QUIET CARS AND PEDESTRIAN SAFETY:

Problems and Perspectives

On November 4, 2006, the Committee on Automobile and Pedestrian Safety (CAPS) of the National Federation of the Blind (NFB) hosted a day-long conference entitled "Quiet Cars and Pedestrian Safety: Problems and Perspectives." The conference was held at the Federation's national headquarters in Baltimore, MD. The purpose of the conference was to discuss the effect of quiet cars on pedestrian safety, especially the safety of blind pedestrians. Quiet cars are defined here as hybrid, electric, and other vehicles that emit little sound and are more difficult to detect audibly than conventional automobiles powered by combustion engines. Representatives from the blindness community, automotive industry, insurance industry, pedestrian and cyclist groups, and other organizations interested in this issue were invited to attend. The goal was to examine possible solutions and strategies for their implementation.

Conference attendees came from thirteen states and represented fifteen organizations. Among those in attendance were electric-car advocates, representatives from pedestrian advocacy groups, acoustical engineers, and members of several blind consumer groups and blindness-related agencies. Although they were strongly encouraged to attend, delegates from the automotive industry and insurance industry were absent.

The conference agenda included presenters from the blindness field, experts in marketing and engineering, and representatives from the Federal Architectural and Transportation Barriers Compliance Board (sometimes known as the Access Board). The meeting began with a direct experience of quiet cars. Approximately thirty participants nonvisually observed two hybrid vehicles, the Toyota Prius and the Honda Civic. Through hearing they tried to determine how detectable the vehicles truly are, both in motion and while stopped at a street crossing. Participants were asked to respond upon hearing each of the vehicles approach, first at an intersection outside the conference site and later at an alley nearby. Observers generally heard the approach of the Civic (although at a dangerously close distance of about thirty feet), and missed the Prius at the intersection. The Prius was somewhat more audible during the approach in the alley, but only at a range of about fifteen feet. With both cars, audibility depended on the charge of the battery. If the combustion engine was running to charge the battery, both cars were usually as observable through hearing as other vehicles are. If the battery had sufficient charge, the vehicles were virtually noiseless while pulling up to an intersection, while stopped at the intersection, and when moving through the intersection at relatively low speeds (under about 25 mph).

After this informal experiment, conference attendees gathered for introductions and the morning session. The session began with summaries of research findings presented by Shirin Hassan of the Wilmer Eye Institute at Johns Hopkins University Medical Center, and by Certified Orientation and Mobility Specialists Janet M. Barlow and Donna Sauerburger. Research conducted by Orientation and Mobility Specialists Rob Wall Emerson and Beezy Bentzen, who were unable to attend, was also summarized. The presenters described several studies on the audible detection of vehicles at traffic round-abouts. They noted differences in the detection of hybrid vs. traditional internal combustion powered vehicles, the contributions of vision and audition in street crossings, and the types of sounds that could be heard amid traffic noise and how well such sounds could be detected. The studies indicated that both blind and sighted pedestrians make better decisions about crossing streets when they can hear vehicles in their environment.

The second panel consisted of Lois Thibault and Marcia Mazz, members of the Architectural and Transportation Barriers Compliance Board. Ms. Thibault explained that the Access Board was formed by Congress to write accessibility guidelines for public rights of way, to be adopted as standards by other agencies. She explained that the board has no mandate on Orientation and Mobility, and therefore has no authority over anything except buildings, sidewalks, and other public rights of way. However, the board may be of assistance in helping to raise interest in federal agencies whose mandate may include concerns about traffic safety.

The final panel, entitled Engineering Solutions, consisted of Gary Wunder of the National Federation of the Blind, aerospace materials engineer David Evans, and William Hauser, an Adjunct Assistant Professor in Boston University's Department of Manufacturing Engineering. Mr. Wunder asserted that engineering seems to give us two alternatives for solving the problem of inaudible vehicles. One alternative would be the development of a device capable of detecting vehicles and providing blind pedestrians with information about them which has in the past been available through hearing. Such a device, one that blind pedestrians would carry and use, would have certain advantages. There would be no need to convince people who have little incentive to change that a modification of their vehicle design is required. Inventing and overseeing the production of such a device could allow the people for whom the problem is most acute to be in charge of designing the solution. There would be no need to accommodate the blind through changes in the environment; rather, the blind would adapt for themselves.

For all its advantages, however, the idea of a portable device has some inherent drawbacks. No present-day technology seems likely to provide the stream of detailed information that blind pedestrians now receive through hearing. By listening blind pedestrians can determine accurately whether a vehicle is near or far away, slowing down or speeding up, coming across a path or turning. They can also judge the direction of its approach, and can collect and analyze all of this information on several vehicles at once.

Mr. Evans has been part of the team which designed and tested the lunar rovers used in the 1970's on several Apollo missions. When prototype vehicles were being tested on the streets and sidewalks of the Stanford University campus, developers found a significant problem which they had not anticipated (and which they doubted they would find on the lunar surface): pedestrians could not hear the vehicles, and therefore made no effort to avoid them as they approached. In an effort to prevent collisions, the team affixed a whistle to their vehicles, but the low speeds at which the vehicles traveled limited the effectiveness of this solution.

William Hauser teaches at Boston University, where his work focuses on the intersection of business and technology. He proposed the development of a system that would cause a car to emit a sound "when blind people are around." Blind pedestrians would carry a device which would activate this feature in the automobile; the sound would alert the blind person to the presence of an otherwise quiet vehicle, and drivers would also be alerted to the blind person's presence. Such a device might be mounted on a cane handle or on the harness of a dog guide.

The afternoon was taken up by two sets of break-out sessions. Members were divided into groups which discussed possible solutions to the quiet car problem. They reconvened as one large group to report outcomes, and then returned to small group discussions of strategies for implementation of the previously proposed solutions. Two possibilities for solving this problem emerged: pedestrians could carry a device to give them information about vehicles in their area, or vehicles could be outfitted with modifications causing them to emit some minimal level of sound to make them audibly detectable by pedestrians. The consensus

was that no device in the foreseeable future is likely to give pedestrians as much information as they now receive audibly about vehicle position and direction of travel. Having vehicles produce an audible indication of their presence, designed to be inoffensive to the public, seems most workable. This engineering solution would most likely be an inexpensive minor modification to the existing design of the automobile. It could sound at lower speeds but disappear at faster speeds where car tires and air movement can easily be heard. Vehicles should emit a recognizable sound or class of sounds that can be localized; it is not necessary that this sound duplicate the engine noise we hear today. Such a modification should not require or allow operator intervention. A "minimum standard" for sound level should be established, regardless of the type of engine a vehicle uses.

While there was clearly a preference that vehicles make some discernible sound, several engineers argued passionately in favor of an electronic signaling device to be carried by the pedestrian. Although this solution may be more acceptable to automobile manufacturers, most conference participants believed its usefulness would be limited. As stated above, existing technology cannot provide the necessary information in an effective manner. Furthermore, sighted children, seniors, and other at-risk pedestrians and cyclists may not be motivated to carry such a device.

Proposed strategies for implementing these solutions include:

1. Mobilizing blindness organizations and blind individuals to contact auto manufacturers, insurance companies, and regulators in order to bring them into
this discussion.

2. Drafting proposed regulations for submission to Congress, mandating a minimal sound-emission standard for every vehicle on the road.

3. Bringing on board other groups that may share concern about quiet cars; these include groups that promote walking and running, Students against Dangerous Driving, American Association of Retired Persons, and Safe Routes to School.

4. Getting study partners to help determine exactly what kind of sound would be most effective and how to build or modify an existing device to emit it.

The conference closed with a short discussion on steps to move this endeavor forward. Representatives from the various groups were encouraged to write about
the conference in their respective journals and other publications. It was suggested that a listserv be created as a forum for persons from all backgrounds and disciplines who are interested in this topic. There was widespread agreement that more research needs to be conducted. However, many participants pointed
out that planning, funding, conducting, and analyzing research studies is a slow process at best. As time passes, there will be far more quiet cars in operation, and pedestrian safety will be more seriously threatened. By acting as quickly as possible, we may save lives.