Driver Perception of School Traffic Control Devices

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Field surveys were used to determine student and driver perceptions of traffic control devices. These consisted of two structured surveys—a student survey and a driver survey. Interviews were conducted with approximately 1000 students (kindergarten and third, sixth, and eighth grades) and some 400 passing motorists at school locations in New York, Maryland, and Virginia.

Driver responses were evaluated based on driver recognition of existing signing and behavioral modifications as evidenced by a change in speed. Covert use of radar hand guns was employed to measure driver performance and to provide a comparison with the driver interview responses. Drivers were not observant of school advance warning and crosswalk signs, and, in general, the only school signs perceived were active signs with flashing lights. These did not necessarily modify driver behavior or reduce speed to the level indicated on the sign.

The student surveys are not addressed within this paper. Readers are directed to the study final report for details of the student survey (1).

This paper discusses the design of the survey, the administration of the survey to the motorists, and general findings related to driver behavior (speed), signing, and other site specific factors. The major task of the project related to the driver was the assessment of driver perception, attitudes, and behavioral changes when drivers approached and passed through a school zone.

To assess any changes in driver behavior, we incorporated two methods of approach into the study design. The first method was the covert measurement of vehicle speeds within school zones by use of radar speed guns (under children present and children not present conditions). The second method of data collection was through interviews with the drivers of these vehicles immediately after they passed through the school zones. A survey format using recall (free response) rather than recognition (multiple choice) items was designed to secure the desired information without prompting the driver.

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DATA COLLECTION METHODOLOGY FOR SPEED MEASUREMENT

Objective measures of vehicle speeds and vehicular and pedestrian activity in the school areas were used. Observers stationed unobtrusively on and around school grounds took pedestrian and vehicle counts a few days before data collection. This permitted identification of any unique occurrences on the day of the driver survey administration.

Individual vehicle speeds were matched with their corresponding questionnaires to allow comparisons between high- and low-speed groups and between driver's estimate of speed and actual speed. The measurement instrument was a radar speed gun, a radar device that can be aimed at moving vehicles as they pass. Use of the radar guns provided the opportunity for observers to obtain speed readings at several points on the roadway while remaining at a single observation point. Testing and calibration revealed that the gun should be aimed at an angle of less than 15 deg because measurement error increased with increasing angle of aim. At 15 deg, the error was about 3.5 percent.

The location of the radar device and the number of speed measures taken were, of course, site dependent. At two of the school sites, three measures of speed were taken. The first reading indicated the driver's speed well before the school zone. The second measure was taken just as the driver entered the zone. The final measure indicated the driver's speed within the zone (usually at a crosswalk). The location of a traffic signal at one site allowed only two meaningful speed measurements: before the school zone and entering the zone. In New York, heavy traffic volume did not permit the collection of speed data on specific vehicles; therefore, the general speed of the traffic stream was determined.

The speed measures were taken on a sample of vehicles and manually recorded. The drivers of these vehicles were stopped by a police officer located downstream and were interviewed. Vehicles were randomly

selected whenever an interviewer was free.

RESULTS

Driver Survey Responses

An attempt to tap the level of awareness of the drivers about the school zone was made early in the interview when drivers were asked whether they had changed their driving behavior when they drove through the area. About 22 percent replied that they had. When asked why, about 40 percent of those drivers mentioned the school zone. Thus about 8 percent of the drivers specifically mentioned the school zone.

A check was made of those drivers who said that they had modified their behavior. Half of these drivers indicated that the way they drove differently was by slowing down (the other half did not specify how they had varied their driving). It was hypothesized that the radar-obtained speed for these drivers should be significantly different from that of the remainder of the driver population. However, a statistical test indicated no significant speed difference between the two driver populations. The motorists who said that they had not changed their driving behavior were then asked if the area was special in any way. Forty-three percent of those asked said that it was; of these, 47 percent said that it was a school zone. Thus about 20 percent of the driver sample when prompted recalled that the area was a school zone. Therefore, slightly more than one-fourth of the drivers mentioned the school zone before it was specifically brought up by the interviewer. About 7 percent of the 348 drivers at the four survey sites responded negatively when asked, Is this a school zone? Five percent did not respond or indicated that they did not know. The total driver sample was generally familiar with the school areas; 67 percent lived 8 km (5 miles) away or less and 70 percent drove past the school at least once per day.

The drivers were asked whether they had seen any school-related signs in the school zone. Sixty-six percent responded affirmatively. (Thirty-three percent who had passed at least one sign and, most often, two signs responded negatively.) They were then asked what the sign looked like. They were shown a 28 by 35.6-cm (11 by 14-in) page containing six photographs of school-related signs. The signs shown and their positions on the paper were varied at each site. Figure 1 shows the distribution of the sign recognition responses of the drivers. The shaded boxes represent the signs the drivers passed in their direction of travel. The only signs indicated by more than half of the drivers' responses at the two sites where they were present were the active (flashing) signs. Less than half of the responses of the entire sample correctly identified the existing signs. Forty-seven percent of the responses at site 14 indicated a sign that they had not passed in the school zone but would be aware of if they lived in the area.

At site 10, the flashing light was on for about half of the driver interview period (38 out of 74 drivers). This permitted a comparison of driver perception of signing responses by using the activation of the sign as a variable. If we consider only the beacon sign, we can see that activation dramatically increases driver recognition of the sign:

	Beacon On		Beacon Off	
Response	Number	Percent	Number	Percent
Right	31	82	20	56
Wrong	7	18	16	44
Total	38	100	36	100

The sign-related observations at the four driver survey sites can be described as follows:

1. Each of the sites was marked with either one or two school warning signs or speed signs or both;
2. Most drivers (89 percent) traveled past the signs one or more times a week, and most drivers (66 percent) reported seeing a school-related sign as they drove through the school zone; and
3. Less than half of the total responses correctly identified the signs that were present, and the type of sign most frequently identified was the flashing school speed sign.

Speed—Signing and Children's Presence

A driver's speed through the school area is generally a product of recognition of a potential hazard to self or to the young pedestrians and a determination of what is a reasonable speed for the traffic and environmental conditions. Drivers who responded to the survey tended to emphasize their caution and their relatively slow speeds through the school zone. The radar speed measurements taken at the school zones do not verify these responses. In a comparison of all the survey sites, the drivers indicated that they were aware of passing through a school zone. Seventy-two percent said that they were driving at or under the legal speed limit. More than half (64 percent) correctly identified the legal speed limit through the zone. Eighty-five percent of the drivers whose speeds were obtained by radar were exceeding the legal speed limit. These drivers exceeded the speed limit by approximately 16 km/h (10 mph).

Several speed comparisons were made at specific sites. In one instance, this reflected the desire of the local traffic engineer for a comparison of speeds in the school area for residents and nonresidents. [Residents live less than 3.2 km (2 miles) from the interview site.] It is interesting to note that familiarity with the area did not relate to observed speed through the school zones. The findings at the Howard County, Maryland, site indicate that local drivers travel at about the same speed as do nonresidents but are more aware of signing and children on their way to school. Increased awareness of the school zone did not cause residents to drive significantly slower than nonresidents in the school area. Increased recognition of the existing signs at this site may be due to the drivers' general familiarity with the area. Weight is given to this argument by the fact that 47 percent of the responses given to the signing question at this site indicated recognition of a sign not driven past but located elsewhere in the general area.

Although drivers generally perceived the active signs with flashing lights, these did not necessarily modify driver behavior or reduce speed to the level indicated on the sign. A flashing sign during school hours, students on the sidewalk, a wide street, and long sight distances reduced speed only slightly (school site 2). A similar sign during the same hours, students present, and a curving uphill road with poorer sight distance produced a significant speed reduction (school site 10). Obviously, the effectiveness of signing has something to do with the driver's perception of it as a credible indicator of a potentially unsafe situation.

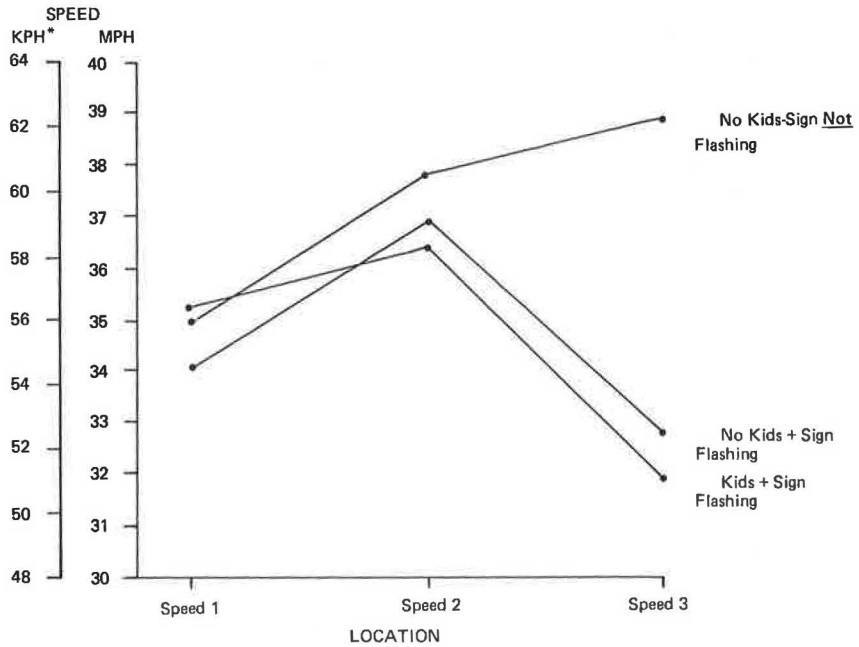
The driver at school site 10 is driving in a rolling terrain and cannot see the school or the crosswalk when the school flashing speed limit sign is observed. Between speed one and speed two, under all conditions, the driver is accelerating after coming down from a rise (even though the road is curved). Figure 2 shows the measured speeds at these locations. The drivers' speeds

Figure 1. Distribution of sign recognition responses of drivers.

SIGNS	FairFax County, Va. 10	Howard County, Md. 14	Brooklyn, N.Y. 11	Falls Church, Va. 2
	6%	4%	10%	8%
	12%	18%	21%	2%
	6%	13%	6%	0%
		14%		
	10%		27%	16%
	59%	5%	4%	
			31%	
				64%
	8%	 * 47%		11%

* The Photo of this Sign was Only Shown to Drivers at Site 14

Figure 2. Driver speeds measured by covert radar through school site 10.



at the second speed location showed no significant decrease even though there is a school advance sign at this location. As Figure 2 illustrates, when the sign is not flashing, the drivers' speeds show no significant decrease (at the third speed location from the advance school sign past the school speed sign to the school crosswalk).

There is a statistically significant decrease in speed 3 when the sign is flashing as opposed to when it is not. This significant reduction in speed occurs whether children are present or not. The speed limit in the area is 56 km/h (35 mph) and is reduced to 40 km/h (25 mph) when the beacon is flashing.

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REFERENCE

1. M. L. Reiss. School Trip Safety and Urban Play Areas: Student and Driver Perception of School Trip Safety and Traffic Control Devices. BioTechnology, Inc., final draft rept., Vol. 2, June 1975.