Development of a Driving Attitude Scale

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Driving attitudes often may become influential factors leading to the occurrence of traffic violations and accidents. However, a great proportion of reported work in this field consists of expert opinion; only two scales which purport to measure driving attitudes have been published and research does not indicate them to be wholly satisfactory.

During the last five years, development of a driving attitude scale has been in progress in the Institute of Transportation and Traffic Engineering of the University of California. To obtain descriptions of real traffic situations for this scale, two clinical psychologists conducted informal interviews with 300 habitual traffic violators. During each interview, the violator described the manner in which he had received recent traffic citations and expressed himself freely regarding the actions of other drivers and police officers in those traffic situations. From the complete set of descriptions, the interviewers formulated 100 multiple-choice items to represent fairly typical traffic situations experienced by most drivers. Multiple-choice items, permitting more than a simple choice between accepting or rejecting a proposition contained in a complete sentence statement, presumably will (a) cover a wider range of attitude toward certain situations, permitting greater potential differentiation between criterion groups of drivers, and (b) make it more difficult for individuals to endorse the response which is believed to be more socially acceptable as a driving attitude.

Fifty-five items of the original group are now undergoing preliminary validation. Test results have been obtained from a large number of university students, and the testing of traffic violators is proceeding slowly. For certain items, the results from the students show statistically significant differences between groups of individuals as classified in terms of traffic citations received while driving in California. Certain items also differentiate between groups of individuals as classified in terms of their reported highway driving speeds under different conditions. Other data tend to support these findings. For the significant items, comparisons of relative response frequencies indicate considerable agreement with some psychological expectations.

●FOR SEVERAL YEARS, psychologists and other social scientists have been interested in the nature of attitudes and their influence on human behavior. Most psychologists seem to regard an attitude as a tendency to act in a certain way toward some object or situation in the environment (7). Although research in driving attitudes has been conducted for about 20 years, most reported work in this field consists of expert opinion. Only two scales which purport to measure driving attitudes have been published, the Siebrecht Attitude Scale and the Conover Driver Attitude Inventory. Research has shown these scales to be unsatisfactory as attitude measures (1, 3, 8).

Methods of measuring attitudes in psychological studies have been classified as direct and indirect. Methods which make no attempt to conceal the purpose of the scale have been called direct methods. The scales published by Siebrecht and Conover illustrate this approach. Methods which try to conceal the real intent of the scale have been called indirect methods. Using this approach, measurements of attitudes are in-

ferred from responses to items of the scale. The attitude items to be considered in this paper illustrated one indirect technique.

DESCRIPTION OF SCALE

During the last five years, research in developing a driving attitude scale has been in progress in the Institute of Transportation and Traffic Engineering of the University of California. The items which have been constructed and tested for this scale may be characterized by three unique features, which are the following:

Items Represent Actual Traffic Situations

The items for the attitude scale represent actual rather than imaginary traffic situations. To obtain descriptions of real traffic situations and driving experiences, two clinical psychologists conducted informal but carefully structured interviews with 300 habitual traffic violators in Los Angeles, defined legally as "negligent operators" by the Vehicle Code of California (5). During the interview, the violator was asked to recall his previous traffic citations and to describe as clearly as possible the circumstances which led to them. He was encouraged to express himself freely during the interview. Previous papers have described the results of the interviews (2, 4, 9). Using the descriptions of these traffic situations, the interviewers prepared 100 attitude items.

Items Were Prepared in Multiple Choice Form

These items were prepared as multiple choice items with four alternatives. Items of this type were believed to sample a wider range of attitudes than, for example, true-false items. The process of writing the attitude items from the descriptions of traffic situations is illustrated in Appendix A.

In the present form of the questionnaire, the subject is instructed to endorse the one alternative action which most closely reflects his own driving behavior in the kind of situation described. He is told that what he considers to be the "best," "right," or "safest" thing to do is not important in the test situation. It is assumed that individuals will endorse those actions which reflect a priori their underlying attitudes.

Trial Response Keys Have Been Based on Experimental Findings

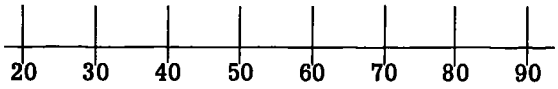
In this approach, the methods of selecting items for tentative response keys have been based thus far on experimental test results. This approach differs in principle from those which use a priori considerations of the investigator or judges for these procedures. Several empirical methods have been used thus far in selecting some of the attitude items and alternatives for differentiating between specific groups of drivers. The purpose of this study was to describe one method which differentiates to a considerable degree between two groups of individuals classified by their reported driving speeds.

METHOD

During 1955-56, test results were obtained from two large groups of students at the University of California, Los Angeles. These two groups, to be called Group A and Group B, contained 130 and 145 individuals, respectively. Group B was used as a cross validation sample for Group A. The two samples were reasonably similar in such factors as age level, sex, and reported length of driving experience in California.

All subjects in both groups were given a questionnaire of attitude items. Group A received a form containing the 100 multiple choice items, while Group B completed a reduced form (which is presently called the Driving Survey) containing 55 of the 100 items in their original order. In addition, each group completed an inventory consisting of items about one's personal driving habits and experiences. Four items concerning driving speed from this inventory were used for classifying the subjects of Group A in terms of speed. One of these items was the following:

What is your usual highway driving speed (MPH) during daylight?



The subjects were instructed to indicate their responses on a continuum similar to those used in numerical rating scales. For IBM procedures, all responses were evaluated to the nearest five mph and recorded in IBM cards.

The 130 subjects in Group A were classified in terms of driving speed by use of a simple summation of the numerical values on the four speed items in the inventory. These sums were ranked in order. Then, using the median of this distribution, the subjects were divided into two subgroups which were called the "slow" drivers and the "fast" drivers. This procedure gave 67 slow and 63 fast drivers.

The classification of the 130 subjects into these two speed groups seemed to be justified. Some examination of their official traffic records for driving in California showed that the fast drivers as a group differed significantly from the slow drivers in three major areas of traffic citations.

Using IBM procedures, the response frequencies for the 67 slow and 63 fast drivers in Group A were obtained for the 55 attitude items common to Groups A and B. Assuming random sampling from a common population, the response frequencies of the slow and the fast drivers for each alternative of each item were tested for independence of this speed classification using chi square (X^2). Chi square was considered significant when its chance probability, by reference to statistical tables, was not greater than .05.

Certain item alternatives with significant chi squares were selected for response keys. Ten items with alternatives which were endorsed to a greater degree by the fast drivers were selected for a fast key, while 10 items with choices endorsed to a greater extent by the slow drivers were used as a slow key. Five items were common to these two response keys. A combination fast-slow key was composed of all the item alternatives from the two separate keys. Using this key, a subject's score was the algebraic sum of his score on the fast key (scored plus) and his score on the slow key (scored minus).

Predictions of how the individuals would be classified in Group B, the cross validation sample, were made using these three response keys. With the slow response key, it was predicted that the subjects in Group B with scores above the median of their own distribution would be classified as the slow drivers. Using the fast response key and the combination of the two keys, it was predicted that the subjects with scores higher than the median of their own distribution would be classified as fast drivers. Then, the subjects in Group B were classified as fast or slow drivers in terms of the median of their own distribution of speed values using the identical procedure of the original sample.

RESULTS

Significance of Response Keys

The chi squares for all three response keys were significant beyond the .01 level. This is evidence of a lack of independence between the speed classification method and the technique of scoring the responses to the attitude items. To state this finding in positive terms, using responses to certain attitude items, it was possible to separate the slow from the fast drivers in the cross validation sample (based on their own reported driving speeds) with greater accuracy than one could obtain by chance. The chi squares and percentages of correct individual predictions are shown in Table 1.

Table 1 shows that the three response keys predicted the actual speed classification of subjects about equally well. On the average, the predictions were correct for about 66 percent of the 145 subjects in Group B. Table 1 shows that the combination fast-slow key using all 20 alternatives (15 different items, since five items contributed to both the slow and the fast keys) did not improve the accuracy of prediction sufficiently to warrant further use in this context.

Some examination of the score distributions for the three response keys suggested that the percentage of correct predictions might be much higher for subjects near either extreme of the continuum of speed values. To explore this possibility, the number of

TABLE 1

STATISTICS FOR THREE RESPONSE KEYS USING TOTAL SAMPLE
(N = 145)

Response Key	Number of Item Alternatives	Chi Square	Percentage Correct Predictions
Slow	10	9.37[a]	63
Fast	10	17.99[a]	68
Fast-Slow	20	20.02[a]	68

[a] Significant at the .01 level.

TABLE 2

STATISTICS FOR THREE RESPONSE KEYS USING UPPER AND LOWER 25 PERCENT OF TOTAL SAMPLE
(N = 73)

Response Key	Number of Item Alternatives	Chi Square	Percentage Correct Predictions
Slow	10	13.77[a]	71
Fast	10	16.98[a]	74
Fast-Slow	20	14.97[a]	73

[a] Significant at the .01 level.

correct predictions was determined for the subjects in the upper and lower 25 percent of the distribution of speed values for Group B. One might consider these individuals to tend toward more extreme driving speeds (either fast or slow) than the subjects nearer the median of the distribution. The results based on the upper and lower 25 percent of the subjects are shown in Table 2.

Table 2 shows that the percentage of correct predictions was higher for the subjects in the two extreme groups than for the entire sample. The three keys again predicted the actual speed classifications about equally well.

Content of Significant Items

In addition to the statistical significance of these results, the content of the items contributing to the response keys seemed to be largely consistent with previous psychological expectations about fast vs. slow driving behavior. While the items themselves represented several kinds of traffic situations in addition to speed situations, the traffic behavior expressed by the item alternatives in the response keys was consistent, in most instances, with fast or slow driving. The alternatives in the fast key mentioned behavior that would enable a driver to reach his destination with a minimum of delay or inconvenience. The responses in the slow key suggested passive behavior—an acceptance of the traffic situation in which drivers found themselves.

SUMMARY

This paper has described briefly the development of a driving attitude scale (which is presently called the Driving Survey) in the Institute of Transportation and Traffic Engineering of the University of California. This scale consists of 55 multiple choice items based on descriptions of actual traffic situations. From this scale, certain item alternatives which differentiated between two criterion groups of drivers (Fast and Slow) in one sample of university students were incorporated into three subtests. Using these three subtests, or response keys, predictions of speed classification as fast or slow were made for an independent cross validation sample of subjects. These predictions

were correct, on the average, for about 66 percent of the cross validation group. The traffic behavior expressed by the item alternatives in the response keys was consistent, in most instances, with fast or slow driving. The predictive value of these subtests might be improved by the use of additional items in the Driving Survey. Further research may enable us to describe driving attitudes which seem to be characteristic of other criterion groups.

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Appendix A

The process of writing the 100 attitude items from the complete set of descriptions may be illustrated as follows:

One kind of traffic situation described by several violators involved driving on a city street where the traffic signals were timed at a faster speed than the posted speed limit. Should a driver obey the legal speed limit, which may tend to create congestion? Or should he try to drive with the timing of the traffic signals, which means that he must exceed the legal speed limit? Some drivers experience this type of situation every day. One violator described his experience in the following way:

> "It is funny that the lights are not synchronized with the indicated speed. If you drive 35 mph on National, you do not make the lights. In order to make the lights, you have to speed up. I know the street very well because I travel the same route every day. I know exactly where and when to step on it. So this time he (police officer) caught me." From a descrip-

tion of this kind of traffic situation, a multiple choice item was formulated as follows:

You are driving to work in a 25 mph zone. Signs read that signals are set for 30 mph. It has been your experience that you must drive much faster than 30 mph to make them. What do you do?

A. Drive within the speed limit of 25 mph, even though you may miss some of the signals.
B. Drive fast enough to make the signals smoothly, even though you must exceed the speed limit.
C. Try to stay ahead of traffic; otherwise you may miss certain signals.
D. Try to move along with traffic whether you make the signals or miss them.

This item involves the essential feature of the traffic situation as described - the necessity of exceeding the legal speed limit for driving with the traffic signals. The four alternative choices per item, stating real courses of action which the violator as the driver might have followed or did follow in part, were also suggested by the descriptions.

Five of the 100 items which mention other kinds of traffic situations are the following:

You are driving on a paved country road where the speed limit is 25 mph. Traffic is light. How fast do you drive?

A. 25 mph
B. 30 mph
C. 35 mph
D. 40 mph

You are slowly approaching a blind intersection. Two cars on the other street, one on your left and one on your right, reach the intersection when you do. What do you do?

A. Stop quickly; then see what the other two drivers will do.
B. Stop and wait until the car on your right has crossed the intersection; then proceed.
C. Continue slowly toward the intersection until you see whether the other two drivers will stop.
D. Stop and wait until the other two cars have crossed the intersection; then proceed.

As you approach an intersection for a left turn, a car on your right stops for a pedestrian who is crossing your street from right to left. As the pedestrian reaches your lane, he sees you, stops, and gives you a sign to proceed. A motorcycle police officer is watching traffic. What do you do?

A. Give the pedestrian a return sign to proceed.
B. Let the pedestrian know that you see his sign; then turn.
C. Stop and wait for the pedestrian to reach the curb before you turn.
D. Stop and wait for the pedestrian to cross your lane; then turn.

You are driving in a 35 mph zone. As you come to within about three car lengths of an intersection, the traffic signal changes to yellow. What do you do?

A. Speed up slightly and continue through the intersection.
B. Slow down and prepare to stop at the intersection if necessary.
C. Maintain your speed; you feel that you can make it in time.
D. Try to stop immediately; you feel that you cannot make it in time.

You are waiting in an intersection during the evening rush hour when the traffic signal changes to red. Traffic on the other street is beginning to move. A motorcycle officer is watching traffic. What do you do?

A. Try to back up slowly to the crosswalk behind you.
B. Wait in the intersection for the officer to direct you through traffic.
C. Tap your horn and proceed slowly through the intersection.
D. Proceed through the intersection as soon as traffic will permit.

The 100 attitude items, which represent several fairly typical traffic situations, will be subjected to further tests in differentiating specific groups of drivers who may experience these situations.