA, USA

Alan Brooks, British Guide Dogs Association, Leemington, UK

Dennis Cory, IRIS Hamburg, Germany

Lukas Franck, Seeing Eye Inc., Morristown, New Jersey, USA

Duane Geruschat, Maryland School for the Blind, Baltimore, MD, USA

Ron Heneline, Leader Dogs for the Blind, Rochester, MI, USA

Moira Higgerty, S.A. Guide Dog Association for the Blind, Bryanston, SA

Bill Jacobson, University of Little Rock, Little Rock, Arkansas, USA

Steven La Grow, Massey University, Palmerston North, NZ

Laurie Mann, Blind Rehabilitation Center, Augusta, GA, USA

Eric Ostergaard, Institute for Blind and Partially Sighted, Hellerup, Denmark

Nurit Neustadt-Noy, Consultant, Blind/VI persons, Israel

William Penrod, University of Louisville, Louisville, KY, USA

Eileen Siffermann, Consultant, Tucson, AZ

Nick Tyler, University College London, London, UK

Gerald Weisman, University of Wisconsin, Milwaukee, WI, USA

Gill Whitney, Royal National Institute for the Blind, London, UK

References

Ashmead, D., & Wall, R. (1999). Auditory perception of walls via spectral variations in the ambient sound field. *Journal of Rehabilitation Research, 36,* 312-322.

Axelson, P. W., Thomas, P. H., Chesney, D. A., Coveny, J. L., & Eve-Anchassi, D. (1994). Trail guides with universal access information. RESNA, June 17-22, 306-308.

Blasch, B. (1981). Foundations for mobility instruction: A mobility model. In *Proceedings of the Second International Mobility Conference.*

Blasch, B., La Grow, S., Bowen, S., & Baker, P. (2000). *In search of an environmental rating scale for describing travel environments for persons who are visually impaired*. Unpublished Manuscript.

Blasch, B., La Grow, S., & Peterson, L. (1997). Other learners with mobility limitations. In B. Blasch, W. Wiener, & R. Welsch (Eds.), *Foundations of orientation and mobility* (pp. 530-552). New York: American Foundation for the Blind.

Graydon, D., & Hannson, K. (Eds.). (1997). *Mountaineering – The Freedom of the hills*. Seattle, WA: The Mountaineers.

Hill, E., & Ponder, P. (1976). *Orientation and mobility techniques: A guide for the practitioner*. New York: American Foundation for the Blind.

La Grow, S., & La Duke, R. (1990). A three-pronged plan for soliciting travel information. In M. Uslan, A. Peck, W. Wiener, and A. Stern (Eds.), *Access to mass transit for blind and visually impaired travelers* (pp. 128-135). New York: American Foundation for the Blind.

LaGrow, S., & Weessies, M. (1994). *Orientation and mobility: Techniques for Independence*. Palmerston North, New Zealand: Dunsmore.

Lessels, B. (1994). *Whitewater Handbook* (3rd ed.). Boston, MA: Appalachian Mountain Club Books.

Strelow, E. R., & Brabyn, J. A. (1982). Locomotion of the blind controlled by natural sound cues. *Perception*, 635-40.

Uslan, M., Hill, E., & Peck, A. (1989). *The profession of orientation and mobility in the 1980's: The AFB competency study*. New York: American Foundation for the Blind.

Wiener, W., & Lawson, G. (1997). Audition for the traveler who is visually impaired. In B. Blasch, W. Wiener, & R. Welsch (Eds.), *Foundations of orientation and mobility* (pp. 104-169). New York: American Foundation for the Blind.

Bruce B. Blasch, Ph.D., *Bear Consultants, Inc. 4561 W. Farm View Dr. Boise, ID 83714, USA; e-mail: <Bearconsul@aol.com>.* ***Steven La Grow, Ed.D.,*** *Massey University, Palmerston North, New Zealand; e-mail: <S.J.LaGrow@massey.ac.nz>.* ***William Penrod, Ed.D.,*** *University of Louisville, Louisville, KY, USA; e-mail: <wpenrod@louisville.edu>.*