PEDESTRIAN RESEARCH

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SYNOPSIS

Impressed with the seriousness of the plight of the pedestrian—the forgotten man in traffic—the American Automobile Association three years ago instituted a study of the subject.

While revealing many hitherto unrealized facts about pedestrian accidents and conditions, the study sharply emphasizes the inadequacy of available information. It points to the very great need for extensive further research and activity in such major areas as:

Fact-Gathering: In most localities present pedestrian accident reports fail principally to provide adequate information concerning acts, conditions, etc., immediately preceding the accident and relating to it.

Life Expectancy: Two out of three pedestrians killed are over 40, and the major toll is for those past 50. However, children of school age are the group which seems to warrant the greatest attention, because of their high injury rate (highest of any age-group) and the years of expected human life ahead. Our study indicated that total years of expected life lost reaches the highest point when children 5-to-14 are killed in traffic.

Increased Visibility of Crosswalks: Standing out sharply is the need for further studies of an engineering nature to assist pedestrians. Needed especially is a careful re-examination of pedestrian crosswalk design, particularly where located in the midblock or at irregularly shaped intersections. A large number of crosswalks in this country are virtually invisible to the motorist from a reasonable distance away. Instead of the usual 4- to 6-in. paint lines, the line at the near right side of the crosswalk should be about 24 in. wide. Some provision should be made to indicate the location of unusually placed crosswalks, especially at night. England has reduced its pedestrian toll by the use of the Belisha Beacon. A partial study in London shows that fatalities decreased 25 per cent and injuries 12 per cent in a before-and-after study.

Intoxication of Pedestrians: Studies in New York City and Cuyahoga County, Ohio, of brain tissue and body fluids for presence of alcohol indicate that this may be a much more important factor in other areas than is believed. These showed two out of five pedestrians killed had been drinking substantial amounts of alcoholic beverages.

Non-Drivers Being Killed: Pedestrians who do not drive are principally those being killed. Studies in Connecticut corroborated by five similar studies, indicated that nine out of ten of those killed did not have a drivers license. But we do not know well enough just what kinds of knowledge they lack—what wrong ideas they may have regarding motor operation and vehicular traffic.

Pedestrian Invisibility: We know all too little about the point which stands out so very prominently in so many pedestrian accidents—the fact that the driver did not see the pedestrian or did not see him until the instant when he hit him.

Recently I had luncheon in New York with the Director of Public Relations of one of our large industrial organizations. He had become keenly interested in pedestrian traffic problems and had thought of engaging in some activities to help improve pedestrian conditions. His proposal to the President of the Company was greeted with decided derision. "Why in the world should we devote attention to the pedestrian? He isn't of any importance in the accident toll" was the gist of the reaction. But he changed his mind when he found out that in cities two-thirds and often more of the persons killed in traffic were pedestrians, and that even in rural areas, pedestrians account for one-quarter to one-third of the total.

Three years ago the American Automobile Association impressed with the seriousness of the plight of the forgotten-man-in-traffic, instituted a study of the subject. Aided by grants from the Automotive Safety Foundation, the Association engaged Professor William J. Cox, then of Yale University, to make the original studies. Since Mr. Cox became Highway Commissioner of Connecticut, the study has been carried on at the Association's headquarters. Originally compiled in a technical report, the material has been formulated into a semi-popular booklet, "Pedestrian Protection."

Some of the main findings of this three-year study are as follows:

1. *Elderly:* Two out of three pedestrians killed are over 40 and the major toll is for those past 50, who are five times as likely as school children to be killed while walking on our streets and highways.
2. *Male:* About seven out of ten of the pedestrians killed are male.
3. *Death After Dark:* The majority of pedestrians killed are meeting death after dark. The month of December, with fewest hours of daylight, is often the deadliest month for those afoot.
4. *Non-Drivers:* Nine out of ten or more of the pedestrians killed do not drive a car.
5. *Midblock Crossings:* Three out of five pedestrian fatalities in cities occurred away from intersections. Many involve coming out from between parked cars—a practice against which the motorist is almost powerless.
6. *Ingested Alcohol:* Studies by the Chief Medical Examiner of New York City and the Coroner of Cuyahoga County, Ohio (Cleveland area) indicate that two out of five pedestrians killed had been drinking substantial amounts of alcoholic beverages. Saturday and Sunday account for the largest percentage of pedestrian drinking.
7. *Under-Privileged and Low-Income Groups:* Spotting fatalities by locations of residence of pedestrians involved, in Dallas, Washington, D. C., Detroit and other places has indicated that certain groups have unusually high numbers of pedestrian fatalities. These are generally groups like the foreign-born, non-English speaking, low-income and those more poorly endowed mentally.
8. *School-Aged Children:* The fatality rate for children of school age is not high. However, the injury rate in traffic is the highest of all age-groups in the data studied.

REASONS FOR BAD RECORD

The natural reaction of the student is to seek reasons behind his findings, for an understanding of *why* is always helpful in deciding upon what to do to correct bad conditions. The following points seem to be significant.

Unfamiliarity with Driving Problems: Middle-aged and older persons formed their walking habits and their attitudes before there was any considerable automobile traffic problem. They are unfamiliar with motor vehicle operation and the problems of driving. They are often unwilling to face the need of readjustments in their walking practices.

Relative Invisibility of Pedestrians: Ignorance by a great majority of pedestrians of their relative invisibility on the highway at night is probably one of the major causes for night-time pedestrian fatalities. The headlights look so very bright to the pedestrian that he is sure

that the driver can see him long before the driver actually does. Over and over again in the special case history study of 1,715 fatal accidents,[1] the driver asserted that he didn't see the pedestrian or didn't see him soon enough.

A companion point is the failure of the average motorist to realize that the pedestrian does not have a proper understanding of this matter, and the failure of motorists to take proper corrective steps themselves (including keeping headlights in better condition, keeping windshields clean and traveling considerably slower at night).

Effects of Advancing Years: Believed to be of considerable importance are the less keen vision and hearing, less agile pace, and lowered alertness in advancing years. Lowered resistance is also important as will be shown later. Momentary lapses of attention and unawareness of existing hazards are likewise important factors.

Unwise Walking Practices: Studies indicate clearly the predominance of unsound walking practices on the part of pedestrians. We greatly need general acceptance of a code for cooperative street use by the motorists and pedestrians which really fits today's conditions.

Lack of Proper Pedestrian Facilities: One major reason why pedestrians have trouble today is that street and traffic facilities have not been properly designed for them.

Lack of Facts: In most localities there is a serious lack of facts concerning pedestrian conditions.

RECENT STUDIES

The Connecticut study of 1,031 pedestrian fatalities which showed that over nine out of ten of those of licensable age had never been licensed to drive aroused very great interest in this factor. Five other rather similar studies have corroborated this significant point. These are shown in Table 1.

TABLE 1

PERCENTAGE OF PERSONS KILLED AS PEDESTRIANS WHO WERE WITHIN LICENSABLE AGE, BUT WERE NOT LICENSED

	Percent
Pedestrians killed in New Jersey in 1938, who were eligible for driver's license, but did not have such a license.....	93
Pedestrians 16 years and over, in Pennsylvania, in 1938 who were not licensed drivers. (In first six months of 1939, this group was 96.4 percent.).....	97.2
Pedestrians killed in South Carolina from November, 1937, through May, 1939, of licensable age who were never licensed to drive in South Carolina.....	85.0
Pedestrians killed in Connecticut in 1938, of licensable age, who did not have such a license.....	92.0
Pedestrians killed in Washington, D. C., based on 8-year average (1931-1938) who were of licensable age who did not have nor had had a license since 1926.	90.0

There are three deficiencies in some of these studies which should be noted:

1. Some of the persons not licensed in the jurisdiction studied may have been licensed elsewhere;
2. In some of the studies the records either were not checked back very far or records were not available to check back to find if the person had ever been licensed to drive;
3. In some places the person may have driven before there was any licensing law or records of persons licensed.

The South Carolina study yields some other interesting information, shown in Table 2.

[1] "A Case History Study of Fatal Accidents," this volume, p. 362.

Relative Emphasis Warranted on Aiding the Elderly

The facts point clearly to the high number of pedestrian fatalities involving persons of middle age and over. No one will question the importance of seeking to reduce that toll. However, there are other aspects to the matter which deserve study and consideration. Mr. Earl Allgaier of the American Automobile Association has made several interesting analyses which bear importantly on the questions of the degree of emphasis in corrective measures which should be devoted to various age groups.

TABLE 2

PEDESTRIAN INFORMATION FROM SOUTH CAROLINA STUDY

NOVEMBER 1937 TO MAY 1939

266 pedestrians killed.
180 of these were over 14 and residents of the state.

Unlicensed	Percent
Males	82
Females	97
Whites	76
Colored	95
White males	73
Colored males	94
White females	92
Colored females	100

Ratio of Injuries to Fatalities

Figure 1 brings out a very significant point. It is based on a study of records of 17 states for the years 1936, 1937 and 1938 involving 16,726 pedestrians who were killed, and 205, 562 pedestrians who were injured. On the average, 12.3 pedestrians were injured for each one killed. However, in the school age group of 5-14, the ratio is 29.8, and after that age group the ratio steadily drops off to a low of 3.6 for persons aged 65 and over.

This helps to answer why the death rate among elderly pedestrians is so high. Having been involved in an accident they do not have the recuperative power which younger persons have. From the point of view of pedestrian casualties, major attention needs to be devoted to the school age children.

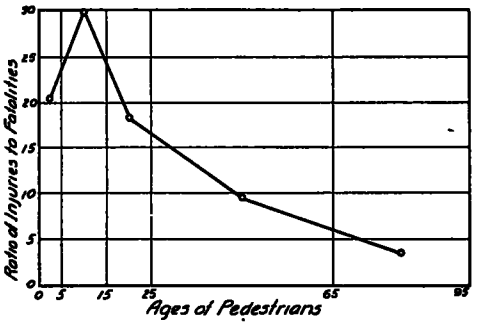

Figure 1. Ratios of Pedestrian injuries to fatalities at various ages. Data from 17 states from 1936 to 1938. 205,562 injured, 16,726 killed.

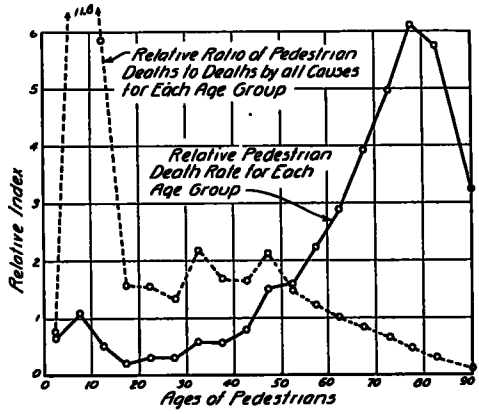

Figure 2. Pedestrian Deaths by Age Groups. From "A Case History Study of Fatal Accidents," p. 362.

Comparison of Pedestrian Deaths to Deaths by All Causes

Figure 2 shows a comparison of the relative death rates for pedestrians of various ages. It also shows the ratio of the comparative pedestrian death rates for each age group to a comparably arranged index for death by all causes for

each age group. This study, likewise prepared by Earl Allgaier, is based on the data from the special case history study of 1,715 fatalities.[1]

Compared to all causes of death, traffic is the most serious for the age group from 5-9, where nearly 12 times as many pedestrians are killed as would be expected if the pedestrian death rate curve followed the curve for deaths from all causes.

It will be quickly pointed out that there is no essential reason why pedestrian rates should be expected to follow the death rate from all causes, nor is this the assumption behind these curves. They are intended merely to point out where the sharpest divergence between the two death rate curves occur. Probably the principal merit of this analysis is to show the very high degree to which traffic hazards are the greatest hazards to life for children of grade school age.

Years of Expected Life Study

Figure 3 provides a further interesting angle on the costliness of pedestrian fatalities in terms of years of human life probably lost. Assume that the records of a typical thousand pedestrians killed in traffic are examined. Assume that the pedestrians are grouped by age and that the number in each age group is multiplied by the years of expected life for that age group, the total of all such multiplied sums for all the age groups would give the total number of years of expected life which had been lost because of the fatalities. The percentages of this total could then easily be figured for each age group. This curve shows those percentages.

Note that the percentage of the total years of expected life lost reaches the highest point in the age group 5-9, with 22.9 per cent; the age group zero to 4 is next most important, with a percentage of 13.1; and the 10-14 age group is next with 9.4 per cent.

Between the ages of 15 and 30, the percentages reach a low point for persons under 65. For persons over 65 the percentages decrease sharply. This curve again emphasizes the importance of attention to the child in traffic safety work.

This analysis, made by Mr. Earl Allgaier, is based upon records of 983 pedestrian fatalities, taken from the previously mentioned case history study of fatal accidents.

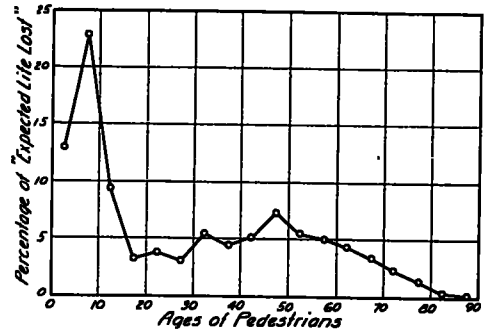

Figure 3. Years of expected life lost by Pedestrian Deaths for each age. 983 Pedestrian Deaths, Expected Life from U. S. Census. From "A Case History Study of Fatal Accidents," p. 362.

Ordinances Providing for Pedestrian Observance of Stop-and-Go Signals

Much interest has been generated recently concerning the desirability of legislation requiring pedestrians to obey traffic control signals. An inquiry among cities of over 50,000 population by the American Automobile Association produced 103 replies. Analysis provides the interesting information shown in Table 3.

It is interesting to note that while a substantial number of cities have ordinances requiring pedestrians to obey traffic control signals, only slightly over half enforce the law and less than half report good observance. Further study is warranted as to the reasons why good

observance is secured in some cities and not in others. Among probable reasons are failure to arrange signal locations, design and operation to suit pedestrian needs (for example, too long intervals, no signal ahead of the pedestrian as he crosses in certain directions, etc.), failure to convince the public that the measure is desirable, through a proper program of education, and improper handling of enforcement.

TABLE 3

ANALYSIS OF REPLIES RECEIVED FROM 103 CITIES REPLYING TO INQUIRY SENT OUT BY THE AAA CONCERNING ORDINANCES REQUIRING PEDESTRIAN OBSERVANCE OF STOP-AND-GO SIGNALS

No. of cities over 50,000 population replying	103
No. of cities requiring pedestrian observance of stop-and-go signals	65
No. of cities which reported enforcing the law	37
No. of cities reporting good observance	31
No. of cities reporting fair observance	20
No. of cities reported prohibiting "jaywalking"	33
No. of cities reporting good observance	9
No. of cities reporting fair observance	15

Crosswalk Design

Our studies lead us to believe that there is need for careful re-examination of the design of pedestrian crosswalks. Particularly where crosswalks are located in the midblock, or at irregular-shaped intersections, it is of very great importance that the motorist always be able to know in advance where the crosswalk is at which he is expected to yield the right-of-way to pedestrians. Yet, a large number of crosswalks in this country do not satisfy this reasonable requirement. For example, the usual 4- to 6-in. paint lines are virtually invisible from a reasonable distance back of the crosswalk location and from the height at which the motorist is expected to see it. At the near-right side of the crosswalk, if the customary type of paint line is used, it should be in the neighborhood of 24 in. wide, except where vehicle speeds are very slow. Furthermore, if snow or ice covers the markings, there is no way at all for a motorist to know of the existence of an irregular-marked crosswalk, although the pedestrian may be expecting the motorist to yield right-of-way there. At night many of the crosswalks are virtually invisible.

In England, this has been faced and the Belisha Beacon is one of the important results. Named after the then Head of the Ministry of Transport Mr. Hore-Belisha, it consists of a post with alternate dark and light bands on it and is surmounted by a large orange-colored globe which is lighted at night. By November 1, 1937, 28,000 of these special crossings had been established, 12,000 of which were in London, and evidences were that they were helping to reduce the pedestrian toll. Fatalities had decreased 25 per cent and injuries 12 per cent, in a partial before and after study. These beacons serve both day and night to help the motorists identify places at which they are to yield the right-of-way. There is a real need for much more effective crosswalk design in this country and it is especially important at irregularly located crosswalks.

FURTHER RESEARCH NEEDED

There is great need for extensive further research on pedestrian problems. A new type pedestrian island has produced an undue number of injuries. What's wrong with the design or with the plan governing its installation and public education concerning its presence?

Pedestrian accident facts are very inadequate. *They principally fail to provide adequate information as to acts, conditions, etc., immediately preceding the accident and relating to it.* In pedestrian fatality cases, unless there is an interested witness, the only source of in-

formation is the motorist. Honest as he may be, he is giving the viewpoint of the man-behind-the-wheel. Much more of the viewpoint of the man-on-foot is needed. In order to obtain this, we are advocating case studies of accidents involving pedestrians injured non-fatally. An interview form has been prepared. Another interesting proposal for gaining such information is that of Mr. Peter Stupka for pedestrian reporting of accidents.

The New York and Cuyahoga County studies of brain tissue and body fluids for presence of alcohol indicate that this may be a much more important factor in other areas than is believed. Further research should be carried on in a number of additional areas to find out the facts. One procedure would be for coroners to make it a matter of normal practice to test the body fluids of accident victims for the presence of alcohol. Another procedure would be for hospitals to make such tests where patients are willing and conditions are appropriate.

Many further studies of relationships between factors in pedestrian accidents are needed. For example, we know of the predominance of persons past 50 in the fatality toll, but we do not know enough about what those persons were doing—whether they were carrying anything light or anything white, where they were crossing, whether they looked or not, whether they have serious vision deficiencies or other physical disabilities. Similarly, we know that the persons who do not drive are principally those being killed, but we do not know well enough just what kinds of knowledge they principally lack—what wrong ideas they may have regarding motor vehicle operation and traffic. We do not know what are the most frequent bad practices of that particular group.

We know all too little regarding the effectiveness of various types of corrective measures, particularly in the field of education where there is great need for appraising the value of various plans, methods, etc.

We know all too little about the point which stands out so very prominently in so many pedestrian accidents—the fact that the driver did not see the pedestrian or did not see him until almost the instant when he hit him. While these assertions are partly rationalizations, they are not altogether so, and the whole problem warrants much further attention.