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Removing Functional Barriers: Public Transit and the Blind and Vision Impaired

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Removing Functional Barriers: Public Transit and the Blind and Vision Impaired

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Abstract: We surveyed 55 blind and vision impaired bus riders in Santa Barbara, California to analyze their use of the local bus system and identify their frustrations, concerns and desires when using a mass transit system. The most important finding was that they needed better access to INFORMATION. We asked question on what kind of technology they would like to use to better access this information. The study revealed the benefits to be gained by using auditory signage to provide information to identify busses and trains, locate and safely cross streets and find and use terminal resources. We conclude this report with an examination of the benefits of using auditory signs

A geographical approach to disability: Behavioral geographers study activity patterns of people as they interact with the built environment. We also study travel activities and what benefits and constraints affect travel. People with disabilities have more constraints to independent travel than the population at large. For the blind traveler these can be the inability to read signs, cross streets safely or the lack of a drivers license. Many people with disabilities use personal assistants or wait for rides which also constrains travel. How does lack of vision affect our use and sense of space? People with disabilities live in a transformed space. Obstacles and barriers are multiplied and expanded. Gutters can become chasms, streets become treacherous paths and stairs may be impossible to use. Space can become widely distorted, the blind lack access to complete knowledge of the environment and space is laboriously transformed for the wheelchair user. We need to understand the transformation between objective reality and the reality of people with disabilities Without vision we lack the ability to label and identify modifiers, such as "the tall red building." It is hard to understand cues to fuzzy spatial concepts like near, across, between and above. It is also difficult to understand cues to spatial layout, orientation, direction, association and connectivity Without vision it is difficult to undersigned cues for updating and perceiving spatial patterns and to access spatial knowledge to make shortcuts. Many studies have shown that without vision it is difficult to access spatial knowledge to integrate known routes into a larger spatial understanding, and so many vision impaired people are restricted to known routes. For many blind people, time dominates space for spatial understanding, as when riding a bus.

To overcome these spatial problems blind and vision impaired people need something to help them update cues, landmarks and signs, and to pre-view and pre-process spatial cues in order to locomote. They need to acquire a broad spatial knowledge to be able to make shortcuts or explore new environments.

Why study activity patterns of the disabled? 1990 Census figures show that nationwide less than 23% of people of working age with a disability are in the labor force. Many believe this dismal statistic is a result of the difficulties non-drivers have in gaining access to employment. Many of these people are denied their independence and freedom of movement, a privilege most Americans take for granted. A study, Americans with Disabilities, 1992 showed that for people aged 21-64 only 45.6% of those with difficulty reading newsprint are employed, and of those unable to read newsprint only 25.6% are employed. Disabled people are much more likely to live alone than the general population. The 1990 Census show that 35% of all disabled live alone, this figure escalates to over 60% among the elderly disabled. This lack of household assistance combined with high rates of non-driving leads to drastically reduced independence and number of trips reported.

Those who rely on a wheelchair encounter many structural barriers to mobility and independent travel. Much of the attention and funding for ADA compliance have focused on this group. There appears to be about four times as many people with vision problems. The 1990 census showed over 3 million people with severe vision impairments or who are legally blind. Another 3-4 million are estimated to have difficulty reading signs or printed mater, or cannot legally drive a car. In this paper we deal with ways to overcome these functional barriers to mobility and independent travel.

The Survey: We studied the blind and visually impaired in Santa Barbara, CA and its surrounding area. Our response rates were surprising high, indicating a strong interest from the visually impaired regarding public transit. To reach the most people we could we offered the survey by mail, telephone, in-home interview and in large print or Braille.

Frequency of transit use: Nationwide about 5 or 6 percent use public transit. Recent surveys have shown that less than half (46%) of disabled travelers use transit (Corns & Sacks, 1994). At first glance our survey results were similar to the estimate that less than half of the disabled use transit, 51% listed local bus as their primary mode of travel.

In our sample, 28.3% used transit 5-7 days a week and another 32.1% used it 2-4 days a week. Almost 21% used transit less than every two weeks. We found that our sample was bimodal in many respects, those that had a household car available and those who did not. There were 10 respondents who had access to a household car, and showed a preference for the private automobile. When we looked at this group who had a car available, there was no one who used transit 5-7 times a week and only 11% used it 2-4 times a week. Almost 67% used transit less than every two weeks and 22% used transit about every two weeks. Therefore, for those who had a household car available, 89% used transit only one day every two weeks or less.

When we looked at the frequency of transit use among those who had no access to a household car, the results were encouraging for transit's role in serving this population Some 36% used transit 5-7 days a week and another 38% used it 2-4 days a week, So almost 3/4 used it on a regular basis. Only

14% used transit once every two weeks or less, compared to 89% for those with an available car. Of the 43 respondents with no household car available 28 (2/3) listed local bus as their primary mode and another 7 listed walking as their primary mode. Two people used friend's cars and the rest used EZ lift or agency vans.

Travel times for transit and car users: Travel times were collected for various trip purposes. Times reported by those with car access were almost always less than the other group. Sometimes the non car users reported twice as much time for identical trip purposes. However, it appears that many non car users walked to many activities which might explain some of these higher trip times.

Long waiting times have frequently been used to explain low transit use. The advantage of an available household car is clearly shown when comparing the arranging and waiting time using transit than when using the household car. Half said it took less than 5 minutes to get a ride in the car, while 66% said it took over 30 minutes to get a ride using transit. However, when the non car users were surveyed they actually reported <u>less time</u> in arranging and waiting time for transit than for getting a ride not using transit. Only 33% waited more than 30 minutes for transit, while 37% waited that long for a non transit trip. Overall, those who had no access to a household car had an average wait time that was <u>less for transit</u> than for non transit rides. When there is no convenient access to a car it appears that transit competes well with the automobile.

Transit wait times for those with no available household car was less than for those who had a household car. Twelve percent waited and walked less than 5 minutes for transit and another 26% reported times less than 15 minutes. Sixty-five percent of those with no household car waited less than 30 minutes compared to only 33% of those with a household car. Two-thirds of those with a household car said that their arrangement and waiting time was more than 30 minutes. These differences are probably dues to better information and familiarity with the transit system and also their closer location to transit stops.

As expected the arranging and wait times for non transit rides shows the advantage of having a household car available. Half of those with a household car waited less than 5 minutes. For more information from this study on travel behavior see Marston et al., 1997. In the next section we briefly report responses to question about the local transit system and their attitudes toward transit. For more information see Golledge et al., 1997.

We asked our sample to list three reasons why they use transit. The top reasons were "service meets my needs", "no alternative", "cost" and surprisingly "driver/operator courtesy and assistance." When asked what information was most useful, helpful drivers and auditory messages were rated most important along with on-board schedules in suitable format. When asked about which devices were most useful they mentioned easy access to auditory information, human operated hotlines were first followed by auditory prompts at bus stops. Independence was highly prized in our respondents. They were most frustrated by poor clarity of terminal announcements, needing to rely on others for rides and exiting at the wrong stop. We asked about difficulties using transit, since visual cues are missing they have difficulty recognizing vehicles, knowing where they are in transit, dealing with crowds and report trouble when transferring buses.

Our survey showed that access to transit information is the main concern for the blind and vision impaired. transit user They requested announcements of bus stops and streets, clear terminal information, on-board schedule information in suitable format, larger bus numbers, auditory messages at bus stops and terminals, auditory pedestrian crossings signals at transfer points and busy bus stops and they asked for auditory signs, which can solve many of these information needs.

Blind, vision impaired and print handicapped individuals have severely limited access to the built environment. To date, most aids for the blind have consisted of little more than obstacle avoidance devices. New technologies like Talking Signs offer this group the ability to extend their range and gain a sense of the surrounding spatial environment.

Talking Signs technology is an infrared, wireless communication system that provides remote directional voice messages that makes independent travel possible for the vision impaired. The system emits short audio signals, sent by invisible infrared beams from transmitters mounted at key location points, to a hand held device that delivers a voice message through a speaker or ear phone. The signals are directional and the beam width and distance can be adjusted to fit different needs and safety concerns. The user scans the environment with the hand held receiver, much like visual scanning. Messages are heard and direction can be determined to the object. Upon entering a transit terminal, for example, one might hear "telephones" on the left, "ticket booth" on the right and "stairs to trains" straight ahead.

So far there has been limited use in various cities around the world. The largest use has been in San Francisco, where a program called "The Accessible City " has been involved with placing these devices at various locations to serve the needs of vision impaired and print handicapped individuals. The new main library has several hundred transmitters installed. Some multi-model transit stations are fully covered and more public and some private buildings are either functional or are in some stage of planning and installation. Some buses have auditory signs, this enables people to know which bus is coming and avoids delay and confusion. Traffic signals are also being fitted for these devices, giving both a wide beam that contains street intersection information and a narrow beam that gives "WALK" and "DON'T WALK" information. This message is only heard if one is aligned with the crosswalk.

With the involvement of private interests, stores and hotels can also join the "accessible city" and bring improved independence to this group. This technology could well bring independent travel and living to those who cannot see or read.

Some user responses: "I don't have to rely on people who point, with auditory signs, I can discover all the facilities, otherwise they are out of reach, I don't have to remember so much, I can make the correct (wayfinding) choice each time I don't have to analyze and infer and hope I get it right, I am less tired. I don't have to suffer so much, I don't have to stop and ask for help."

Conclusion: Auditory signage can provide much of the spatial and planing information needed and requested by blind travelers. They offer a high degree of independent travel and reduce stress and anxiety for the traveler. They can help meet the goals of the ADA by providing access to transit, buildings and the built environment.

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