COMMENTARY DRIVING ON LOW VOLUME RURAL ROADS: TRAINING AND USE

by

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TO MY MOTHER AND FATHER

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INTRODUCTION

Problem Statement and Purpose

Every day, county personnel from states across the nation are faced with the problem of signing and maintaining the low volume roads (roads with less than 400 vehicles per day) within their county. Many of the counties have their own methods for the inventory and inspection of their signs and markings. However, few counties have a simple method for the evaluation of information deficient locations on their road systems.

Whereas an inventory is simply a matter of the numbers of signs and their respective location, the inspection is concerned with the physical condition and appearance of the sign. An evaluation determines if the current signs are correct, are needed at all, or if a needed sign is missing, i.e. evaluation of information deficient locations.

One can readily see that there is a definite need for some type of simple procedure by which the counties can evaluate the road systems for information deficient/potentially hazardous locations. Commentary driving is one such procedure. Commentary driving is a technique in which, at the beginning of a section of road to be evaluated, the driver states his "expectancies" of the road and as he proceeds along the road he "comments" on locations/conditions which violate his expectancy.

This study was conducted to determine the amount of time required to teach someone the technique of commentary driving, and then to determine the effectiveness of two alternative teaching methods. The

two teaching methods were to have the students make commentaries (a) while viewing a videotape of a pre-determined route, or (b) while driving a pre-determined route.

Scope

This study dealt only with the aspects of teaching the technique to county personnel of Kansas and to Kansas State University students who have the same background as the county personnel. The term "background" refers to the students knowledge of the proper rules, regulations, general signing and geometrical layout of county/township road systems. Even though, as described later in the Summary, commentary driving can be used for various other situations, this study was concerned only with its application on low volume rural (LVR) roads. The reason for applying this limitation to the study was to gather information on teaching commentary driving to county personnel and to later add a section on commentary driving to the Handbook of Traffic Control Practices for Low Volume Rural Roads (LVR HANDBOOK)(1).

BACKGROUND

Commentary Driving Procedure

The information that a driver receives from the roadway must be correct, pertinent, concise and presented in such a way that it is readily usable by the driver. In many cases, however, the information that the driver receives from the roadway is not consistent with the information that he expects to, or should, receive. If the driver's expectancy, what the driver expects from the roadway environment, is violated then a potentially hazardous situation exists. The procedure

of commentary driving was developed by R. S. Hostetter, et. al., and is presented in reference 2. Generally stated, commentary driving is a simple field technique, which requires no special equipment, and from which information is gathered, concerning the roadway environment, to help rid the roadway environment of all information deficient locations. Information deficient locations are specific locations on the roadway where the information, received by the driver from the roadway, is not sufficient to give the driver the needed information to safely traverse the roadway.

In the planning for the evaluation of a county's road system it is recommended the road system be divided into several routes. Each route is from 3 to 15 miles in length. Every road that the county is responsible for is placed on only one of the routes. The routes are prioritized in a list so that the roads deemed to be most hazardous are looked at first (2).

After the routes have been established, and listed on a priority basis, either a team of two, or an individual with a tape recorder, (See Personnel Requirements) drives the roads making sure to drive each route in both directions and, if necessary, some routes should be driven at night. As the team or individual drives the route, the driver will comment verbally on what information is needed versus what information is received from the various situations on the route. The driver's commentaries will usually be stored on a cassette tape so that later reference can be made to them, if necessary.

The driver's commentary is divided into two parts. Within the first half mile, the driver makes statements concerning the general nature of the roadway environment. Included in this group of general

comments are: the classification of the road, the surface quality, existing positive guidance (3), predicted safe driving speeds, availability of warning signs, and other general expectancies of the road. The driver's comments then focus more specifically on the events that he encounters as he moves farther down the roadway, commenting on the situations as they arise (2). The comments regard:

1) The driver's expectancy concerning direction (i.e. straight, curves left or right), vertical curves, sharpness and safe speed of curves, oncoming traffic, culvert and bridge width and alignment, right of way controls at intersections, etc.

2) What actions may be necessary regarding speed changes, lateral movement, turns, etc.

3) Any uncertainty related to any of the two items above.

During the running commentary, the driver may feel it necessary to restate his initial comments. This is especially true on long straight tangents where there is little need for specific comments. It is believed that during the initial statement and restatement of expectancies that obvious information deficient locations will be identified as a result of the commentary.

Verbal comments are suggested because it forces the driver to state what he expects from the road environment ahead and thus makes him more sensitive to any inconsistencies that may confront him. It is also suggested that the driver maintain a speed as close to the posted speed limit as is comfortably possible. If no speed limit is posted then the driver should drive the road as he believes a reasonably prudent driver would.

As stated earlier, the driver's comments should be stored on an audio cassette via a cassette tape recorder. That way the driver can

replay the tape in the event that he must further investigate a site. For this reason, in addition to identifying the route, it is very necessary that the driver record the mileage at the beginning of and also at the specific points of interest along the route. Although some drivers may be uneasy with the tape recorder at first, with a few hours of practice they will become relaxed and proficient in its use (2). This point is discussed, in more detail, later in the Conclusion section of this paper.

The last step in the procedure is to conduct more detailed surveys of the sites that have been identified as information deficient during the commentary driving portion of the task. This job is made easier by using the checksheets found in Volume 2 of reference (2). Figure 1 and Figure 2 are two of the 10 checksheets. The other eight checksheets are for: Horizontal Curves, Tangential Intersections, Intersections Which Require a Turn, Railroad-Highway Grade Crossings, Uncontrolled Y-Intersections, Low Water Stream Crossings, Height/Weight Restrictions, and Other Situations. Table 1 is mentioned in Figures 1 and 2 and in the other eight checksheets. All of the checksheets were developed to aid the crew when they revisit the information deficient locations to conduct further study of the site. The checksheets are self explanatory for experienced highway personnel. The locations in question are those in which there was no obvious solution on the initial drive-through of the route. These locations can then be prioritized and later improved as the county acquires the funds for this purpose.

Figure 1. Information Deficiency Evaluation Checksheet for a Stop-Controlled Intersection

ROUTE ID _____ INTERSECTING ROUTE _____

APPROACH DIRECTION N S E W (circle)

DATE _____ TIME _____ AM PM INSPECTOR_____

SPEED LIMIT _____MPH ESTIMATED TYPICAL APPROACH SPEED _____MPH

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

(1) Is the intersection clearly visible from decision sight distance?
_____Yes _____No

(2) Is the stop sign clearly visible from decision sight distance?
_____Yes _____No

If no, go to (4)

(3) From decision sight distance, can you determine that the stop sign applies to you? _____Yes _____No

If yes, go to (6)

(4) Is there a STOP AHEAD warning sign present? _____Yes _____No

If no, go to (6)

(5a) Is the STOP AHEAD warning sign clearly visible on the approach?
_____Yes _____No

(5b) Is the STOP AHEAD warning sign designed according to the specifications in the MUTCD? _____Yes _____No

(5c) Is the STOP AHEAD warning sign properly located? (i.e., neither too far upstream such that you would "forget" it or too close to the intersection such that you still would not have sufficient time to stop) (Check Table of Placement Distances for Advance Warning Signs)*____Yes ____No

* See Table 1

Figure 1 (continued).

(6) Do other informational sources (i.e., roadway surface edges, terrain cuts, brush/tree line, shoulder edges, centerlines, etc.) provide information suggesting either 1) that the situation ahead is not a stop-controlled intersection, 2) that stop sign does not apply to your approach, or 3) that the stop controlled intersection is located further downstream than it actually is?
_____Yes _____No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:_____

---

(7) Is the presently available information sufficient for you to recognize the stop-controlled intersection at a distance such that you can stop safely? _____Yes _____No

(8) Would the presently available information be sufficient for you to recognize that a stop-controlled intersection is located downstream:

- o during nighttime conditions? _____Yes _____No
- o when the roadside vegetation is at its densest growth? _____Yes _____No

SUGGESTED TREATMENTS

_____ Install STOP AHEAD warning sign
_____ Improve visibility of STOP AHEAD warning sign
_____ Relocate STOP AHEAD warning sign
-Move closer to intersection by _____feet
-Move back from intersection by _____feet
_____ Replace non-standard warning sign with standard STOP AHEAD warning sign
_____ Improve sight distance to intersection
_____ Improve visibility of stop sign
_____ Install stop lines
_____ Improve markings at intersection
_____ Improve signing at intersection
_____ Correct for confusing, conflicting or misleading information:

_____ Implement other treatment:

Figure 2. Information Deficiency Evaluation Checksheet for a Narrow/One-Lane Bridge

ROUTE ID_____ LOCATION: _____MILES FROM REFERENCE POINT_____

APPROACH DIRECTION N S E W (circle)

DATE_____ TIME_____ AM PM INSPECTOR_____

SPEED LIMIT_____MPH ESTIMATED TYPICAL APPROACH SPEED_____MPH

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	230	290	355	430	510	590	680

(1) Is the bridge clearly visible from decision sight distance?
_____Yes _____No

If no, go to (3)

(2) From decision sight distance, can you perceive the reduced roadway width at the bridge? _____Yes _____No

If yes, go to (5)

(3) Is there a NARROW BRIDGE or ONE-LANE BRIDGE warning sign present?
_____Yes _____No

If no, go to (5)

(4a) Is the warning sign accurate? (i.e., the ONE-LANE BRIDGE is applicable to bridges with usable roadway widths less than 16 feet or 18 feet if a significant number of wide vehicles cross the bridge or if the approach alignment is winding)
_____Yes _____No

(4b) Is the warning sign clearly visible on the approach?
_____Yes _____No

(4c) Is the warning sign properly designed according to the specifications in the MUTCD? _____Yes _____No

(4d) Is the warning sign properly located: (i.e., neither too far upstream such that you would "forget" it or too close to the bridge such that you still would not have sufficient time to select a safe speed and decelerate to it) (Check Table of Placement Distance for Advance Warning Signs)* _____Yes _____No

* See Table 1

Figure 2 (continued).

(4e) Is there a supplemental speed advisory plate attached to the warning sign? _____Yes _____No

(5) Do other informational sources (i.e., hazard panels, guardrails, edgelines, roadway edges, bridge abutments, etc.) provide information suggesting 1) that the situation ahead is not a narrow/one-lane bridge, 2) that usable roadway width across the bridge is wider than it actually is, or 3) that a narrow/one-lane bridge is located further downstream?
_____Yes _____No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:_____

---

(6) Is the sight distance to opposing vehicles sufficient for you to make a safe decision on whether you can safely cross the bridge and to safely execute the selected maneuver? _____Yes _____No

(7) Is the presently available information sufficient for you to recognize the narrow/one-lane bridge at a distance such that you can decelerate safely to a safe and comfortable crossing speed?
_____Yes _____No

(8) Would the presently available information be sufficient for you to recognize that a narrow/one-lane bridge is downstream:

- o during nighttime condition? _____Yes _____No
- o When the roadside vegetation is at its densest growth? _____Yes _____No

Figure 2 (continued).

SUGGESTED TREATMENTS

_____ Install NARROW BRIDGE warning sign
_____ Install ONE-LANE BRIDGE warning sign
_____ Improve visibility of advance warning sign
_____ Relocate advance warning sign
-Move closer to bridge by _____feet
-Move back from bridge by _____feet
_____ Replace non-standard warning sign with standard warning sign
_____ Install supplemental speed advisory plate;
suggested speed is _____MPH
_____ Install other advance warning signs, i.e.,
_____ Curve warning
_____ Intersection warning
_____ Low overhead clearance
_____ Other (specify) _____
_____
_____ Improve pavement markings at bridge (i.e., tapered approach treatment)
_____ Install hazard panels at bridge
_____ Improve visibility of bridge
_____ Correct for confusing, conflicting or misleading information:
_____
_____
_____
_____ Implement other treatment:
_____
_____
_____

TABLE I —A Guide For Advance Warning Sign Placement Distance[1]

Posted or 85 percentile speed MPH	*Condition A high judgment needed* [3] *(10 secs. PIEV)*	*General warning signs*[3]					
		Condition B—Stop condition	*Condition C—Deceleration condition to listed advisory speed—MPH (for desired speed at condition)*				
		0	*10*	*20*	*30*	*40*	*50*
20	[5] 175	(4)	(4)	.....			
25	250	(4)	[2] 100	.....			
30	325	[5] 100	150	[5] 100	.....		
35	400	150	200	175	.....		
40	475	225	275	250	[5] 175	.....	
45	550	300	350	300	250	.....	
50	625	375	425	400	325	[5] 225	.....
55	700	450	500	475	400	300	.....
60	775	550	575	550	500	400	[5] 300

Typical Signs for the Listed Conditions in Table II-1; Condition A—Merge. Right Lane Ends, etc; Condition B—Cross Road, Stop Ahead, Signal Ahead, Ped-Xing, etc.; Condition C—Turn, Curve, Divided Road, Hill, Dip, etc.

1 Distances shown are for level roadways. Corrections should be made for grades. If 48-inch signs are used, the legibility distance may be increased to 200 feet. This would allow reducing the above distance by 75 feet.

2 In urban areas, a supplementary plate underneath the warning sign should be used specifying the distance to the condition if there is an in-between intersection which might confuse the motorist.

3 Distance provides for 3-second PIEV, 125 feet Sign Legibility Distance, Braking Distance for Condition B and Comfortable Braking Distance for condition C as indicated in *A Policy on Geometric Design of Rural Highways*, 1965, AASHTO, Figure VII-15B.

4 No suggested minimum distance provided. At these speeds, sign location depends on physical conditions at site.

5 Feet

Source: Ref. (1), Ref. (4, Revision No. 2, December 1983)

Survey Frequency

It is important to note that this type of survey probably need not be done at any set interval of time. In fact, once the initial survey has been finished, the only reason for re-doing it would be for substantial changes in the nature of the roadway environment. This in no way means that once the survey is completed that the responsible county engineer is no longer concerned with providing the needed information to the motoring public. He must continue the routine inspection of all his roadways (2). Note that surveys during high vegetation growth seasons can be very helpful in determining problems of weeds or trees obstructing signs.

Personnel Requirements

When using a team of two people, the driver does the commentary, and the passenger acts as a guide or navigator. The passenger can also be a recorder if the audio player/recorder is not used. The main objective in using a team of two people is to free the driver from concerns about staying on the route so he may concentrate on evaluating the route.

Although there are no rigid requirements for selecting a driver it is recommended that he be knowledgeable in the application of traffic control devices, particularly signs. He should also be familiar with the Manual of Uniform Traffic Control Devices (MUTCD) (4) and in particular the LVR Handbook (1). The preferred driver would be unfamiliar with the road system to be driven (i.e. a borrowed engineer from the neighboring county). The driver should be neither too cautious (overstates deficiencies), nor too aggressive (high tolerance for

deficiencies)(2).

Hostetter (2) suggests the driver be a Traffic Engineer and the recorder be a technician. From the experimenter's experience in Kansas he believes the driver (commentator) should be a county engineer/road supervisor or some other of the technical personnel experienced in the use of the LVR Handbook. While it would be helpful if the passenger (navigator/recorder) were a technician he believes it is not necessary. On the other hand if the driver is a county engineer/road supervisor from, say, an adjacent county, then he believes the passenger should be a technically qualified person from the county in which the roads are located.

EXPERIMENTS

Introduction

This section covers the two experiments that were designed to answer the question: Can a student show that he has learned the technique of commentary driving by watching a videotape of a route, in a classroom, and commenting on what he sees, or does the student need to do the commentary from a car, out on the road?

The commentaries were about 40 - 50 minutes in length and the routes were 20 - 25 miles long for both experiments. All routes included examples of the various types (A, B, and C: LVR HANDBOOK definitions) of LVR roads. Included in this section is a brief explanation of each experiment followed by a section on the statistical results of the experiments.

EXPERIMENT 1

Procedure and Experimental Design

The 21 subjects, for this experiment, were all members of the fall semester 1984 "Route Location and Design" class in the Civil Engineering Department at Kansas State University (K.S.U.).

Before the subjects began the experiment, they attended several lectures and slide presentations where they were given information on how to identify various types of problem locations. In addition, they were required to read the information and concepts presented in the LVR HANDBOOK (1). Furthermore, they were exposed to the technique of commentary driving by way of prepared commentary driving tapes (videotaped segments of road with someone correctly doing commentary driving), and they were given handouts showing hypothetical examples of commentaries (2). See Figures 3 and 4. The subjects were also given specific instructions, by way of handouts, that described their particular task during the experiment. See Appendix A.

The first group (pairs - driver and navigator) was assigned to go into the field and actually drive a designated route. See Figure 5. While driving the route, the driver did commentary and identified the problem locations on an audiotape. The navigator simply made sure the driver stayed on the designated route. Drivers were told that they would be graded on their ability to identify all of the problem locations on the route and to follow the recommended commentary driving procedure. They also were told that they would be penalized for reporting a location that actually was not a problem location. This

Figure 3. Two Hypothetical Examples to Illustrate How One Might Comment on Initial Expectancies

"Now travelling on Rt. 101, Northbound. The road has a smooth surface with a 2-4 foot paved shoulder and open terrain. The road is generally straight with a few gentle curves and short crests with generally good sight distance. The road is marked with centerline and edgeline. I expect to be able to travel at 55 mph even though a speed limit is not posted. I am not concerned about on-comming traffic. If there are curves or other situations requiring a speed reduction, I expect to be warned through appropriate signing."

or

"Now travelling on Jones Bridge Road, Southbound. The road is paved but there are occasional breaks in the pavement. There is no shoulder or centerline and I am not certain as to my lane limits. The road is curvilinear with several crests and dips which limit the sight distance. Except for some locations my safe speed is about 50 mph. There will be several occasions where I will have to reduce my speed but I expect to receive curve warning signs with speed advisory only at those locations."

Source: Reference (2)

Figure 4. Example Commentaries for Specific Situations (Source: Ref. (2))

Item	Possible Commentary
	Example A
Approach to Crest	"Crest curve ahead, view of road limited . . . tree Vertical Curve line indicates that road goes straight ahead . . . not concerned about on-coming traffic . . . wide enough pavement . . . can maintain cruising speed . . ."
On Vertical Curve Crest	"Confirmed" [continue with next section] or "Expectation violated . . . tree line went straight but road curved left . . . not sharp enough to cause any problem . . . no need for warning sign." [continue with next section] or "Expectation violated . . . tree line went straight but road turned left sharply . . . needed to reduce speed . . . should have had curve warning sign at least . . . possibly speed advisory . . . mark site for study"
	Example B
Approach to Horizontal Curve	"Curve left ahead . . . see curve warning sign, no speed advisory . . . should be able to take curve at cruising speed . . . looking out for opposing vehicles because of narrow width"
Point of Curvature	"Curve sharper than anticipated . . . speed reduction necessary expecially if on-coming vehicles . . . mark site for speed advisory check"
	Example C
Approach to Narrow Bridge on Curve	"Curve right ahead . . . see curve warning sign . . . assume I can maintain speed . . ."
Closer to Curve/Bridge	"See bridge headwalls . . . narrower pavement . . . not certain if wide enough for two vehicles . . . need to slow down . . . can't see across bridge for opposing vehicles . . ."

was done to keep them from commenting that "every little spot in the road" was a problem location. The second group (individuals) was given the same assignment with the exception that they demonstrated their ability at identifying problem locations by looking at a pre-recorded videotape of the same designated route. See Figure 5. Both groups were given a tape and tape recorder for recording their comments. At the end of the experiment, both groups returned their tapes.

Measurement

The experimenter evaluated the subjects' tapes by comparing them to a key tape (the experimenter's evaluation of the routes). The subjects were graded according to (a) the number of actual problem locations that they were able to identify and (b) the number of locations that they identified as problem locations when in fact they were not. A score was calculated for each subject by totaling the number of correct observations made and subtracting the number of incorrect observations made. The scores then were averaged for the subjects within the groups and the variances were found. The averages and variances then were compared for the two groups. The explanation of how the experimenter compared the subjects' tapes to his is in Appendix B.

Results

The tapes produced by the students were evaluated and a score was determined for each. The score was determined as previously described in the Measurement section. Table 2 shows the scores arranged in a descending order and separated into the two conditions, VIDEO (commentaries made while viewing a videotape) and DRIVE (commentaries

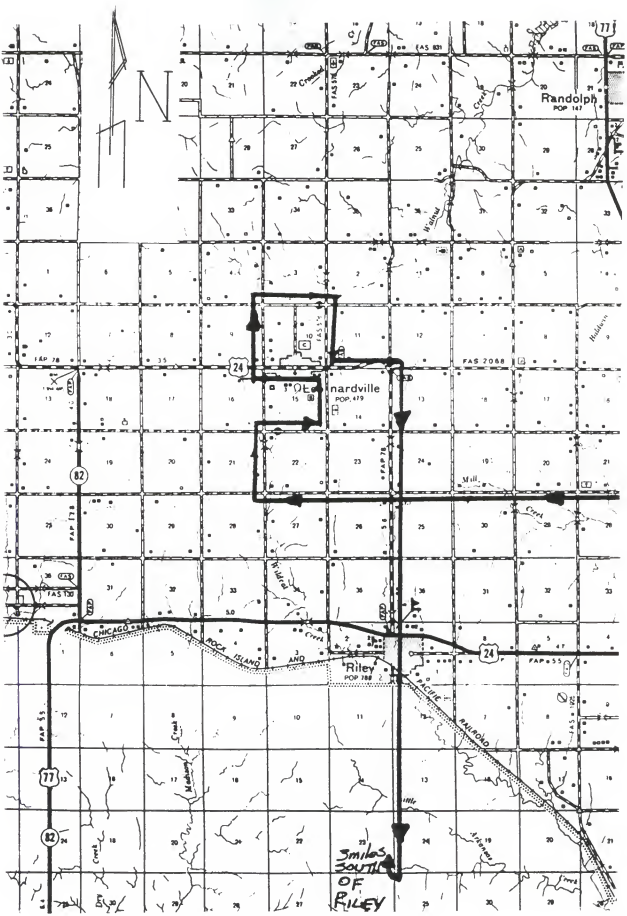

Figure 5. Route Riley 4 - Experiment 1 Fall 1984

Table 2. Subject Scores By Subject

SUBJECT	CONDITION	SCORE
1	VIDEO	257
2	VIDEO	239
3	VIDEO	237
4	VIDEO	226
5	VIDEO	206
6	VIDEO	191
7	VIDEO	189
8	DRIVE	206
9	DRIVE	203
10	DRIVE	175
11	DRIVE	168
12	DRIVE	168
13	DRIVE	159
14	DRIVE	150

made while driving a selected route). The subject numbers have been arbitrarily defined and do not suggest the order in which the route was driven. The possible score for this route was 366 according to the experimenter's evaluation of the route.

Averages and standard deviations were calculated for both conditions. The average score for the viewers of the videotape (VIDEO) was 221 (range 189 to 257), while the average score for the students driving (DRIVE) was 175 (range 150 to 206). The standard deviation for the VIDEO condition was 26 as compared with 21 for the DRIVE condition.

The objective of the analysis of data, by the F test (5), was to find out if there was a significant difference between the two conditions of the experiment. Since the F test assumes that the two samples are normally distributed, the two groups were checked for normality using the Kolmogorov - Smirnov One-sample Test (6). The calculated D, the statistic for the Kolmogorov - Smirnov test, for the VIDEO condition was 0.16, while that for the DRIVE condition was 0.23. The critical D for both conditions ($N = 7$, $\alpha = .05$) was 0.49. Therefore since both of the calculated values are less than the critical value, it can be concluded that the sample can be assumed to be normally distributed.

Next, the F test was run on the data set. The null hypothesis for this test was that the mean scores of the two conditions were equal (H_o: $\mu_v = \mu_d$), where μ_v is the mean score of the VIDEO condition, and μ_d is the mean score of the DRIVE condition. The calculated F, the test statistic for the F test, for this set of data is 12.64. The critical F for degrees of freedom $\nu_1 = 1$ and $\nu_2 = 12$ with α level, probability of rejecting the null hypothesis when it is true, .05 is 4.75. Since 12.64 is larger than 4.75, there is a significant difference between

the two sample mean scores. In other words, the two samples sets probably do not come from the same distribution. Since the mean for the VIDEO condition was larger than that of the DRIVE condition, the subjects watching the videotape scored higher, performed better, than those subjects driving the road.

EXPERIMENT II

Procedure and Experimental Design

The second experiment was divided into two sections. The only difference between the two sections was the type of subjects used in each. The first section used 23 students, from the spring semester 1985 "Route Location and Design" class at Kansas State University, for subjects. The second section enlisted the aid of 23 county level highway employees (county personnel). Included in this group were county engineers, engineering technicians, road supervisors, bridge supervisors, signing foremen, and a Kansas Department of Transportation (KDOT) safety engineer. This section of the experiment was conducted as an experiment/workshop type exercise. Two consecutive six hour days of instruction/experiment were used.

The subjects in each section were separated into two groups. The first group consisted of several "pairs" (driver - navigator) which were assigned to the DRIVE condition of the experiment. The second group consisted of the remaining "individual" subjects who were assigned to the VIDEO condition.

Before the subjects began the experiment, they attended several lectures and slide presentations where they were introduced to information on how to identify various types of information deficient loca-

tions. In addition, they were required to read the information and concepts presented in the LVR HANDBOOK (1). Twenty-two of the 23 members of the county personnel had attended a 3-day workshop on the use of the LVR HANDBOOK within the last two years. Furthermore, they were given instruction on the technique of commentary driving by way of lectures, and prepared commentary driving tapes (videotaped segments of road with someone correctly doing commentary driving) along with handouts illustrating hypothetical examples of commentary for particular situations on a road (2). See Figures 3 and 4. The subjects were also given specific instructions, by way of handouts, that described their particular job during the experiment. A separate handout was prepared for each of the three jobs: Driver (did commentary while driving on route), Guide (navigator for driver), and Video (did commentary from the videotape). These handouts are presented in Appendix A.

Each section of the experiment consisted of two trials. In trial 1, the first group (pairs - driver and navigator) was assigned to go into the field and actually drive a designated route. See Figure 6. While driving the route, the driver did commentary and identified the problem locations and the navigator made sure the driver stayed on the designated route. Drivers were told that they would be graded on their ability to identify all of the problem locations on the route, and to make the correct and appropriate comments that described the route. The second group (individuals) was given the same assignment with the exception that they demonstrated their ability in identifying problem locations by looking at a pre-recorded videotape of the same designated route. Both groups were told that they would be penalized for

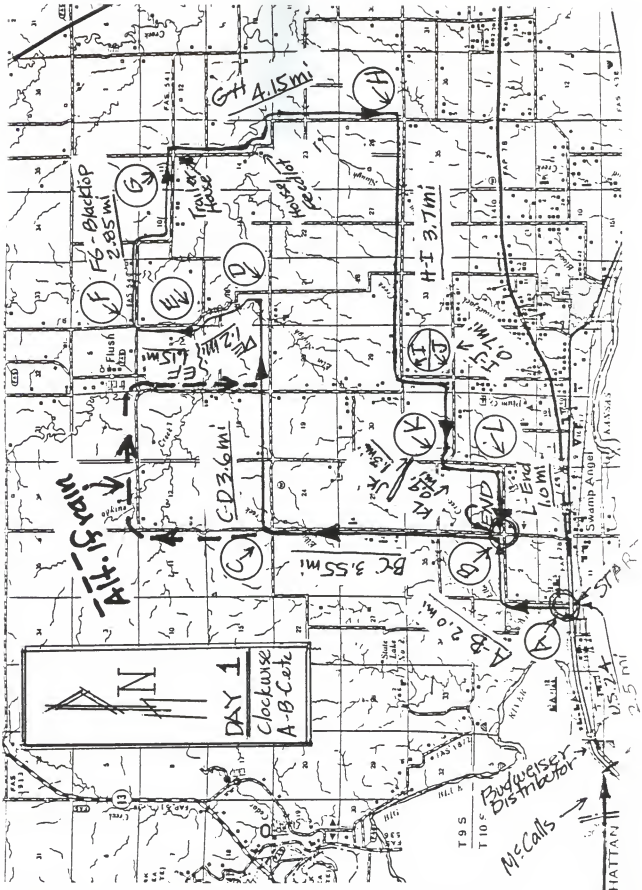

Figure 6. Route Pott. D-1 - Experiment 2 (Day 1) Spring 1985

reporting a location that actually was not a problem location. This was done to keep them from commenting that "every little spot in the road" is a problem location. At the end of trial 1, the subjects in both groups returned their tapes to the experimenter.

During trial 1 of the second section, the experimenter decided to see if more than one person could participate in the VIDEO condition at one time. He found that by using full audio protection earmuffs, he could keep the subjects from hearing one another's comments. He also found that by using external microphones, held close to the subject's mouth, the comments from one subject did not record on the tapes of the other subjects. The subjects were spaced about five feet apart. In this part of the experiment only four subjects were trained at a time, but it is believed that more can be trained if room space and the field of view to the video monitor are available.

Before the start of trial 2, portions of each subject's tape were listened to by the experimenter. From these tapes the experimenter was able to get a fairly good idea of how well the subjects were doing. Then the experimenter talked to the subjects about the types of comments that they had made and gave several suggestions that might improve the subjects' performance.

After the conference between subjects and experimenter, the subjects were sent out to the route for the second trial. In trial 2, the assignment was similar to that given during the first trial. Once again the subjects were to use commentary driving to pick out the information deficient locations on a route. The route was the reverse direction of travel of the route driven in trial 1. See Figure 7. As with the first trial, the driver/navigator pairs drove the route. For

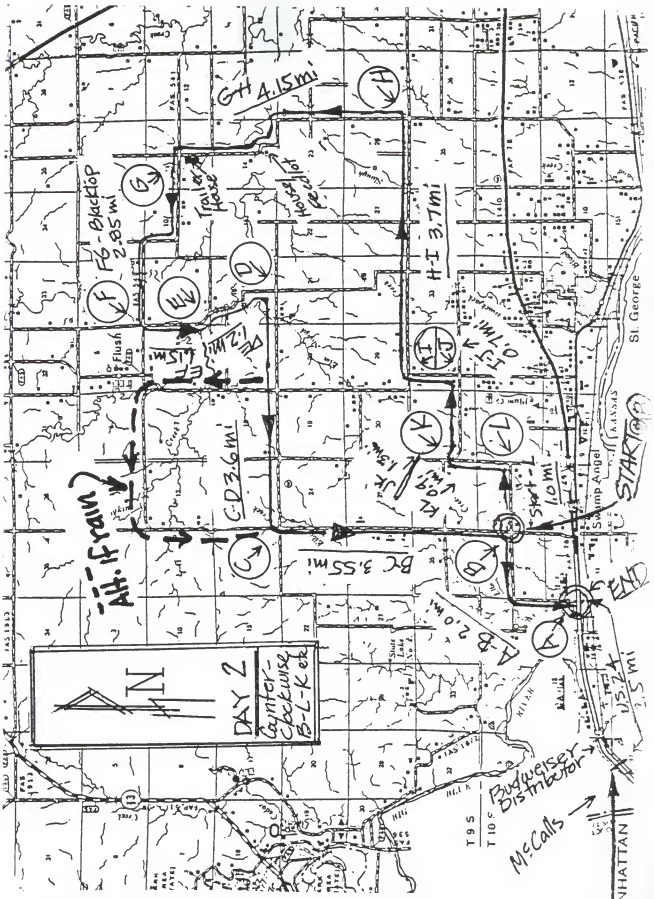

Figure 7. Route Pott. D-2 - Experiment 2 (Day 2) Spring 1985

this trial, however, the individuals responsible for doing commentary while viewing the videotape of the route in the first trial became drivers (commentators) and went out with a navigator to drive the route. Navigators were either the experimenter or someone who had previously completed this part of the experiment.

Measurement

The experimenter evaluated each subject's tape for each route and compared it to a key tape (the experimenter's evaluation of the routes). The subjects were graded according to the same criteria listed in the Measurement section of experiment I. The score was calculated for each subject by totaling the number of correct observations made and subtracting the number of errant observations, then dividing this by the total possible for each of the routes. This score reflects a subject's percentage correct observations for a route, and allows for the comparison of the performance of the participants in both directions around the route. The total possible score for the first route was 733 and for the second, reverse, route it was 798. An explanation of how the experimenter compared the subjects' tapes to his own is presented in Appendix B.

Results

As described in the earlier paragraphs, the second experiment consisted of two sections. The first section involved the use of students as subjects, while the second section used county level transportation people for subjects. In each section there were 23 subjects split into two groups which reduced the amount of data collected even further. In an effort to make the tests more sensitive, the experi-

menter felt that the data should be combined in such a way that only two conditions were left, either the subject (student or county personnel) drove the route or else he watched a video of the route. In other words, the student and county subjects were combined into one large sample within each condition.

The hypothesis for this test was that the scores for the two sets of subjects (students and county personnel), within conditions, were from the same distribution. It was assumed that the data sets are all normally distributed. The test used to determine the statistic was the F test (5).

The first set of data that was analyzed was the trial 1 scores for the VIDEO condition. The mean score for the students was 51.7 (range 37.8 to 60.4) while that of the county personnel was 51.3 (range 41.6 to 58.1). The standard deviations were 7.2 and 5.4, respectively. The calculated statistic, F, was 0.02. The critical F value with degrees of freedom, $\nu_1 = 1$, $\nu_2 = 14$ and at level $\alpha = .05$ is 4.60. Therefore since 0.02 is less than 4.60, there is no significant difference in the two samples, and the samples could be from the same distribution.

Next the sample sets from trial 2 for the VIDEO condition were analyzed. The mean score for the students was 53.5 (range 40.6 to 70.7), while the mean score of the county personnel was 61.0 (range 46.4 to 74.2). The standard deviations were 11.5 and 9.9, respectively. The calculated F was 1.68, while the critical F was 4.60 with the same parameters listed above. Again there was no significant difference in the two samples, and the two data sets were combined.

The third data set to be analyzed was from the subjects in the DRIVE condition of trial 1. The mean score for the students was 43.6

(range 31.0 to 57.3) while the mean for the county personnel was 46.6 (range 38.5 to 52.0). The standard deviations were 9.9 and 5.0, respectively. The calculated F value was 0.55. The critical F with $\nu_1 = 1$ and $\nu_2 = 13$ at $\alpha = .05$ is 4.67. Once again the samples can be combined.

The last sample that was checked for the possibility of combining the students and county personnel was the trial 2 scores for the DRIVE condition. The students mean score was 53.7 (range 28.6 to 70.5), as compared to the county personnel mean score which was 64.9 (range 44.5 to 81.3). The respective standard deviations were 13.1 and 10.4. The critical F was 4.67. The calculated F was 3.44. Therefore there was no significant difference in the two samples.

Since there was no significant difference between the two groups of subjects as noted in the four cases discussed above, the experimenter combined the two groups. The remaining analysis of data is based on the two groups of subjects being combined. Table 3 shows the reduction of the data due to the combination of subjects.

Before running the F test (5) on the combined data sets, the experimenter checked the assumption of normality using the Kolmogorov - Smirnov One-sample Test (6). The four cases tested were: case 1, VIDEO condition trial 1; case 2, VIDEO condition trial 2; case 3, DRIVE condition trial 1; and case 4, DRIVE condition trial 2. The calculated statistics were 0.0844, 0.1330, 0.0880, and 0.1160, respectively. The critical values were 0.328, for the VIDEO condition ($N = 16$, $\alpha = .05$), and 0.338, for the DRIVE condition ($N = 15$, $\alpha = .05$). Therefore since all of the calculated values were less than the respective critical values, the results of this test show that the samples can be assumed

Table 3. Subject Scores by Subject for the Combined Groups of Subjects

SUBJECT	TRIAL 1 CONDITION	TRIAL 1 SCORE (percent)	TRIAL 2 CONDITION	TRIAL 2 SCORE (percent)
1	VIDEO	37.79	DRIVE	41.73
2	VIDEO	45.70	DRIVE	50.38
3	VIDEO	46.38	DRIVE	40.60
4	VIDEO	51.71	DRIVE	56.39
5	VIDEO	53.21	DRIVE	68.92
6	VIDEO	55.80	DRIVE	51.00
7	VIDEO	56.48	DRIVE	41.60
8	VIDEO	57.71	DRIVE	70.68
9	VIDEO	60.44	DRIVE	60.28
10	VIDEO	41.61	DRIVE	67.04
11	VIDEO	49.25	DRIVE	56.02
12	VIDEO	49.80	DRIVE	70.80
13	VIDEO	51.71	DRIVE	55.76
14	VIDEO	51.71	DRIVE	46.37
15	VIDEO	56.75	DRIVE	56.52
16	VIDEO	58.12	DRIVE	74.19
17	DRIVE	30.97	DRIVE	28.57
18	DRIVE	34.79	DRIVE	53.76
19	DRIVE	38.74	DRIVE	61.40
20	DRIVE	43.66	DRIVE	51.00
21	DRIVE	44.20	DRIVE	50.38
22	DRIVE	55.66	DRIVE	60.15
23	DRIVE	57.30	DRIVE	70.55
24	DRIVE	38.47	DRIVE	44.49
25	DRIVE	40.93	DRIVE	63.78
26	DRIVE	44.75	DRIVE	63.41
27	DRIVE	45.43	DRIVE	64.04
28	DRIVE	49.25	DRIVE	62.66
29	DRIVE	50.89	DRIVE	71.68
30	DRIVE	50.89	DRIVE	81.33
31	DRIVE	51.98	DRIVE	68.17

to be normally distributed.

The first F test, using the combined subjects, was run on the data taken from the tapes of trial 1. The mean score of the VIDEO condition was 51.5 (range 37.8 to 60.4) with a standard deviation of 6.3. In contrast, the mean score of the DRIVE condition was 45.2 (range 31.0 to 57.3) with a standard deviation of 7.6. The calculated value of F was 6.43 which is greater than the critical F with degrees of freedom $\nu_1 = 1$ and $\nu_2 = 29$, and at α level .05 of 4.18. Therefore there is a significant difference between the two conditions at $\alpha = .05$. This means that, on the average, the VIDEO subjects did a better job than did the DRIVE condition subjects.

The final F test was run on the trial 2 scores for the combined subjects. The objective for taking this set of data was to draw conclusions about which of the two methods better prepares the subject for the real world environment.

The results of the F test are as follows: The mean score for the VIDEO condition was 56.8 (range 40.6 to 74.2) with a standard deviation of 11.1. In comparison, the mean score for the DRIVE condition was 59.7 (range 28.6 to 81.3) with a standard deviation of 12.7. The critical F was 4.18 with the same parameters as were listed in the previous test. The calculated F statistic was 0.47. Since 0.47 is smaller than 4.18, there is not a significant difference between the two conditions. In other words both methods equally prepare the student for the real world, i.e. prepare him to identify problem locations on the actual roadway.

In both experiments the subjects' scores were low compared to the experimenter's evaluation of the route. The reason for this is that

the experimenter wanted the tests to be as sensitive as possible. Therefore, as he listened to the tapes, he was looking for very "picky" comments that are not necessarily mandatory, but that could be made if the commentater was thinking about it at the time, i.e. the location of every crest vertical curve, where powerpoles (positive guidance (3)) switch from one side of the road to another, if the adjacent land is wooded or farm ground, etc. These comments do not really impose a constant threat to the driver but they are a part of the roadway environment.

Although the scores were low, the experimenter believes that subjects did a very satisfactory job at finding the really critical problem areas on the roads. The experimenter could go back and reanalyze the tapes without looking for the "picky" comments but he feels that the time consumed would be wasted on a trivial matter. The experimenter is convinced the subjects will be able to do an evaluation on LVR county roads that is complete and correct.

DISCUSSION

The VIDEO condition can be looked at as a simulation of the real world, while the DRIVE condition can be considered to be the real world. The VIDEO condition also provides the opportunity to create real-life situations and combinations of situations that may not be readily found on the local roads but that may confront the student somewhere later. These situations can be set up temporarily and filmed and then they can be removed so as not to pose a hazard to the drivers of the road. This allows for a multitude of "what if" situtations. The major drawback to this advantage is that it requires the road to be

closed for the taping if the temporary situation is not a permanent feature of the road environment.

The instructor has no control over what the student in the field may miss when driving the roads. The instructor can, however, control what the student sees on the videotape. For example, assume there is a sign, vital to the driver, with lettering too small to be read at the travelling speed, or that is obscured by vegetation; the instructor can capture this sign on tape so that the student realizes that there is a problem at that location. Thus the student will be made aware that such situations do exist in the real world and can come up with a corrective measure.

One major problem encountered in the DRIVE condition is the student driver getting lost. This will always be a problem with the students learning by the DRIVE condition. Even with the navigator in the vehicle the possibility of this problem exists. With videotapes of the route there is no possibility of the driver getting lost. The VIDEO condition allows the driver to concentrate on the task of learning to do commentary driving and picking out the problem locations without getting lost.

The VIDEO condition allows for the training of people in remote counties that cannot afford to send someone to some central location for the needed training. The equipment is relatively lightweight and compact. The instructor, with considerable time, can locate various routes that have the same or familiar terrain as that found in the county that he will be visiting. He can then get these routes on videotape and take them to the county with him. Then as he trains personnel from other counties with similar terrain, he can use these

same tapes. With the DRIVE condition the instructor would still have to go out several days in advance, locate routes to drive and then put on the workshop, and if he needed to visit another county he would have to go to that county and find even more routes instead of using the routes he had already found. The VIDEO condition is also independent of weather conditions present during the training period. If necessary, the videotapes can be used to train students, who are normally too busy during the daytime hours, at night.

The VIDEO condition can be used to train several people at the same time, therefore wasting less valuable time than is necessary with the DRIVE condition. The multiple person training session requires the use of full audio protection earmuffs, and would be aided by the presence of more than one video monitor. The DRIVE condition requires a separate vehicle for each driver/commentator, therefore one must take into account the added expenses incurred.

CONCLUSIONS

Results of the Study

It can be concluded that students learn to do commentary driving equally well, if not better, by watching videotapes of routes than if they were sent out in a car to do the commentary while driving the same routes. It has been proven that a student will be able to do commentary driving in a real world situation, driving the roads, even though he was trained to do the technique by watching a videotape of the route.

Based on the experience with Kansas county personnel the experimenter believes that instructors can teach the commentary driving

technique and the use of information deficient location checksheets in a 1-2 day workshop. See Table 4. This assumes the participants are experienced in the use of the LVR HANDBOOK and that the number of participants is 30 or fewer. He also believes the length of the videotape for commentaries could be reduced to about 20 - 30 minutes if various roadway sections or situations were carefully selected.

The most time consuming part of the workshop would be the evaluation of individual participant commentary tapes by the instructional staff and feedback to the participants. The evaluation would take about 10 to 15 hours of instructional staff time.

Checksheet Evaluation

The checksheets (Figures 1 and 2) are based on the concepts of decision sight distance (7,8). These particular checksheets along with others were introduced to the group of county personnel in a workshop situation. The county people were asked to look over the checksheets and then give the instructors their opinion of how useful the sheets might be. The consensus was that the checksheets were ideally suited for suggesting treatments of sites found to be information deficient. The county people also agreed that the checksheets were easily followed and self explanatory.

Use of Tape Recorders

It was found that only a short period of time was required by the subjects, in both experiments, to become relaxed while talking into the tape recorder. While listening to the tapes the experimenter noticed that most of the subjects sounded awkward in their initial comments. After about 2 or 3 minutes the subjects calmed down and there was a

Table 4. A Realistic Schedule of Activities for Teaching Commentary Driving and the Evaluation Checksheets

		Time (hours)
DAY 1		
1.	Introduction, purpose of workshop etc.	0.5
2.	Review of use of LVR HANDBOOK	1.0
3.	Introduction to commentary driving, examples, instructions for doing commentary driving from videotapes	1.0
4a.	Participants do commentaries from 20 - 30 minute tape - 2 video monitors - 5 participants/monitor Thus allow 40 minutes per group of 10 participants	2.0
b.	Evaluation of tapes by staff (2 staff members 5 hours "evening" work) (The experimenter believes he can shorten this time considerably by having the "students check the students". He hopes to check this idea in the Fall 1985 "Route Location and Design" class at K. S. U.; If this can be done the workshop can be given in a single day.)	10-15
5.	Presentation, discussion, instruction in the use of checksheets	0.5
6.	Worksession in applications of worksheets	1.0
DAY 2		
7.	Feedback on participant commentaries (general observations on commentaries; meet with any individuals having particular problems with the technique)	1.0-2.0

noticeable improvement in both the types of comments made and in the confidence and voice qualities with which these comments were made.

Other Uses

Commentary driving is a very useful technique for highway personnel in the everyday safety evaluation of their projects. Although this paper has dealt only with its use on county low volume roads in Kansas, it should be very helpful in many other situations on higher volume roads and highways. In particular the technique could well be used at work zone sites, school zones and in the evaluation of signing/warning at narrow/one-lane bridge sites.

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APPENDIX A

HANDOUTS SHOWING THE SPECIFIC INSTRUCTIONS GIVEN TO THE SUBJECTS FOR EACH OF THE EXPERIMENTS

HANDOUT FOR EXPERIMENT 1

COMMENTARY DRIVING - Lab Project - Fall 1984

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. Group 1 will drive a selected route in Riley County. Group 2 will watch a video tape of a selected route in Riley County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

   In particular:
   - classify each road (LVR HANDBOOK system)
   - state your expectancies (follow up with what happened)
   - describe the road geometry (curves, shoulders, etc.)
   - describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
   - describe any uncertainties that you might have about the road ahead
   - describe any information deficient locations

3. Carefully identify all problem locations on the provided map. Group 1 will state verbally, on the tape, the odometer readings of the problem locations. Group 2 will use the tape counter as if it were the odometer. MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING ON THE TAPE AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished. (Wednesday in Route class is fine.)

For the purpose of this experiment your class will be divided into two groups. Group 1 will consist of 7 pairs, a driver and a passenger. The driver will be the person responsible for doing the commentary. The passenger is responsible for keeping track of the problem locations on the map. Group 2 will be the remaining 7 individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point.

HANDOUT FOR SECTION I OF EXPERIMENT II

COMMENTARY DRIVING - Lab Project - Spring 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. Group 1 will drive a selected route in Riley County. Group 2 will watch a video tape of a selected route in Riley County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:
- classify each road (LVR HANDBOOK system)
- state your expectancies (follow up with what happened)
- describe the road geometry (curves, shoulders, etc.)
- describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
- describe any uncertainties that you might have about the road ahead
- describe any information deficient locations

3. Carefully identify all problem locations on the provided map. Group 1 will state verbally, on the tape, the odometer readings of the problem locations. Group 2 will use the tape counter as if it were the odometer. MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING ON THE TAPE AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished. I am in room 125A or you may put them in my mailbox in the C. E. Office.

For the purpose of this experiment your class will be divided into two groups. Group 1 will consist of 7 pairs, a driver and a passenger. The driver will be the person responsible for doing the commentary. The passenger is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. Group 2 will be the remaining 9 individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point, unless they are obvious.

HANDOUT FOR SECTION II OF EXPERIMENT II

DRIVER

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will drive a selected route in Pottawatomie County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:
classify each road (LVR HANDBOOK system)
state your expectancies (follow up with what happened)
describe the road geometry (curves, crests, shoulders, sight distance, etc. and their locations).
describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
describe any uncertainties that you might have about the road ahead
describe any information deficient locations

3. Carefully identify all problem locations on the provided map. You will state verbally, on the tape, the odometer readings of the problem locations, and other pertinent locations (start of new roads, crests, intersections, etc).

MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING, AND YOUR NAMES, ON THE TAPE, AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

Remember, you are only responsible for finding the problem locations. Do not attempt to give solutions at this point, unless they are obvious.

When driving the route, do not follow too close to another group. Drive the roads as a prudent driver would.

HANDOUT FOR SECTION II OF EXPERIMENT II

VIDEO

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will watch a video of a selected route in Pottawatomie County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:

classify each road (LVR HANDBOOK system)
state your expectancies (follow up with what happened)
describe the road geometry (curves, crests, shoulders, sight distance, etc. and their locations).
describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
describe any uncertainties that you might have about the road ahead
describe any information deficient locations

3. Carefully identify all problem locations on the tape. You will use the tape counter, on the video machine, as if it were an odometer. You will state verbally, on the tape, the tape counter readings of the problem locations, and other pertinent locations (start of new roads, crests, intersections, etc).

MAKE SURE THAT YOU STATE THE BEGINNING TAPE COUNTER READING, AND YOUR NAMES, ON THE TAPE, AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point, unless they are obvious.

HANDOUT FOR SECTION II OF EXPERIMENT II

GUIDE

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will ride in a car with a driver on a selected route in Pottawatomie County.

2. It is your responsibility to keep your driver on the correct route.

3. From time to time you will need to check the tape recorder to make sure that it is working properly.

4. Make sure that the driver states the beginning odometer reading at the beginning of the route.

5. It is very important that you keep the driver on the route. If you should become lost, backtrack to the point that you were last on the route. Identify such a problem on the tape.

6. Turn in the tape and map when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

When driving the route, do not follow too close to another group. Drive the roads as a prudent driver would.

APPENDIX B

Method Used to Compare the Subjects' Tapes to the Experimenter's Tape

Figure B1 shows two pages from a set of evaluation sheets used by the experimenter to compare the subjects' tapes to his own evaluation of the route. A separate set of evaluation sheets was used for each route in the two experiments. The method to obtain these evaluation sheets was the same for both experiments and is presented below.

The experimenter mapped out the routes by combining several segments of road, in a general area, that had information deficient locations on them. Then he made a videotape of each route taking into account each direction of travel. Special attention was given to showing the road from the same perspective that a person riding in a car would have.

After about a week, the experimenter drove the route, using commentary driving he made an evaluation tape for it. After a few more days, the experimenter listened to the tape and made a list of the situations that he had found. After setting this list aside for a few days, the experimenter watched the videotape of the route while he compared his list to it. The experimenter changed any situations that were necessary.

Using the list of situations, the experimenter decided what types of comments should be made for each situation on the route. Using these comments, the experimenter made an evaluation checksheet. This checksheet included all of the comments that the experimenter listened for on the tapes made by the subjects.

Again, after putting the checksheets aside for a week, the

Figure B-1. Example Checksheet Used to Evaluate the Subjects' Tapes

Name									
Route ID									
Classify									
Expectancy									
signing									
speeds									
curves									
Poss. Guide.									
surface									
other									
location									
Crest									
location									
expect									
actual									
speed Chg.									
maneuvers									
Culvert									
location									
type									
erosion									
markings									
correct signs									
taper									
barriers									
Jog									
Intersection									
Sight Dist.									
right									
left									
type									
signing									
path									
location									
Turn									
location									
new class									
direction									
expectancy									
speeds									
signing									
surface									
Class chg.									
location									
expectancy									
speed									
surface									

Figure B-1 (continued).

Curve-right									
expectancy									
Sight Dist.									
speed chg.									
location									
maneuvers									
Curve-left									
expectancy									
Sight Dist.									
speed chg.									
location									
maneuvers									
Curve Warning sign									
Washout-right									
Pos. Guide. switch									
Adjacent Land Use									

experimenter compared them to the videotape of the route. In addition, he drove the route and compared the sheets to it. The experimenter made any adjustments that were necessary. Then the experimenter used the checksheets to evaluate the tapes made by the subjects.

As the experimenter listened to the subjects' tapes, he was able to simply go down the list of comments and "check off" the comments as the students made them. Each comment, as listed on the checksheet, was worth one point. In rare instances when a subject made an errant observation, the experimenter wrote down a "-1" (a loss of one point). If the subject made a pertinent comment that was not on the checksheet, then the experimenter wrote down a "+1" (a gain of one point). After the experimenter listened to all of the tapes, so that no bias was introduced, the experimenter summed all of the tallies on the checksheet for each subject. Thus the score was determined.

COMMENTARY DRIVING ON LOW VOLUME RURAL ROADS: TRAINING AND USE

by

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

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1985

ABSTRACT

Two teaching methods for the technique of commentary driving were studied. The study was conducted to determine the amount of time required to teach someone the technique of commentary driving, and then to determine the effectiveness of the two alternative teaching methods. The two teaching methods were to have the students make commentaries (a) while viewing a videotape of a pre-determined route (VIDEO), or (b) while driving a pre-determined route (DRIVE).

The procedure of commentary driving is a simple field technique used in the safety evaluation of roadways. The procedure and its uses are described.

A set of checksheets, based on the concepts of decision sight distance, are introduced. These checksheets should be a valuable tool in the safety evaluation of sites that are found to be information deficient by commentary driving.

It was concluded that the commentary driving technique and the use of the information deficient location checksheets can be taught to county personnel in a 1 - 2 day workshop. It was also concluded that the VIDEO or DRIVE methods work about equally well in teaching the use of the commentary driving technique.

APPENDIX A

HANDOUTS SHOWING THE SPECIFIC INSTRUCTIONS GIVEN TO THE SUBJECTS FOR EACH OF THE EXPERIMENTS

HANDOUT FOR EXPERIMENT 1

COMMENTARY DRIVING - Lab Project - Fall 1984

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. Group 1 will drive a selected route in Riley County. Group 2 will watch a video tape of a selected route in Riley County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

   In particular:
   - classify each road (LVR HANDBOOK system)
   - state your expectancies (follow up with what happened)
   - describe the road geometry (curves, shoulders, etc.)
   - describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
   - describe any uncertainties that you might have about the road ahead
   - describe any information deficient locations

3. Carefully identify all problem locations on the provided map. Group 1 will state verbally, on the tape, the odometer readings of the problem locations. Group 2 will use the tape counter as if it were the odometer. MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING ON THE TAPE AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished. (Wednesday in Route class is fine.)

For the purpose of this experiment your class will be divided into two groups. Group 1 will consist of 7 pairs, a driver and a passenger. The driver will be the person responsible for doing the commentary. The passenger is responsible for keeping track of the problem locations on the map. Group 2 will be the remaining 7 individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point.

HANDOUT FOR SECTION I OF EXPERIMENT II

COMMENTARY DRIVING - Lab Project - Spring 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. Group 1 will drive a selected route in Riley County. Group 2 will watch a video tape of a selected route in Riley County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:
- classify each road (LVR HANDBOOK system)
- state your expectancies (follow up with what happened)
- describe the road geometry (curves, shoulders, etc.)
- describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
- describe any uncertainties that you might have about the road ahead
- describe any information deficient locations

3. Carefully identify all problem locations on the provided map. Group 1 will state verbally, on the tape, the odometer readings of the problem locations. Group 2 will use the tape counter as if it were the odometer. MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING ON THE TAPE AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished. I am in room 125A or you may put them in my mailbox in the C. E. Office.

For the purpose of this experiment your class will be divided into two groups. Group 1 will consist of 7 pairs, a driver and a passenger. The driver will be the person responsible for doing the commentary. The passenger is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. Group 2 will be the remaining 9 individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point, unless they are obvious.

HANDOUT FOR SECTION II OF EXPERIMENT II

DRIVER

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will drive a selected route in Pottawatomie County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:
classify each road (LVR HANDBOOK system)
state your expectancies (follow up with what happened)
describe the road geometry (curves, crests, shoulders, sight distance, etc. and their locations).
describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
describe any uncertainties that you might have about the road ahead
describe any information deficient locations

3. Carefully identify all problem locations on the provided map. You will state verbally, on the tape, the odometer readings of the problem locations, and other pertinent locations (start of new roads, crests, intersections, etc).

MAKE SURE THAT YOU STATE THE BEGINNING ODOMETER READING, AND YOUR NAMES, ON THE TAPE, AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape and map when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

Remember, you are only responsible for finding the problem locations. Do not attempt to give solutions at this point, unless they are obvious.

When driving the route, do not follow too close to another group. Drive the roads as a prudent driver would.

HANDOUT FOR SECTION II OF EXPERIMENT II

VIDEO

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will watch a video of a selected route in Pottawatomie County.

2. With the aid of a cassette tape recorder, use the commentary driving technique to describe the route.

In particular:

classify each road (LVR HANDBOOK system)
state your expectancies (follow up with what happened)
describe the road geometry (curves, crests, shoulders, sight distance, etc. and their locations).
describe any driver actions necessary to properly negotiate the road (speed changes, lateral movement, turns, etc.)
describe any uncertainties that you might have about the road ahead
describe any information deficient locations

3. Carefully identify all problem locations on the tape. You will use the tape counter, on the video machine, as if it were an odometer. You will state verbally, on the tape, the tape counter readings of the problem locations, and other pertinent locations (start of new roads, crests, intersections, etc).

MAKE SURE THAT YOU STATE THE BEGINNING TAPE COUNTER READING, AND YOUR NAMES, ON THE TAPE, AT THE BEGINNING OF THE ROUTE!!!!!!!!!!

4. Turn in the tape when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

Remember you are only responsible for finding the problem locations, do not attempt to give solutions at this point, unless they are obvious.

HANDOUT FOR SECTION II OF EXPERIMENT II

GUIDE

COMMENTARY DRIVING - WORKSHOP - Summer 1985

Objective: Use Commentary Driving to identify information deficient locations on a Low Volume Road.

Instructions:

1. You will ride in a car with a driver on a selected route in Pottawatomie County.

2. It is your responsibility to keep your driver on the correct route.

3. From time to time you will need to check the tape recorder to make sure that it is working properly.

4. Make sure that the driver states the beginning odometer reading at the beginning of the route.

5. It is very important that you keep the driver on the route. If you should become lost, backtrack to the point that you were last on the route. Identify such a problem on the tape.

6. Turn in the tape and map when you are finished.

For the purpose of this experiment we will divide the participants into three groups. A group of drivers, a group of guides, and a group of video watchers. Each guide will pair off with a driver. The driver will be the person responsible for doing the commentary. The guide is responsible for keeping track of the problem locations on the map, AND KEEPING THE DRIVER ON THE ROUTE. The video watchers will be the remaining individuals. These people will be responsible for doing the commentary using the video tapes.

When driving the route, do not follow too close to another group. Drive the roads as a prudent driver would.

APPENDIX B

Method Used to Compare the Subjects' Tapes to the Experimenter's Tape

Figure B1 shows two pages from a set of evaluation sheets used by the experimenter to compare the subjects' tapes to his own evaluation of the route. A separate set of evaluation sheets was used for each route in the two experiments. The method to obtain these evaluation sheets was the same for both experiments and is presented below.

The experimenter mapped out the routes by combining several segments of road, in a general area, that had information deficient locations on them. Then he made a videotape of each route taking into account each direction of travel. Special attention was given to showing the road from the same perspective that a person riding in a car would have.

After about a week, the experimenter drove the route, using commentary driving he made an evaluation tape for it. After a few more days, the experimenter listened to the tape and made a list of the situations that he had found. After setting this list aside for a few days, the experimenter watched the videotape of the route while he compared his list to it. The experimenter changed any situations that were necessary.

Using the list of situations, the experimenter decided what types of comments should be made for each situation on the route. Using these comments, the experimenter made an evaluation checksheet. This checksheet included all of the comments that the experimenter listened for on the tapes made by the subjects.

Again, after putting the checksheets aside for a week, the

Figure B-1. Example Checksheet Used to Evaluate the Subjects' Tapes

Name									
Route ID									
Classify									
Expectancy									
signing									
speeds									
curves									
Poss. Guide.									
surface									
other									
location									
Crest									
location									
expect									
actual									
speed Chg.									
maneuvers									
Culvert									
location									
type									
erosion									
markings									
correct signs									
taper									
barriers									
Jog									
Intersection									
Sight Dist.									
right									
left									
type									
signing									
path									
location									
Turn									
location									
new class									
direction									
expectancy									
speeds									
signing									
surface									
Class chg.									
location									
expectancy									
speed									
surface									

Figure B-1 (continued).

Curve-right									
expectancy									
Sight Dist.									
speed chg.									
location									
maneuvers									
Curve-left									
expectancy									
Sight Dist.									
speed chg.									
location									
maneuvers									
Curve Warning sign									
Washout-right									
Pos. Guide. switch									
Adjacent Land Use									

experimenter compared them to the videotape of the route. In addition, he drove the route and compared the sheets to it. The experimenter made any adjustments that were necessary. Then the experimenter used the checksheets to evaluate the tapes made by the subjects.

As the experimenter listened to the subjects' tapes, he was able to simply go down the list of comments and "check off" the comments as the students made them. Each comment, as listed on the checksheet, was worth one point. In rare instances when a subject made an errant observation, the experimenter wrote down a "-1" (a loss of one point). If the subject made a pertinent comment that was not on the checksheet, then the experimenter wrote down a "+1" (a gain of one point). After the experimenter listened to all of the tapes, so that no bias was introduced, the experimenter summed all of the tallies on the checksheet for each subject. Thus the score was determined.

COMMENTARY DRIVING ON LOW VOLUME RURAL ROADS: TRAINING AND USE

by

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B.S., Kansas State University

AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

Two teaching methods for the technique of commentary driving were studied. The study was conducted to determine the amount of time required to teach someone the technique of commentary driving, and then to determine the effectiveness of the two alternative teaching methods. The two teaching methods were to have the students make commentaries (a) while viewing a videotape of a pre-determined route (VIDEO), or (b) while driving a pre-determined route (DRIVE).

The procedure of commentary driving is a simple field technique used in the safety evaluation of roadways. The procedure and its uses are described.

A set of checksheets, based on the concepts of decision sight distance, are introduced. These checksheets should be a valuable tool in the safety evaluation of sites that are found to be information deficient by commentary driving.

It was concluded that the commentary driving technique and the use of the information deficient location checksheets can be taught to county personnel in a 1 - 2 day workshop. It was also concluded that the VIDEO or DRIVE methods work about equally well in teaching the use of the commentary driving technique.