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Motorcycle Trade Press Exposure Study

CLINTON H. SIMPSON, JR.

To determine nationwide motorcycle rider characteristics, training, protective gear use, and riding patterns, the Motorcycle Safety Foundation conducted a questionnaire survey in cooperation with the motorcycle trade press. Seven motorcycle magazines ran the full-page questionnaire in their January 1981 issue: American Motorcyclist, Biker, Cycle, Cycle Guide, Cycle World, Road Rider, and Touring Bike. In addition, a New England motorcycle club newsletter reprinted the form. A total of 16 339 forms were returned and analyzed. These national exposure data replicate the findings from an earlier observational exposure study by Hurt in such areas as motorcycle brand, engine size, motorcycle and helmet color, and respondent's sex and education.

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RIDING PATTERNS

Mileage Last Month

The questionnaire appeared in the January 1981 issue of the trade press magazines. It appears that the magazines were received in December, because many respondents noted that their answers were for November. Therefore, half the responses for "last month" probably represent November and half December.

Twenty-six percent of the respondents said they had ridden zero miles; only 8 percent claimed more than 1000 miles. The mean was 410 miles and the median was 200 miles. The highest mileage claimed was 8500 and only 55 respondents claimed more than 3000 miles. The data from the question about distance ridden last month are as follows:

| No. of Miles | Percent of Respondents | No. of Miles | Percent of Respondents |
|--------------|------------------------|--------------|------------------------|
| 0 | 26.1 | 701-800 | 3.9 |
| 1-100 | 10.9 | 801-900 | 1.5 |
| 101-200 | 15.2 | 901-1000 | 5.8 |
| 201-300 | 8.5 | 1001-2000 | 6.7 |
| 301-400 | 6.2 | 2001-3000 | 0.8 |

| No. of Miles | Percent of Respondents | No. of Miles | Percent of Respondents |
|--------------|------------------------|--------------|------------------------|
| 401-500 | 8.3 | 3001-4000 | 0.2 |
| 501-600 | 3.7 | 4001-5000 | 0.05 |
| 601-700 | 2.1 | 5000+ | 0.07 |

Annual Mileage

Less than 1 percent of the respondents stated that they had not ridden last year, and 26 percent claimed 10 000 miles or more. The average number of miles ridden was 7110; the median was 6000 miles. The highest mileage reported was 85 000, although only 60 respondents claimed more than 30 000 miles (85 000 miles at an average of 50 mph is 1700 h--there are only 8760 h in a year). Mileage last year is summarized below (zero-mileage responses excluded):

| No. of Miles | Percent of Respondents | No. of Miles | Percent of Respondents |
|--------------|------------------------|---------------|------------------------|
| 0 | 0.9 | 6001-7000 | 6.5 |
| 1-1000 | 5.5 | 7001-8000 | 7.1 |
| 1001-2000 | 10.3 | 8001-9000 | 4.1 |
| 2001-3000 | 10.0 | 9001-10 000 | 7.1 |
| 3001-4000 | 9.9 | 10 001-20 000 | 16.9 |
| 4001-5000 | 10.4 | 20 001-30 000 | 1.9 |
| 5001-6000 | 9.0 | 30 001+ | 0.4 |

By Manufacturer

The number of miles that respondents reported riding last year by manufacturer differed substantially only for BMW. As the table below shows, BMW owners reported an average of 2500 miles more than that reported by owners of the Harley-Davidson:

| Avg No. of Miles | Manufacturer |
|------------------|-----------------|
| 9940 | BMW |
| 7440 | Harley-Davidson |
| 7090 | Honda |
| 7070 | Suzuki |
| 6490 | Yamaha |
| 6410 | Kawasaki |

By Engine Size

The number of miles last year reported for various sizes of bikes increased with larger engine sizes. Motorcycles with engines less than 400 cc traveled only about 3000 miles last year compared with those

that had 1100-cc engines, which averaged close to 10 000 miles. Although the average number of miles reported last year was 7110, bikes with engines 1000 cc and larger, which made up more than one-fourth of the bikes, had a reported annual mileage of more than 9000 miles. The number of miles ridden last year by engine size is shown below:

| Engine Size (cc) | No. of Miles | Engine Size (cc) | No. of Miles |
|------------------|--------------|------------------|--------------|
| 1-100 | 2850 | 801-900 | 8000 |
| 101-200 | 3230 | 901-1000 | 9270 |
| 201-300 | 3720 | 1001-1100 | 9860 |
| 301-400 | 4920 | 1101-1200 | 7540 |
| 401-500 | 6220 | 1201-1300 | 9080 |
| 501-600 | 6650 | 1301-1400 | 7800 |
| 601-700 | 6470 | 1401+ | 9270 |
| 701-800 | 7290 | Unknown | 5130 |

By Age

Comparing the miles ridden per year by different ages shows a slight trend of increased mileage for older riders up to 60 years; then the annual mileage tapers off.

Lending support to the quality of the data was the reported mileage for riders under 16, which was just 2680 miles; this figure is substantially lower than that for older riders, as would be expected.

By State

The highest reported mileage for a state was that for Arizona, in which the respondents indicated an average of 9200 miles; the second highest was that for California, 9050 miles. The area with the lowest mileage was not Alaska (the 31 Alaskan respondents averaged 5130 miles) but Washington, D.C., which reported 4210 miles. Average mileage by state is summarized in Table 1.

Those who took a rider-training course reported about 1000 more miles ridden last year than those who learned on their own--7920 miles as opposed to 6970 miles.

Months Ridden Last Year

One-third of the respondents said that they ride all 12 months. Only 10.7 percent listed 5 or fewer months. The average was 8.94 months (8 months, 28 days, 14 h). But if zero-mileage riders are excluded, the average comes up to 9.14 months. The median was 9 months and the most common response was all 12 months. The responses are summarized below:

| No. of Months | Percent of Respondents | No. of Months | Percent of Respondents |
|---------------|------------------------|---------------|------------------------|
| 0 | 2.2 | 7 | 10.3 |
| 1 | 0.5 | 8 | 11.7 |
| 2 | 0.6 | 9 | 11.2 |
| 3 | 1.4 | 10 | 8.9 |
| 4 | 2.2 | 11 | 4.1 |
| 5 | 3.8 | 12 | 33.4 |
| 6 | 9.7 | | |

The five major motorcycle brands were all ridden about the same number of months. (They were within one week of each other.) Only BMW differed, with almost an additional month more than the others.

The months ridden by the size of the motorcycle showed the same trend as the annual mileage; the smaller bikes were ridden for slightly fewer months than the larger ones.

The number of months ridden by cyclists of various ages has a similar pattern--the older the cy-

clists, the more months they ride up to about 60 years of age.

Although cyclists who own helmets might be expected to ride more months of the year by using the helmet for protection from the elements, this is not the case. The number of months ridden last year is almost identical for helmet owners and nonowners (8.9 months for helmet owners, and 8.8 months for nonowners).

Puerto Rico has the longest reported riding season, which averages 11.5 months; Hawaii's is next longest--11.08 months. The shortest riding season was not that of Alaska (which reported 7.23 months of riding) but that of North Dakota, which reported only 6.61 months of riding last year (Table 1).

Daylight Riding

More than 97 percent of the respondents indicated that they ride in daylight half or more than half of the time.

The respondents' average daylight riding was 79.2 percent of the time; the median was 80 percent. Only 21.3 percent ride during the day more than 90 percent of the time:

| Percentage of Time in | | Percentage of Time in | |
|-----------------------|-------------|-----------------------|-------------|
| Daylight | Respondents | Daylight | Respondents |
| 0 | 0.5 | 51-60 | 6.4 |
| 1-10 | 0.4 | 61-70 | 9.8 |
| 11-20 | 0.3 | 71-80 | 28.3 |
| 21-30 | 0.6 | 81-90 | 25.0 |
| 31-40 | 1.2 | 91-100 | 21.3 |
| 41-50 | 6.2 | | |

City Riding

The average amount of time spent in city riding was 30.7 percent; the median was 25 percent. Only 1.2 percent always ride in the city. A total of 15.9 percent of the respondents indicated that 50 percent or more of their riding was in the city:

| Percentage of City | | Percentage of City | |
|--------------------|-------------|--------------------|-------------|
| Riding | Respondents | Riding | Respondents |
| 0 | 3.8 | 51-60 | 4.6 |
| 1-10 | 24.4 | 61-70 | 3.1 |
| 11-20 | 18.6 | 71-80 | 4.9 |
| 21-30 | 17.1 | 81-90 | 2.1 |
| 31-40 | 10.0 | 91-100 | 1.2 |
| 41-50 | 10.4 | | |

Suburban Riding

The average amount of riding done in a suburban location was 40.29 percent; the median was 40 percent. Only 2.2 percent of the respondents ride in a suburban setting more than 90 percent of the time. These data are summarized below:

| Percentage of Suburban | | Percentage of Suburban | |
|------------------------|-------------|------------------------|-------------|
| Riding | Respondents | Riding | Respondents |
| 0 | 3.6 | 51-60 | 8.2 |
| 1-10 | 13.2 | 61-70 | 6.6 |
| 11-20 | 13.0 | 71-80 | 8.1 |
| 21-30 | 15.7 | 81-90 | 3.8 |
| 31-40 | 12.4 | 91-100 | 2.2 |
| 41-50 | 13.2 | | |

Expressway Riding

The average amount of expressway riding was 27.4

Table 1. Annual riding patterns by state.

| State | Avg No. of Miles | No. of Months | State | Avg No. of Miles | No. of Months |
|----------------------|------------------|---------------|----------------|------------------|---------------|
| Alabama | 7260 | 9.89 | Nebraska | 6480 | 8.03 |
| Arizona | 9200 | 10.88 | Nevada | 8390 | 10.47 |
| Alaska | 5130 | 7.23 | New Hampshire | 6240 | 7.33 |
| Arkansas | 7070 | 9.30 | New Jersey | 6550 | 8.89 |
| California | 9050 | 10.54 | New Mexico | 6890 | 9.91 |
| Colorado | 7030 | 9.22 | New York | 6250 | 7.99 |
| Connecticut | 6210 | 8.39 | North Carolina | 7960 | 10.27 |
| Delaware | 7060 | 10.59 | North Dakota | 5090 | 6.61 |
| District of Columbia | 4210 | 10.29 | Ohio | 6160 | 8.02 |
| Florida | 8310 | 10.66 | Oklahoma | 7740 | 9.75 |
| Georgia | 8200 | 10.31 | Oregon | 7290 | 9.45 |
| Hawaii | 7140 | 11.08 | Pennsylvania | 6080 | 8.26 |
| Idaho | 7220 | 8.48 | Puerto Rico | 5500 | 11.50 |
| Illinois | 6060 | 7.80 | Rhode Island | 5600 | 8.28 |
| Indiana | 5810 | 7.88 | South Carolina | 7040 | 10.28 |
| Iowa | 6730 | 8.07 | South Dakota | 6240 | 7.36 |
| Kansas | 7300 | 9.35 | Tennessee | 6980 | 9.47 |
| Kentucky | 8130 | 8.77 | Texas | 8250 | 10.41 |
| Louisiana | 8880 | 10.58 | Utah | 6530 | 8.48 |
| Maine | 6840 | 6.85 | Vermont | 7000 | 7.10 |
| Maryland | 7260 | 9.56 | Virginia | 7960 | 9.84 |
| Massachusetts | 6270 | 7.96 | Virgin Islands | 6000 | 12.00 |
| Michigan | 6190 | 7.14 | Washington | 7540 | 9.42 |
| Minnesota | 6490 | 6.83 | West Virginia | 6430 | 8.21 |
| Mississippi | 6190 | 11.02 | Wisconsin | 6360 | 7.44 |
| Missouri | 7100 | 8.68 | Wyoming | 4750 | 7.55 |
| Montana | 6240 | 7.19 | No answer | 5670 | 7.97 |

percent and the median was 20 percent. More than one-fourth of the respondents, however, indicated that they only ride expressways 10 percent or less of the time and more than three-fourths of the respondents indicated that they ride expressways less than 40 percent of the time.

The Hurt data (1) show that expressway accidents account for only 10 percent of all accidents. Compared with our average exposure percentage of 27, expressways are underrepresented in accidents. These data are summarized as follows:

| Percentage of Expressway Riding | | Percentage of Expressway Riding | |
|---------------------------------|-------------|---------------------------------|-------------|
| Riding | Respondents | Riding | Respondents |
| 0 | 9.2 | 51-60 | 5.0 |
| 1-10 | 26.0 | 61-70 | 3.5 |
| 11-20 | 15.8 | 71-80 | 3.5 |
| 21-30 | 15.1 | 81-90 | 1.1 |
| 31-40 | 10.0 | 91-100 | 0.3 |
| 41-50 | 10.4 | | |

Average Round Trips per Week

Almost one-third of the respondents indicated that they do not take any round trips. The average was 5.13 round trips per week, and the median was 4. Only 2 percent indicated that they take more than 20 round trips a week.

There was a problem with this question on our form, and the responses are suspect. A percent sign appeared next to the blank, which gave the impression that the question was asking what percentage of trips were round trips. Many of the returned forms had this question crossed off; other respondents wrote in such responses as "Every trip is a round trip if I'm still around to be filling out forms."

Miles per Round Trip

The average number of miles per round trip was 44.8; the median was 25 miles. An average round trip of more than 200 miles was claimed by 381 cyclists. The most common response was 20 miles per trip, which was given by 11 percent of the respondents.

Primary Trip Purpose

Commuting was the most frequent response; 40.8 percent gave this answer. Recreation was the only other sizable response (18 percent). Shopping, visiting, and other purposes totaled only about 5 percent. Multiple responses made up 34.6 percent of the responses, although the instructions requested the respondent to pick just one purpose. Apparently motorcycles are used for a variety of purposes and respondents wanted to show that. Trip purposes are summarized below:

| Trip Purpose | Percent of Respondents |
|-------------------|------------------------|
| Commuting | 40.8 |
| Multiple response | 34.6 |
| Recreation | 18.0 |
| Visit friends | 2.3 |
| Shopping | 1.0 |
| Other | 2.0 |
| No answer | 1.2 |

RIDER PROTECTION

Helmets

Ownership

Almost everyone (98.05 percent) indicated that they owned a helmet. Only 128 respondents out of 16 339 (0.78 percent) said that they did not own a helmet (1.17 did not respond properly). This figure matches that from a survey by the American Motorcycle Association, Applied Science Associates, and MSF (2, p. 1435), which indicated approximately the same high level of ownership--96.9 percent.

Excluding responses that were indecipherable or blank, 99.2 percent of the respondents indicated that they owned helmets and only 0.8 percent said that they did not. It is interesting to note that the percentage of those who missed this question or gave an illegible response was greater than the percentage of those who did not own helmets.

Relation to Brand of Motorcycle

In a comparison of motorcycle brand and helmet ownership, Harley-Davidson owners made up only 5.5 percent of the respondents but accounted for 27 percent of those without helmets. BMW owners, who made up almost 8 percent of the responses, accounted for only 3 percent of those who did not own helmets. This comparison is summarized below:

| Item | Percentage by Manufacturer | | | | | |
|-----------------------|----------------------------|--------|--------|----------|-----|-----------------|
| | Honda | Yamaha | Suzuki | Kawasaki | BMW | Harley-Davidson |
| Respondents | 36.3 | 18.3 | 13.9 | 12.2 | 7.9 | 5.5 |
| Those without helmets | 20.3 | 17.2 | 8.6 | 10.2 | 3.1 | 27.3 |

Relation to Education

Helmet ownership is also related to respondent's education. Those with college degrees accounted for 30 percent of the responses but only 19 percent of the riders without helmets:

| Item | Percentage by Education Level | |
|-----------------------|-------------------------------|----------------------------------|
| | College | High School and Technical School |
| Respondents | 30.4 | 33.9 |
| Those without helmets | 18.8 | 39.9 |

Those who had graduated from high school and technical school, who accounted for close to 34 percent of the respondents, made up almost 40 percent of the riders without helmets. California accounted for one-fourth of the riders who do not own helmets but only about 14 percent of the respondents. Surprisingly, there were 24 states in which all respondents said that they owned helmets.

Color

White helmets are the most common (30 percent), followed by black (19.7 percent), red (11.4 percent), silver (10.7 percent), and blue (6.7 percent).

Reflectorized Material

About half the respondents indicated that their helmets did not have any reflective material. Slightly more than one-fourth indicated that they had reflectorized material on both the sides and the back.

According to the Hurt study (1), the most critical area for conspicuity is the front of the helmet. Unfortunately, our questionnaire did not have a space to show whether reflectorized material was used on the front. The maximum percentage of helmets that could have had such treatment on the front would have to be less than 30 percent (obtained by excluding those who had none or who had reflectorized material on the sides and back only).

Use

Only 1.5 percent indicated that they never wear a helmet when riding. A total of 78 percent of the respondents indicated that they wear a helmet all of the time. The average helmet use indicated was 91.2 percent of the time; the median was 100 percent.

These figures include those from states with mandatory helmet laws, where use approaches 100 percent, as well as from states where helmet use is observed to be 50 percent. Combining data from states in which helmets are mandatory with data from those not requiring helmets is relatively meaning-

less, except to report nationwide cyclists' claim to wear a helmet 91.2 percent of the time. Helmet use may be summarized as follows:

| Helmet Use | Percentage of Respondents |
|-----------------------|---------------------------|
| 0 (never) | 1.5 |
| 25 (rarely) | 3.2 |
| 50 (half the time) | 2.5 |
| 75 (most of the time) | 14.6 |
| 100 (always) | 78.0 |
| No answer | 0.3 |

MSF records indicate that at the time of the survey there were nine states without helmet laws (whereas some states do not require helmets for cyclists older than 18). The respondents in these nine states (California, Colorado, Connecticut, Illinois, Indiana, Iowa, Maine, Rhode Island, and Washington) reported using a helmet 88.3 percent of the time. This self-reported use is much higher than direct observation has shown actual use to be.

In the observation of helmet use, figures of 47.8-68 percent have been obtained from states without helmet laws (Colorado and California) or states with laws that require helmets only for those younger than 18 (Maryland, South Dakota, and Kansas). It is possible that motorcycle magazine readers really do wear their helmets more often than other riders. A more probable explanation is that the respondents are overestimating their own use of helmets. They may mean to wear their helmets 80-90 percent of the time, but somehow the helmet is left behind. Observed helmet use for these five states is tabulated below:

| State | Percent |
|--------------|---------|
| Colorado | 56.6 |
| California | 50 |
| Maryland | 68 |
| South Dakota | 57.3 |
| Kansas | 47.8 |

This difference between self-reported use of safety equipment and actual use shows up in seatbelt research also. Although observed seatbelt use is about 9-12 percent, it is typical that they are reported to be worn far more often.

Less than 5 percent of the respondents indicated that they rarely or never wear a helmet. Although only 4.7 percent of the respondents rarely wear helmets, 22 percent of the Harley-Davidson riders indicated this low use, whereas less than 2 percent of the BMW riders said that they rarely or never used helmets.

The table below gives the distribution by manufacturer of those who say they never use a helmet and those who say they always wear one:

| Level of Use | Over-Use by Manufacturer (%) | | | | | | |
|--------------|------------------------------|-------|--------|--------|----------|------|-----------------|
| | all | Honda | Yamaha | Suzuki | Kawasaki | BMW | Harley-Davidson |
| Never | 1.5 | 1.0 | 1.2 | 1.0 | 1.2 | 0.7 | 8.6 |
| Always | 78 | 78.8 | 80.3 | 81.3 | 75.2 | 86.1 | 54 |

Although more than three-quarters of the riders of foreign-made bikes indicated that they use their helmets all the time, only 54 percent of the Harley-Davidson riders claim to always wear a helmet. (Remember that more than half of these data is from states with helmet laws.)

Education level is also related to reported helmet use: the higher the education, the greater the helmet use.

| Level of Education | Helmet Use (%) | |
|--------------------------------|----------------|--------|
| | Never | Always |
| High school | 2.2 | 72.5 |
| Trade school | 2.5 | 74.5 |
| Less than two years of college | 1.2 | 77.6 |
| More than two years of college | 1.2 | 79.8 |
| College degree | 1.3 | 84.3 |
| Professional degree | 0.6 | 85.8 |

Helmet use also increases with age. The lowest reported percentage of helmet use is that for the youngest group (16-20 years old)--only 50 percent report that they always use a helmet, despite the fact that more than three-fourths of the states mandate helmets for this age group.

It would seem reasonable to expect that respondents who do not own helmets also do not wear helmets. Yet more than half of those who do not own helmets indicated some helmet use and one-fifth of them indicate that they always use a helmet.

The states with the lowest reported use were North Dakota (only 48 percent always wear helmets), Nebraska (49 percent always), and Utah (54 percent always). States that have a mandatory helmet law report the greatest use of helmets. These data, however, are relatively meaningless since helmet use is probably more than 95 percent. California, which has never had a helmet law, has a surprisingly high reported use--77 percent indicated that they always wear helmets and only 1.8 percent stated that they never do.

Glove Use

Although 1.6 percent never wear gloves, only 37 percent indicated that they always wear gloves. The mean glove use was 69.1 percent; the median was 75 percent:

| Percentage of | |
|---------------|-------------|
| Glove Use | Respondents |
| 0 | 1.6 |
| 25 | 18.8 |
| 50 | 18.2 |
| 75 | 23.8 |
| 100 | 37.0 |
| No answer | 0.6 |

The use of gloves showed the same tendency as helmet use but was more moderate. Glove use increased with education and age and was highest for BMW riders. Respondents who had taken a rider-training course used gloves slightly more often than those who had not taken a course (average, 77.5 percent versus 67.3 percent).

The highest glove-use state was Alaska--an average of 89 percent. California again had a surprisingly high use, 83 percent, especially considering the amount of fair weather there. The lowest average glove use was in Puerto Rico--31 percent.

Boot Use

About half the respondents (48 percent) indicated that they always wear boots; this was the most common response. The average use was 75.83 percent; the median response was 75 percent. Boot use is summarized below:

| Percentage of | |
|---------------|-------------|
| Boot Use | Respondents |
| 0 | 4.1 |
| 25 | 10.7 |
| 50 | 11.1 |
| 75 | 25.4 |
| 100 | 48.3 |
| No answer | 0.3 |

Although Harley-Davidson riders indicated that they do not tend to use protective gear as frequently as others do, they make much greater use of boots than anyone else. More than 68.5 percent of the Harley riders indicated that they always wear boots compared with BMW riders, of which about 58.4 percent do. Boot use does not seem to be influenced by education: college graduates report about the same boot use as high school graduates. Boot use does seem to be associated with the size of the motorcycle. The use of boots climbs steadily from 62 percent for 100-cc bikes to 88 percent for 1200-cc bikes.

Boot use, like helmet and glove use, increases with increasing age, from 55 percent for teenagers to more than 80 percent for those more than 35 years old. Alaskan cyclists have the highest boot use (85 percent), whereas Puerto Rican cyclists have the lowest (62 percent).

Brightly Colored Clothing

Less than 10 percent of the respondents indicated that they always wear bright clothing. The average was only 44.7 percent of the time; the median was 50 percent. (These figures, however, are not even close to what would be obtained with a direct-observation study.) These data are shown below:

| Percentage of | |
|--------------------|-------------|
| Bright-Clothes Use | Respondents |
| 0 | 10.0 |
| 25 | 37.4 |
| 50 | 24.5 |
| 75 | 17.9 |
| 100 | 9.2 |
| No answer | 0.9 |

The Hurt exposure data (which were collected by direct observation) indicated that only 5.1 percent of the motorcyclists wear high-visibility jackets. The Hurt report found that cyclists wearing high-visibility jackets were involved in significantly fewer accidents than those in average-visibility clothing. The use of bright clothing is a powerful countermeasure to avoid accidents, yet in the Hurt exposure data only about 5 percent of those observed were taking advantage of this benefit.

In the collection of data on use of brightly colored clothes (as well as on helmets, gloves, boots, and headlights), respondents were restricted to using the following responses: zero percent, never; 25 percent, rarely; 50 percent, half the time; 75 percent, most of the time; and 100 percent, always. Very few respondents indicated zero percent or never on any of the questions, including this one. The next choice, 25 percent or rarely, was used by about 40 percent of the respondents and possibly reflects a figure more like 5 percent than 25 percent.

Harley-Davidson riders report the lowest use of bright clothes (33.8 percent), although the use of bright clothes was low for riders of all kinds of bikes. BMW riders did not come out highest on use of bright clothes. They reported 44 percent, whereas Honda riders claimed 47 percent.

Comparing the rest of the questions to use of bright clothing does not really offer any revealing comparisons, probably because so few cyclists make use of highly visible clothes.

Headlight Use

More than three-fourths of the respondents indicated that they always ride with their headlight on. The

average headlight use was 88.1 percent, but the median response was 100 percent.

This finding is not really noteworthy; since 1978, most headlights have been wired on. A number of the respondents, after checking 100 percent, also indicated that they do not have a choice. For example, one respondent wrote, "What else can I do? There's no switch!"

Because the newer bikes come with the headlight wired on and most of the bikes in the survey were models from the late 1970s or 1980s, it was expected that the majority of the responses would be "always." This is the case for most of the motorcycle manufacturers except for Harley-Davidson, whose riders indicated that they have the headlight on (in the daytime) only about 68.2 percent of the time. The data are summarized below:

| Percentage of Time with Headlight on | | Respondents |
|--|--|-------------|
| 0 | | 3.9 |
| 25 | | 5.8 |
| 50 | | 3.0 |
| 75 | | 8.5 |
| 100 | | 78.2 |
| No answer | | 0.6 |

MOTORCYCLE CHARACTERISTICS

Number Owned

Surprisingly, just about everyone indicated that they own at least one motorcycle (97.5 percent) and 40 percent indicated that they own more than one. The average was 1.7 motorcycles per respondent although the median was one bike per person. In all, the respondents indicated that they own 27 324 motorcycles:

| No. Owned | Respondents (%) |
|-----------|-----------------|
| 0 | 2.5 |
| 1 | 57.7 |
| 2 | 24.2 |
| 3 | 8.6 |
| 4 | 3.6 |
| 5 | 1.5 |
| 6 | 0.9 |
| 7 | 0.3 |
| 8 | 0.2 |
| 9+ | 0.5 |

Brand

Honda, as expected, accounted for the greatest share of the bikes--36.3 percent. Next were Yamaha (18.3 percent), Suzuki (13.9 percent), Kawasaki (12.1 percent), and, surprisingly, BMW (7.9 percent). Harley-Davidson accounted for 5.5 percent and other bikes made up 4.1 percent.

This is slightly out of line with new-registration data, which give Honda 38 percent of the market and BMW less than 1 percent. Possibly those who ride Hondas subscribe to fewer motorcycle magazines, whereas BMW riders tend to read more motorcycle magazines (or at least return more survey forms).

Engine Size

The largest motorcycle reported by more than one respondent had a 1600-cc engine. The average-size engine was 743 cc. The smallest was 50 cc.

The most common engine size was 750 cc, reported by 20.2 percent of the respondents. This matches the Hurt figure (1) of 21.2 percent for 750-cc engines almost exactly.

Color

The most common color for a motorcycle is black (31.6 percent), followed by red (24.2 percent), and blue (13.3 percent). No other color accounted for more than 10 percent.

Year

The oldest motorcycles reported by more than one person were made in 1905, followed by four 1907s; however, 98.7 percent of the bikes were made since 1960 and 97 percent were made since 1970. The most frequently reported year was 1980 (21.6 percent), followed by 1978 (19.3 percent), and then 1979 (18.5 percent). The average year (1976.5) is meaningless, but the median response of 1978 indicates that half the bikes were made in 1978 or more recently.

RIDER CHARACTERISTICS

Training

Only 15.1 percent of the respondents had taken a rider-training course, whereas 83.8 percent had not and 1.08 percent did not answer properly. This figure matches the Hurt study figure of 15.7 percent who indicated that they had learned from a course or from professionals.

The percentage of respondents who had taken a rider-training course varied slightly by the bike they ride; 18 percent of the BMW riders indicated that they had taken a course, whereas only 12 percent of the Harley riders indicated that they had.

There were 2467 respondents who said they had taken a rider-training course. The average length of these courses was 18.9 h; 88.6 percent of the courses had a classroom portion and 72.2 percent had an on-cycle portion in an off-street setting. More than half the courses (53.2 percent) had an on-street, on-cycle phase.

The percentage of respondents who had taken a rider-training course increased slightly at higher levels of education, but this does not seem to be related to age (except for those less than 16, only 7.8 percent of whom have taken a course).

Surprisingly, 20 percent of the Alaskan cyclists indicated that they had taken a rider-training course, although MSF does not even list one course in Alaska.

The states that had the highest percentage of respondents who indicated that they had taken a rider-training course were Hawaii and Rhode Island (which have legislation pertaining to motorcycle rider-training courses). In Hawaii, 51.4 percent of the respondents had taken such a course.

Rhode Island has a law requiring all first-time motorcycle license applicants to take a minimum 10-h motorcycle rider-training course. Minnesota also had a high percentage of respondents who had taken such a course (24.4 percent). The state has a rider-course law that requires riders under 18 to take a minimum of 14 h of training.

The state with the lowest number of trained riders was Indiana; only 4.7 percent of the 297 respondents had taken a course. Next were Massachusetts (5 percent), West Virginia (5.7 percent), Idaho (6.2 percent), and Kentucky (6.5 percent).

Sex

Men accounted for 95.9 percent of the respondents; women, 3.7 percent; only 0.4 percent (68 respondents) did not answer. Leaving these out brings the division to 96.3 percent men and 3.7 percent women. This compares closely with the Hurt study exposure

data, which reported 98.4 percent men and 1.4 percent women observed riding.

Age

The average age was 35; the median was 33. Half of the respondents were between 21 and 35. The oldest respondent was 83 years old and 101 respondents were 70 or older.

Less than 2 percent of the respondents were younger than 17 years old, which supports the quality of the data. The age question was left blank by 88 respondents.

Compared with the Hurt-study riders, our respondents are a little older; the median rider age in the Hurt exposure data was 26.7 compared with our median of 33.

Education

High school degree alone was the education level most frequently indicated, by 21.3 percent. Next came college degree (17.1 percent), two or more years of college (16.3 percent), professional degree (13.3 percent), less than two years of college (13 percent), and technical school (12.6 percent). Respondents who have attended at least some college made up 60 percent of the survey.

Residence

The most responses (13.8 percent) were from California, as might be expected. New York (6.2 percent) and Illinois (5.7 percent) were the only other states with more than 5 percent response. Texas,

Pennsylvania, and Ohio were next with 4.7 percent each.

CONCLUSION

Perhaps the most interesting finding is that motorcyclists are so willing to participate in a study of this nature. More than 16 000 cyclists took the time to complete the form, address an envelope, and use their own stamp. This study showed that valuable information can be collected from a national (and even international) sample of motorcyclists with a minimal cost to the surveyor.

A number of our findings duplicate or approximate the findings in the Hurt study. Although the Hurt study was only done in a portion of one state, our national figures help to show that the findings apply to the rest of the country.

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Moped and Bicycle Use by University of Hawaii Students

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The findings of two user surveys that attempted to determine the characteristics of moped and bicycle users and their school trips are discussed. Among the items covered are the degree of use of these devices, modal shifts, impact on other modes, trip-length characteristics, and problem areas. Because school trips by college students represent a significant market share of bicycles and mopeds, the information derived can add to the accumulating knowledge regarding mopeds and bicycles and the competition between them.

Recent increases in bicycle and moped use for both utility and recreational travel have stimulated the allotment of considerable attention to these modes. In Hawaii as elsewhere in the nation, an accelerated rate of construction of special facilities has occurred. In addition, the 1978 State Legislature defined mopeds and bicycles as separate categories of devices distinguished from motor vehicles and revised the rules and regulations governing their use.

A paper by Papacostas and Yoshioka in this Record describes the legislative background of moped and bicycle use in Hawaii and presents the findings of a study that has analyzed the characteristics of mopeds renters in Honolulu, their trips, and their accident patterns.

This paper concentrates on another significant market segment, University of Hawaii students and their school trips. The scope of the study was ini-

tially envisioned to be confined to moped users. However, during the early stages of the study it became evident that a significant portion of current moped users had shifted from bicycles. Consequently, the scope of the study was expanded to include bicyclists in an attempt to also discern the reasons behind the decision not to shift from bicycles to mopeds.

STUDY APPROACH AND DATA SOURCES

The study consisted of conducting and analyzing two similar user surveys. Bicycle and moped users were interviewed at various locations on the university campus. The questionnaires employed were divided into three sections. The first section elicited information about the respondents such as age and sex. The second section concentrated on the attributes of school trips and included items relating to the respondent's previous mode of travel and the reasons for shifting to the current mode. The last section sought information about the highway system from the perspective of the respondents and asked for suggestions for improvement.

In addition to the interviews, a series of counts of parked devices were taken throughout the campus at various times of the day in order to ascertain