A SAMPLING STUDY of DRIVERS on the HIGHWAYS for the 24-HOUR PERIOD*

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SYNOPSIS

The paper is a presentation of the first 6 mo. of a round-the-clock sampling technique designed to throw light on the driving habits of the licensed population considering age, sex, speeds, age of car driven, and related factors.

It was found that speed and age are inversely related at times when the traffic flow is light. Heavy traffic seems to cramp the style of speed demons. This classification of drivers is most heavily constituted of man between the ages of 20 to 24. In all 51.3 percent of the traffic observed on rural highways between midnight and 0700 was in the 20-to-29-yr.-old group, mostly those 24 and below. This figure may be contrasted with 26.3 and 8.4 for the 30-to-39- and 40-to-49-yr.-old groups respectively. Further it may be compared with 22.6 percent for the same age groups in daylight driving and 24.0 percent from 1700 until midnight.

The average percent of women drivers on the highway around the clock was found to be 14.5 of the total. Their heaviest driving hours were between 1400 and 1600. Two other minor peak traffic periods for women were noted at 1800 and 2100. Women drive slightly more during midweek than on week ends.

Evidence was found of a block of wild drivers constituting about 10 percent of the 20-to-24-yr.-old group who flagrantly and dangerously violate the rules of driving safely from midnight to 0400. Only rarely were excessive speeds noted among other age groups or at other hours of the day. The mean speed for all men observed was 47.6 mph. at an average age of 36.2. The mean speed of drivers between midnight and 0500 was 50.6 mph. at an average age 29.3. If men under 27 were to reduce their accidents to the average for all men driving, the accident toll and consequent fatality lists of the state should be cut by 12 percent.

It would appear that night speed limits would reduce the hazards to the public from this group only by the strictest enforcement between midnight and 0500 daily. Provisional licenses for drivers up to 24 and governors on cars required for persons apprehended exceeding the speed limits might reduce accidents resulting from driving at speeds too fast for conditions or for the driver's experience and training.

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LAST year the writer reported a study of age and sex (1) in relation to accident involvement before this body. It was shown that accidents are not equally distributed by age groups, nor are they equally distributed by age groups when mileage is held constant. A slight advantage was shown for women although no significant difference was found to exist when all ages were grouped together on a mileage basis.

In the study reported, no account could be taken of exposure; hence, the present research was designed in an attempt to throw light on the relative exposure due to hours of travel and speeds as they apply to the accident situation. Two pilot studies were carried out before the final design was established. The method developed is described more in detail in the appendix of this report.

The principal hypothesis to be tested may be stated as follows:

An overall description of the structure of the driving population may be obtained by a statified sampling technique.

Two corollary hypotheses were also investigated: (1) A sampling technique can be employed to give reliable parameters of the driving population for given conditions of driving. (2) It is possible to reduce the number of observation points by comparing the variance of randomly chosen points in a given geographical area.

Due to the wide variety of data available a number of subhypotheses will be stated, the data then presented with an indication as to whether or not the subhypothesis is confirmed.

METHOD AND PROCEDURE

After preliminary experimentation with two methods, photographic and observational, it was found that infra-red photography was not sufficiently developed for precision night work on the highway under the conditions of moving traffic. Variations in the illumination levels in daylight made photography rather impractical for dependable results under all the conditions of this study.

In order to increase observational precision in daylight a high-grade binocular was tried and found to be unsatisfactory. Consequently an 8-power elbow telescope was obtained and anchored between the front and rear seats of the experimental car. It was used as needed in identifying the make of the car and the license plate number at a distance. These were spoken into the microphone of a tape recorder and later transcribed at the office. As the vehicle came nearer, the identification was confirmed and the following data recorded on the tape: (1) year and make of car; (2) number of persons in the car; (3) sex of the driver; (4) estimated age of the driver; (5) verification of the license number on the car; (6) speed of the vehicle as recorded by a radar speed meter; and (7) distance from the centerline whenever possible to secure it. (This was found very difficult to get and was not used in the analysis of data.)

Unless traffic was heavier than average one trained observer could

work alone in daylight. Every nth car was taken for recording of data on it in the more dense traffic. During much of the time one technician was assigned to the speed meter exclusively.

For nighttime observations the technique had to be varied somewhat at rural unlighted locations. Two stations were set up, one for checking speed and identifying the car. The second station was established at the first stoplight within the city. Only four types of data could be obtained at the second observation point as follows: (1) year and make of the car; (2) number of persons in the car; (3) age and sex of the driver; and (4) license number of the vehicle;

In case the numbers, the year and make of car did not check at the two stations that observation was not used in the data.

The license number recorded was then taken to Des Moines and the owner's name secured. He was sent a double postcard asking him to indicate the age of the driver, the sex of the driver and the number of persons in the car at the time observed. In this way reliability of the observation techniques could be determined. In addition he was asked to state the number of miles driven the hour of the observation. These returns were not complete.

The data were tabulated and punched on IBM cards. Although the last 6 mo. have not been completely processed, there will be something over 11,000 cases in all. Only a part of the analysis can be presented within the time limits of this paper.

RESULTS

The presentation of results here will deal only with certain correlations and comparisons by age and sex for the first 6 mo., or the winter season. Under this subdivision 4,622 cases randomly drawn are analyzed for the structure of the driving population in three ways, those pertaining to: (1) reliability of observations, (2) age and sex, and (3) factors relating to speed and time of the day.

Reliability of Observations

Since one of the primary purposes of the present study was to evaluate the accuracy of the method used in determining age and other data taken under the conditions imposed, the observations were correlated with those given in the license files. These results are shown in Tables 1, 2, and 3 and may be summarized as they relate to the subhypothesis given.

Subhypothesis 1: Observations as to age of the driver taken under conditions of this study are sufficiently accurate for purposes of traffic estimates in general.

TABLE 1

CORRELATION BETWEEN ESTIMATED AGE AND REPORTED AGE AND COMPARISON OF MEANS

	Correlations	Mean Reported Age	Mean Estimated Age
Male			
Urban-Day	0.882	40.60	39.17
Urban-Night	0.864	33.22	31.25
Rural-Day	0.826	41.33	40.21
Rural-Night Fast	0.743	37.43	36.65
Rural-Night Slow	0.729	32.69	32.02
Female			
Urban	0.810	36.35	34.97
Rural	0.615	36.04	34.72

TABLE 2

PERCENT TIMES THE SEX REPORTED WAS DIFFERENT THAN OBSERVED

Urban-Day	1.94
Urban-Night	3.62
Rural-Day	0.63
Rural-Night-Fast	0.53
Rural-Night-Slow	0.00

TABLE 3

PERCENT TIMES THE NUMBER OF PERSONS REPORTED DIFFERED FROM OBSERVED, AND COMPARISON OF MEANS

	Mean No. Observed	Mean No. Reported	Percent Reported Different
Urban-Day	1.67	1.74	8.26
Urban-Night	1.90	1.97	11.56
Rural-Day	2.04	2.11	7.93
Rural-Night-Fast	2.23	2.58	17.63
Rural-Night-Slow	1.82	2.12	11.82

Correlations between the observed ages and the reported ages are as high as ordinarily required for consistency of measurements of this type. Comparison of means for the observed and reported ages is within the experimental error of measurement. The mean age of men driving at night is

about 7 years younger than those driving in daylight. There is no apparent difference between the ages of women drivers observed in urban and rural areas.

When split into rural-night fast and rural-night slow groups the latter were of slightly lower age, due probably to slower speeds of the drivers below 20 years of age at earlier hours of the period of darkness. The urban groups of men were younger than those observed in the country for the total 24-hr. period.

There was a negligible error in observation of sex averaging less than 1.5 percent. Greater discrepancy was noted in observation of the number of persons in the car as compared with reports received. The average discrepancy here was about 10 percent, but there is as much likelihood that a part of the variance could be accounted for largely on the basis of inaccuracy of reporting by the respondent. The driver receiving a card two days later might well have forgotten just who or how many persons were with him at the time. There is also the possibility of children being hidden, persons laying down in the seat, and other reasons for error in observation.

Speed was measured objectively with a Radar Speed Meter which is accurate within limits of 1 mph.

Subject to conditions of the study it may be stated that subhypothesis 1 is sustained and that the method is sufficiently reliable for application to traffic studies designed to secure information on the driver for use in scientific analysis of drivers in traffic.

Factors Relating to Age and Sex of Drivers

It would be impossible to discuss all the ramifications of these two variables but a concise statement may be made as subhypothesis 2 and stated in the null form: There is no difference in driving habits of men and women of different ages with respect to speed, age and time of day. Tables 4, 5, 6, 7 and 8 show these data. Figure 1 also shows the percent of men observed on the highways during different parts of the day and night.

Women were observed on the highway much less than men and in a companion study (2) the figures obtained were 17 percent night mileage for women and 28 percent for men. Between midnight and 0700 percentages of 1.9 and 5 of total mileage respectively were given by women and men.

While the mean age for rural and urban driving was almost the same for women, it was slightly different for men. Figure 2 shows the variation in percentages of men drivers observed during daylight, evening darkness, night darkness, first 4 hr. after midnight, and for the full 24-hr. period.

Summarizing all the data it would seem to warrant the assertion that subhypothesis 2 is not confirmed and that the driving habits of men and women are sufficiently divergent to necessitate separate analyses and comparisons.

TABLE 4

HOURS WOMEN DRIVERS

Time of Day	Percent Women Private Passenger Car Drivers	More or less than Expected by Chi Squared
00-01	8.1	Less
01-07	3.7	Less
07	9.2	Less
08	11.9	----
09	15.2	----
10	18.3	More
11	17.7	More
12	16.3	----
13	12.3	Less
14	25.8	More
15	19.4	More
16	20.5	More
17	9.1	Less
18	11.2	Less
19	9.2	Less
20	8.0	Less
21	11.6	Less
22	9.1	Less
23	7.5	Less
Over-all percent	14.5	

TABLE 5

DISTRIBUTION OF SEX BY LOCATION

	Percent Women
Urban	18.3
Rural	8.8

Significantly more in urban by chi squared.

TABLE 6

DISTRIBUTION OF SEX BY TIME OF WEEK

	Percent Women
Week End	13.9
Midweek	15.2

Chi squared significant at 2-percent level.

TABLE 7

URBAN HOURLY MEANS FOR SPEED, AGE AND YEAR OF CAR

Hour	Mean Speed	Mean Age	Mean Year of Car
00	19.48	26.76	46.12
*01-03	20.42	26.04	46.06
*04-06	17.92	36.52	44.84
07	16.32	37.44	45.58
08	15.54	42.96	47.10
09	15.76	39.08	47.02
10	10.68	38.96	46.96
11	13.60	36.98	46.06
12	15.20	34.68	45.82
13	17.82	35.42	46.02
14	14.56	40.00	46.84
15	13.68	38.48	45.70
16	13.62	38.42	45.96
17	13.18	34.52	47.00
18	18.28	33.94	47.34
19	15.28	30.96	45.64
20	15.64	31.60	47.10
21	16.78	29.98	47.86
22	17.14	25.66	47.26
23	19.34	23.74	46.50

*It will be noted that in this table the 3-hr. periods from 1 to 4 and 4 to 7 were combined due to the number of cases observed.

TABLE 8

RURAL HOURLY MEANS FOR SPEED, AGE AND YEAR OF CAR

Hour	Mean Year of Car	Mean Age	Mean Speed
00	47.34	29.68	46.64
01-03	46.96	26.90	52.88
04-06	47.72	34.56	51.08
07	46.16	34.82	48.36
08	48.50	39.40	36.80-Fog
09	47.76	41.36	49.46
10	48.20	37.66	47.82
11	47.56	39.84	48.20
12	48.08	40.46	50.68
13	47.80	32.06	49.38
14	46.38	36.18	45.48
15	47.06	38.06	46.86
16	48.82	39.94	50.86
17	46.40	32.56	27.90-Ice
18	47.54	34.20	46.30
19	48.76	35.70	47.58
20	48.58	32.06	48.76
21	47.66	33.64	48.38
22	47.22	30.78	46.42
23	47.82	31.52	46.64

The lower speeds at 0800 and 1700 are also reflected in Figure 2 which shows the age breakdown on a part of these data. One set of observations under unusual conditions would unduly affect the means given since each value is based on four sets of observation.

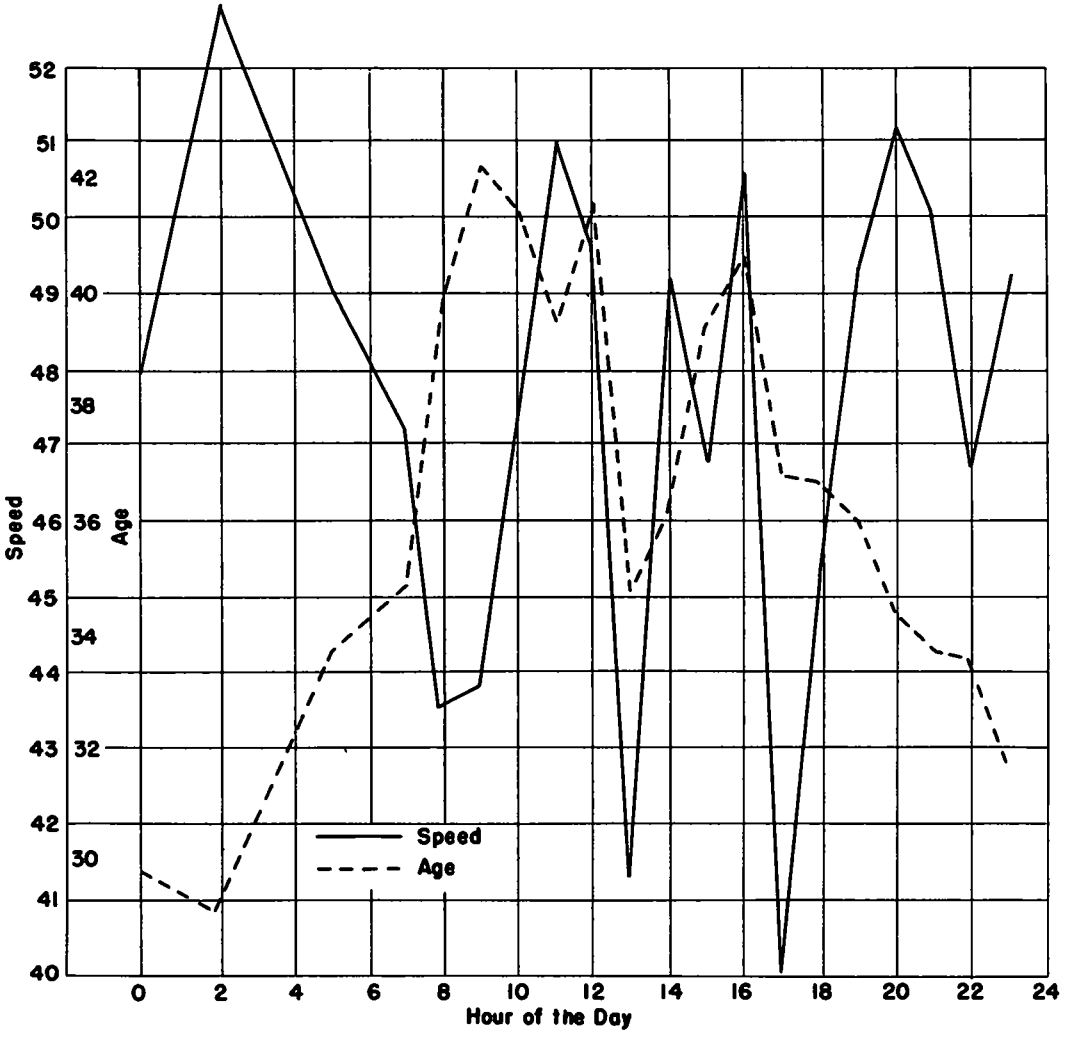


Figure 1. Speed and age by hour of the day.
(Winter Season)

Speed, Time of Day, Age of Driver and Age of Car

The factor of speed is interrelated with age and time of day. Heavy traffic and slower speeds are associated with higher age groups. Likewise speed seems to be associated with the age of the car.

Subhypothesis 3 may aid in orienting the problem for evaluation. It may be stated in the null form as follows: Speed variations in traffic are primarily a function of the age group of the driver.

To test this hypothesis a number of correlations were run and are shown in Table 10. Table 9 as well as Figure 2 also show relationships between age and speed at different hours of the day and for different age groups.

It would be expected that in urban driving the potential speed of the car would be of only slight importance while in rural areas the newer high-speed cars would tend to be driven faster.

Again considerable variance is found in the mean speeds of urban traffic throughout the day which are affected mostly by weather conditions. Shortly after midnight the mean urban speed for both sexes combined was slightly over 20 mph., while at 1000-1100, in the morning, the mean speed dropped to around 11 mph.

A speed peak occurs also at 0200 and at 1000 for urban traffic.

Traffic density seems to complicate relationships noted between speed and age in rural driving. While rather clear-cut as an inverse relationship between midnight and 0900-1000, around 1200 and until 1650 the relationship is equivocal. This cannot be deduced from correlation techniques since the relationship is not linear.

The correlation between speed and age for rural traffic during week ends when all hours are grouped together is lower than for midweek periods for male drivers. The reverse is true for midweek urban driving. While young men drive significantly faster than older men, it would appear that heavy traffic on rural highways over weekends tends to cramp their style except during late hours at night.

In both rural and urban areas older cars are driven by older persons, yet in the country older cars are driven at higher speeds. If age alone were considered the reverse might be expected. This is especially true for midweek traffic. In the city the correlations are reversed suggesting cat-and-mouse techniques so far as law enforcement and observance is concerned. It should be stated that careful consideration of the distributions seems to indicate a group of drivers between the ages of 20 and 24 who are likely to frequent the highways during late night hours. About 10 percent of this age group show characteristics of speeding from midnight to 0400. From the age of cars used and other cues it would appear that they may come from homes above the average in socio-economic status and represent types of individuals that cannot stand prosperity, with a tendency to show off. The other 90 percent of this age group showed normal conservative traits so far as speed is concerned and would probably give little trouble under ordinary circumstances.

TABLE 9

SUMMARY OF DATA ON PERCENTAGE OF DRIVERS OF DIFFERENT AGE GROUPS
(Men - Winter Season by hour of the Day)

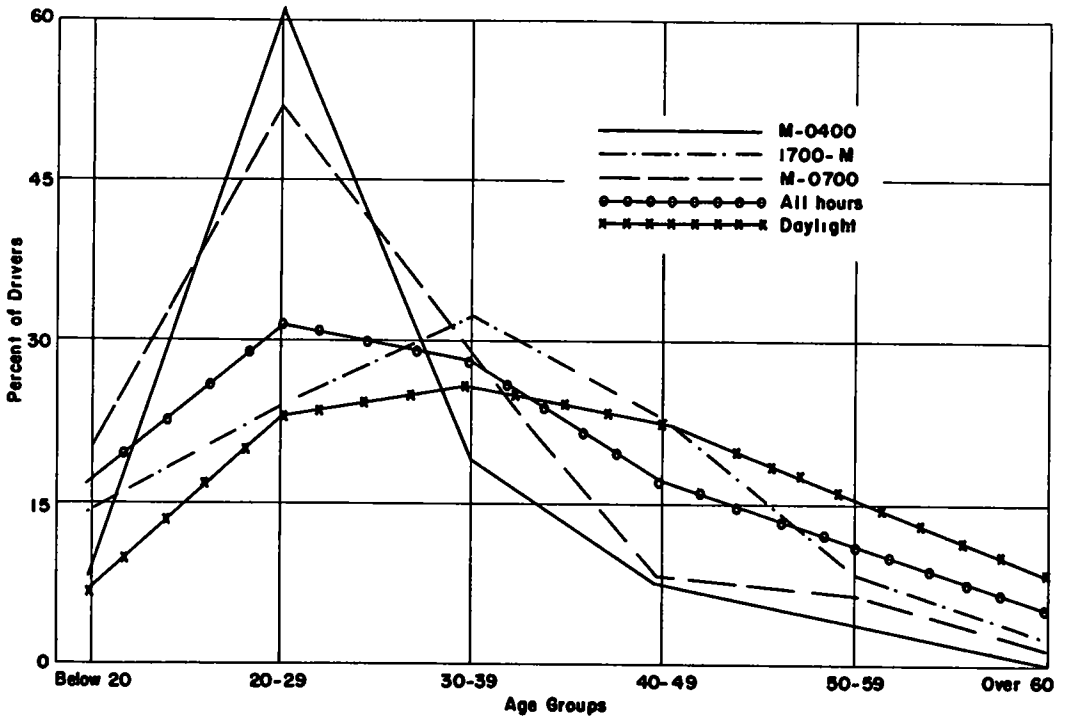
Hour	Teenage	20-29	30-39	40-49	50-59	60-69	70-79
01	9	59	15	12	4	2	0
1-2	8	50	21	9	9	0	0
2-3	5	58	26	9	0	0	0
3-4	7	79	11	3	0	0	0
4-5	0	41	41	5	14	0	0
5-6	7	50	31	7	3	8	0
6-7	7	22	39	14	13	3	0
7-8	12	29	28	14	13	4	0
8-9	7	22	23	18	18	10	2
9-10	4	20	22	27	15	12	0
10-11	4	17	27	20	24	7	1
11-12	7	13	35	20	18	5	0
12-13	2	16	29	31	12	10	3
13-14	10	31	28	14	13	4	0
14-15	9	30	24	19	11	4	0
15-16	5	22	21	29	12	9	5
16-17	1	26	26	21	16	10	0
17-18	15	17	24	28	12	2	2
18-19	6	20	40	21	8	5	0
19-20	8	26	28	22	15	1	0
20-21	10	28	29	22	8	3	0
21-22	8	25	40	19	6	2	0
22-23	17	17	38	21	5	1	0
23-24	10	35	30	18	5	2	0
Total Period	15.7	31.4	28.2	17.6	10.6	4.3	0.5
Day-light	6.1	22.6	26.3	21.3	15.2	7.5	1.1
*Night p.m.	14.8	24.0	32.7	21.5	8.4	2.3	0.3
**Night a.m.	20.4	51.3	26.3	8.4	6.2	1.8	0.0

*Dark to midnight
**Midnight to 0700 (Winter Season)

TABLE 10

CORRELATIONS BETWEEN AGE, SPEED AND YEAR OF CAR
FOR MALE DRIVERS

	Corr. Between Age & Speed	Corr. Between Age & Year of Car	Corr. Between Year of Car and Speed
Rural			
Week end	-0.078	0.174	0.247
Midweek	-0.140	0.167	1.196
Urban			
Week end	-0.318	0.126	-0.067
Midweek	-0.234	0.175	-0.106



Percent of male drivers on highway by hours.
(Winter Season by Age)

Applying all these observations to Subhypothesis 3 it may be concluded tentatively that the data tend to confirm it as stated only for a group of perhaps 10 percent of this age classifaction. It is rejected for the remaining 90 percent of younger drivers.

SUMMARY AND CONCLUSIONS

Results from a 6-mo., round-the-clock sampling study of drivers on the highway are given for the winter season. The following conclusions would seem to be warranted, subject to the nature of the study and other limitations noted:

1. The driving habits and exposure risks of men and women drivers are so vastly different that no fair direct comparison can be made between them. In any case women are a slightly better actuarial risk than men.

2. Youthful male drivers are travelling too fast at late hours of the night for their experience and conditions of illumination. With all the basic physical qualifications for superior driving performance their record of accidents and violations is entirely unwarranted. Their record does not noticeably improve until a period of 5 to 7 years has elapsed after being licensed.

3. Older cars are driven faster round the clock during the 24-hr. period in the country than new cars. This suggests a group of less responsible drivers are found on the highways at night. The reverse is true for urban traffic.

4. A sampling procedure and technique is set up evaluated which may prove of value in many types of traffic studies involving the driver.

5. The sampling procedure used, if streamlined, would seem to be adaptable to many studies of similar nature.

6. The primary hypothesis was confirmed and the two corollary hypotheses sustained with a reasonable degree of confidence.

REFERENCES

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2. Lauer, A. R. and Schumacher, Charles F. "The Effect of Training on Driving Performance Using a Composite Accident-Violation Index as the Criterion." Paper given before Section Q, American Association for the Advancement of Science, Dec. 30, 1952, St. Louis, pp. 134.

APPENDIX

RESULTS OF PILOT STUDIES ON DRIVER SAMPLING TECHNIQUE

(Prepared by Donald A. Hoppe)

Introduction

Pilot studies were necessary in order to find solutions for the two major problems involved in the sampling survey to determine age, sex and other characteristics of drivers at different times of the day. These problems were: (1) Development of a sampling procedure for location of the observation periods in time, and observation points in space. (2) Development of an observation technique for obtaining reliable information.

The pilot study for the first problem was conducted with the idea of determining an estimate of the variance between observation points, time of the day, day of the week and dates. The second was conducted with the aim of evaluating the observation techniques which have been developed.

Procedure for the First Pilot Study

For this pilot study five points were selected for observation at three different hours of the day. Points were selected rationally with the objective of observing points with different traffic characteristics. The three hours of the day observed for each of these points were (1) 7:45-8:45 a.m., (2) 2:00-3:00 p.m., (3) 6:00-7:00 p.m. These hours were selected in an attempt to determine what might be different types of traffic, i.e., chiefly workbound traffic, shopping and business traffic, and recreation traffic respectively.

The information obtained was the number of persons in the car, sex of driver, and an estimate of the age of the driver. Traffic was observed in only one direction at a time, but the direction observed was alternated every five minutes, and thus each direction was observed for 1/2 hr. for each hour of observation.

The observation points selected and the dates they were observed were as follows: (1) North Duff at Lincolnway, Monday, May 21 and June 25, 1951; (2) East 9th at Grand, Tuesday, May 22 and Tuesday, June 26, 1951; (3) US 69, 3 mi. north of Ames, Wednesday, May 23 and June 27, 1951; (4) Fifth between Burnett and Kellogg, Thursday, May 24 and June 28, 1951; (5) Lincolnway between Beech and Riverside, Friday, May 25 and June 29, 1951.

From the data obtained on these observations it was possible to run an analysis of variance on the following variables: (1) time, (2) location, (3) date. The results are shown in Table A.

TABLE A

ANALYSIS OF VARIANCE I - AGE OF DRIVER

Source	DF	SS	MS
Dates	1	25.5	25.5
Location	4	2,248.7	562.2
Time	2	4,914.6	2,457.3
Date x time	2	5,013.6	2,506.8
Date x location	4	2,852.8	713.2
Time x location	8	8,129.6	1,016.2
Date x time x location	8	10,359.6	1,295.0
Error	1470	233,370.2	1,587.6
Total	1499	266,914.6	

As the day of the week and the observation point were confounded in the above analysis it was necessary to make another series of observations to estimate the serious-

ness of that confounding. To do this one point was observed on each day of the week. The analysis of variance for this study is shown in Table B.

TABLE B

ANALYSIS OF VARIANCE II - AGE OF DRIVER

Source	DF	SS	MS
Time	2	992.4	496.2
Day of the week	6	873.3	145.6
Time x days	12	5,461.8	455.2
Error	1029	184,184.3	179.0
Total	1049	191,511.8	

Sampling Design

From Tables A and B it can be seen that time and the interactions of time with the other variables are the largest sources of variance. With this in mind the following sampling procedure was designed.

As the variance contributed by locations was not large two locations were chosen: one rural point on US 69 south of Ames and one urban point on Fifth Street between Burnett and Kellogg in downtown Ames.

Since the day of the week was not a major source of variance the week was divided into two parts: (1) week end, consisting of Friday, Saturday, and Sunday and (2) mid-week, consisting of Monday, Tuesday, Wednesday, and Thursday.

For seasonal effect the year was divided into two seasons, winter beginning September 21 to March 21 inclusive, and summer starting March 21 to September 21 inclusive.

For hours, the day was considered as 24 hr. and each hour to be observed at both locations, both times of the week and both seasons. This makes a total of 192 hr. of observation during the year. The procedure calls for making an hour's observation at one observation point, skipping an hour, and then make another hour of observation at the other point.

The schedule of observations was determined at random and established for the entire year as follows:

Winter Season

Ob. No.	Time	Date	Location
1.	7-8	Fri., Sept. 21	1
	9-10	" " 21	2
2.	2-3	Wed., Oct. 3	2
	4-5	" " 3	1
3.	10-11	Fri., Oct. 5	1
	12-13	" " 5	2
4.	21-22	Thur., Oct. 11	2
	23-24	" " 11	1
5.	1-2	Sun., Oct. 14	2
	3-4	" " 14	1
6.	16-17	Mon., Oct. 15	2
	18-19	" " 15	1
7.	15-16	Sat., Oct. 20	1
	17-18	" " 20	2
8.	12-13	Thur., Oct. 25	2
	14-15	" " 25	1
9.	3-4	Fri., Oct. 26	2
	5-6	" " 26	1
10.	14-15	Tues., Oct. 30	2
	16-17	" " 30	1
11.	6-7	Sun., Nov. 4	1
	8-9	" " 4	2
12.	15-16	Mon., Nov. 5	2
	17-18	" " 5	1
13.	14-15	Sun., Nov. 11	1
	16-17	" " 11	2
14.	12-1	Tues., Nov. 13	2
	2-3	" " 13	1
15.	4-5	Sun., Nov. 18	1
	6-7	" " 18	2
16.	6-7	Tues., Nov. 20	2
	8-9	" " 20	1
17.	17-18	Sun., Nov. 25	1
	19-20	" " 25	2
18.	8-9	Thur., Nov. 29	2
	10-11	" " 29	1

Winter Season - continued

Ob. No.	Time	Date	Location
19.	5-6	Sat.,Dec. 1	1
	7-8	" " 1	2
20.	17-18	Wed.,Dec. 5	2
	19-20	" " 5	1
21.	11-12	Sun.,Dec. 9	1
	13-14	" " 9	2
22.	20-21	Wed.,Dec. 12	2
	22-23	" " 12	1
23.	2-3	Sat.,Dec. 15	1
	3-4	" " 15	2
24.	13-14	Wed.,Dec. 26	2
	15-16	" " 26	1
25.	12-1	Sat.,Dec. 29	2
	22-23	" " 29	1
26.	9-10	Wed.,Jan. 2	1
	11-12	" " 2	2
27.	19-20	Sun.,Jan. 6	2
	21-22	" " 6	1
28.	12-1	Mon.,Jan. 7	1
	22-23	" " 7	2
29.	9-10	Sat.,Jan. 12	2
	11-12	" " 12	1
30.	4-5	Wed.,Jan. 16	2
	6-7	" " 16	1
31.	1-2	Fri.,Jan. 18	2
	23-24	" " 18	1
32.	11-12	Mon.,Jan. 21	2
	13-14	" " 21	1
33.	21-22	Sun.,Jan. 27	1
	23-24	" " 27	2
34.	18-19	Tu.,Jan. 29	1
	20-21	" " 29	2
35.	8-9	Sat.,Feb. 2	1
	10-11	" " 2	2
36.	3-4	Thur.Feb. 7	1
	5-6	" " 7	2
37.	13-14	Sat.,Feb. 9	1
	15-16	" " 9	2
38.	7-8	Thur.Feb. 14	2
	9-10	" " 14	1
39.	18-19	Sat.,Feb. 16	2
	20-21	" " 16	1
40.	5-6	Mon.,Feb. 18	2
	7-8	" " 18	1
41.	12-1	Fri.,Feb. 22	1
	2-3	" " 22	2
42.	19-20	Thur.Feb. 28	1
	21-22	" " 28	2
43.	16-17	Fri.,Feb. 29	1
	18-19	" " 29	2
44.	1-2	Mon.,Mar. 3	1
	3-4	" " 3	2
45.	12-13	Fri.,Mar. 7	1
	14-15	" " 7	2
46.	10-11	Tu.,Mar. 11	2
	12-13	" " 11	1
47.	20-21	Fri.,Mar. 14	1
	22-23	" " 14	2
48.	1-2	Tu.,Mar. 18	1
	23-24	" " 18	2
49.	1-2	Fri.,Mar. 21	1
	3-4	" " 21	2
50.	20-21	Tu.,Mar. 25	2
	22-23	" " 25	1
51.	15-16	Fri.,Mar. 28	1
	17-18	" " 28	2
52.	12-13	Tu.,Apr. 1	2
	14-15	" " 1	1
53.	10-11	Fri.,Apr. 4	2
	12-13	" " 4	1
54.	1-2	Wed.,Apr. 9	2
	3-4	" " 9	1
55.	17-18	Sat.,Apr. 12	1
	19-20	" " 12	2
56.	1-2	Mon.,Apr. 14	1
	23-24	" " 14	2
57.	20-21	Sat.,Apr. 19	1
	22-23	" " 19	2
58.	3-4	Mon.,Apr. 21	2
	5-6	" " 21	1
59.	12-1	Fri.,Apr. 25	2
	22-23	" " 25	1
60.	5-6	Mon.,Apr. 28	2
	7-8	" " 28	1
61.	11-12	Sun.,May 4	1
	13-14	" " 4	2
62.	11-12	Tu., May 6	2
	13-14	" " 6	1
63.	13-14	Sat.,May 10	2
	15-16	" " 10	1
64.	16-17	Mon.,May 12	1
	18-19	" " 12	2
65.	7-8	Thur.May 22	2
	9-10	" " 22	1
66.	8-9	Fri.,May 23	1
	10-11	" " 23	2
67.	18-19	Wed.,May 28	2
	20-21	" " 28	1
68.	16-17	Sun.,June 1	2
	18-19	" " 1	1
69.	6-7	Tu.,June 3	1
	8-9	" " 3	2
70.	4-5	Fri.,June 6	1
	6-7	" " 6	2
71.	19-20	Tu.,June 10	2
	21-22	" " 10	1
72.	19-20	Sun.,June 15	1
	21-22	" " 15	2
73.	2-3	Sat.,June 21	1
	4-5	" " 21	2
74.	15-16	Wed.,June 25	2
	17-18	" " 25	1
75.	1-2	Sat.,June 28	2
	23-24	" " 28	1
76.	14-15	Thur.July 3	2
	16-17	" " 3	1
77.	12-1	Sun.,July 6	1
	2-3	" " 6	2
78.	10-11	Mon.,July 7	1
	12-13	" " 7	2

Winter Season - continued

Ob. No.	Time	Date	Location
79.	21-22	Sun.,July 13	2
	23-24	" " 13	1
80.	12-1	Wed.,July 16	1
	22-23	" " 16	2
81.	9-10	Sat.,July 19	2
	11-12	" " 19	1
82.	17-18	Thur.July 24	2
	19-20	" " 24	1
83.	5-6	Sat.,July 26	1
	7-8	" " 26	2
84.	8-9	Wed.,July 30	2
	10-11	" " 30	1
85.	7-8	Sun.,Aug., 5, '51	
	or	" " 3, '52	1
	9-10	Sun.,Aug. 5, '51	
	or	" " 3, '52	2
86.	2-3	Thur.Aug. 9, '51	
	or	" " 7, '52	2
	4-5	Thur.Aug. 9, '51	
	or	" " 7, '52	1
87.	12-13	Sun.,Aug. 12, '51	
	or	" " 10, '52	1
	14-15	Sun.,Aug. 12, '51	
	or	" " 10, '52	2
88.	12-1	Tu.,Aug. 14, '51	
	or	" " 12, '52	2
	2-3	Tu.,Aug. 14, '51	
	or	" " 12, '52	1
89.	3-4	Sun.Aug. 19, '51	
	or	" " 17, '52	1
	5-6	Sun.Aug. 19, '51	
	or	" " 17, '52	2
90.	13-14	Mon.,Aug. 20, '51	
	or	" " 18, '52	1
	15-16	Mon.,Aug. 20, '51	
	or	" " 18, '52	2
91.	18-19	Fri.,Aug. 24, '51	
	or	" " 22, '52	1
	20-21	Fri.,Aug. 24, '51	
	or	" " 22, '52	2
92.	21-22	Thu.,Sept. 6, '51	
	or	" " 4, '52	1
	23-24	Thu.,Sept. 6, '51	
	or	" " 4, '52	2
93.	6-7	Sat.,Sept. 8, '51	
	or	" " 6, '52	2
	8-9	Sat.,Sept. 8, '51	
	or	" " 6, '52	1
94.	4-5	Wed.,Sept. 12, '51	
	or	" " 10, '52	2
	6-7	Wed.,Sept. 12, '51	
	or	" " 10, '52	1
95.	14-15	Fri.,Sept. 14, '51	
	or	" " 12, '52	1
	16-17	Fri.,Sept. 14, '51	
	or	" " 12, '52	2
96.	9-10	Thur.Sept. 20, '51	
	or	" " 18, '52	1
	11-12	Thur.Sept. 20, '51	
	or	" " 18, '52	2

Procedure for the Second Pilot Study

The purpose of this study was to evaluate observation techniques. For the daytime procedure, eight observation points were picked at random from a list of 16. The days and hours of observation were also picked at random. The points and directions observed, and when they were observed are listed below:

1. Westbound traffic on Lincolnway between Welch and Hayward. Every third car was observed on May 2, 1951, between 4 and 5 p.m.

2. Southbound traffic on Highway 69 3 mi. north of Ames. Every other car was observed on Sunday, May 6, 1951, between 10 and 11 a.m.

3. All traffic in both directions on gravel road 3 mi. east and 2 mi. north of Ames. Observed on Wednesday, May 9, 1951, between 12 and 1 p.m.

4. Westbound traffic on East Ninth at Grand. Every car observed on Thursday, May 10, 1951, between 11 and 12 a.m.

5. Southbound traffic on North Duff at Lincolnway. Observed every other car on Wednesday, May 16, 1951, between 1 and 2 p.m.

6. Every car in both directions on 13th Street east of Ames city limits. Observed on Saturday, May 19, 1951, between 6 and 7 p.m.

7. Northbound traffic on Burnett between Sixth and Seventh. Every car was observed on Tuesday, May 29, 1951, between 5 and 6 p.m.

STOP ACCIDENTS

IMPORTANT

Driving Laboratory
Iowa State College
Ames, Iowa

Return Postage Guaranteed
A. R. Lauer, Driving Laboratory
Iowa State College
Ames, Iowa

Return to
Ames, Iowa

587 PERSONS WERE KILLED ON IOWA HIGHWAYS LAST YEAR. The Driving Laboratory at Iowa State College is making an effort to find ways of reducing this accident toll. One type of information needed is the characteristics of drivers at different times of the day. The only way we can get this is from drivers that are actually observed on the road. Please look on the inside to find when your vehicle was observed and then answer the questions below. Make a special effort to be accurate.

1. Age of person driving when your vehicle was observed____.
2. Sex of driver male____ female____
3. Number of persons in the vehicle (including driver)______.
4. Approximate number of miles driven by this driver between   and   on the day your vehicle was observed_____.

Please do not let your failure to return this card make it impossible for us to obtain a 100 percent return.

In making the survey to determine the characteristics of drivers we have been observing traffic going   on

Your car, license number   , was observed going by here at   on

Your cooperation in answering the questions on the other side and returning the card will be greatly appreciated. The success of our study depends entirely on your willingness to do this.

We want to stress that we are interested in the characteristics of the driver of your vehicle only because it happened to be included in our sample of vehicles. It is not the objective of this study to observe for violations and it is in no way connected with any law enforcement agency.

THANK YOU FOR YOUR COOPERATION

Figure A

8. Westbound traffic on Fifth between Kellogg and Douglas. Every car was observed on Wednesday, May 30, 1951, between 8 and 9 a.m.

The information obtained was: (1) number of persons in the car, (2) sex of driver, (3) estimate of the age of the driver, etc., (4) year and make of car, and (5) license number of car.

For the first observation the names and addresses of the owners of the cars registered were obtained from the Department of Public Safety. A postcard was prepared for sending to the owners with the request that they report the age of the person driving when their car was observed. For the first point 20 cards were typed and sent out. As the return was fairly satisfactory and acceptance of the plan seemed satisfactory, 300 cards were printed. Because of the delay in printing no cards were sent out to the persons observed at Points 2 and 3. For the remainder of the observations cards were sent to all private car owners observed. The names and addresses were obtained from the same source. The card which had been prepared was not satisfactory for sending to the owners of commercial vehicles, since the exact vehicle observed was not designated on the card.

In this study a total of 595 vehicles were observed. Cards were sent to 318 owners. The over-all percentage returned was 46.8.

In general the information as to sex of the driver and the number of persons in the car reported on the card corresponded with the observed information. In five instances the sex was reported different than that which was observed. The question on the card about the number of persons in the car was ambiguous in that it did not state whether the driver should be included or not. The number reported on the card was different from the observed on 26 cases, with the number reported usually one less than the number observed. The correlation between the estimated ages and the ages reported on the cards was 0.831. The card was redesigned as shown in Figure A.

A similar procedure, but on a smaller scale, has been done for the night observation procedure. Cards were sent 60 owners. Of these 30 were returned and the correlation obtained between estimated age and reported age was 0.54. This is a significant correlation, but not high enough for the present purposes. It seemed reasonable to raise this correlation with practice.