

**BEI'S DRIVER SKILL ENHANCEMENT PROGRAM (D-SEP):
BRIEF REVIEW OF EXPERIMENTAL MINI-PROGRAM AND CONCLUSIONS**

Seymour M. Bogdonoff
Princeton University

Introduction

The program had its beginnings in a local group meeting to provide input to the "White House Commission on Aging", about 6 years ago. At this meeting, the author became acutely aware of the problems older people had with driving. Building on the author's twenty-five years of activities with "Drivers Education" programs on high-speed road tracks, Ref. 1, he started a research program, which continues today. Research was initiated into other driving schools and their methods, and study of the fundamental elements of driving (from many sources). The research was supplemented by data gathering on the "process of driving" (by discussions with many "experts"). There is general agreement that driving is a combination of several skills; and there are three basic elements of driving:

- a) information gathering, primarily visual
- b) cognitive processing, during which the large amount of data obtained visually is sifted to separate out what is crucial for the driving experience. A decision is made as to what should be done.
- c) physical activities of the arms and legs, to carry out the decisions reached in the cognitive process.

This process is repeated continuously as one drives, since driving is a "dynamic" process.

The BEI program is based on two premises:

- 1) P+A=a good driver. P is Preparation: what the drivers, in their cars, can actually do. A is Anticipation: the visual-cognitive process which buys time to carry out the physical activities involved in making a car perform. Anticipation is usually not consciously practiced, although carried out in some form, for all driving.
- 2) "Training and practice" will, in most cases, considerably enhance the skills required for driving.

Program Development

About three years ago, the author started testing some of the elements of the program he had assembled. In the springs of 1999, (with a colleague, Kevin Roche, then a student at Princeton University), the author extended some of the original testing. BEI (the author) carried out a program in the summer 1999 to extend the testing to a wider group under a variety of conditions. Twenty-two volunteers (20 completed the program) were involved in 2-day programs. They were selected from a group of about 40 (who responded to a written invitation) between 65-80 years old. The final group had a few younger and a few older candidates. The program was carried out in 6 sessions, with 3 or 4 students in each group, during the period of June through

September, 1999. The original concept (based on previous experience) was to lay out the driving course in a large parking area (approximately 1200' by 400'), using the usual markings of painted lines and plastic "traffic cones". However, over the past several years, the author found it more and more difficult to simulate the required configurations. The "mini-program" was carried out on part of the lightly traveled road system and several open areas at the Forrestal Research Center of Princeton University, which served more closely, the developing requirements of the full Program.

The clientele (not a "typical sample") and the results are briefly reviewed herein. More extensive discussions and details are in References 2-4. The results included some surprises (to the author), and a general validation of the full program of D-SEP. They form the basis for current work on an "improved and extended" development of the D-SEP plan for the future.

The Program

The full D-SEP Program originally included an extensive questionnaire, simulator exercises, and an interview. In the mini program, this was shortened, (because of time and financial constraints), to a brief written questionnaire and a half-hour interview (based on personal observations of gait, physical characteristics, and mental acuity in the ensuing discussion). The simulator phase of the full program was replaced by brief exercises included in the "driving phase" with the instructor (the author).

Previous work had shown some major weaknesses in the usual "traffic cone" layout of a driving course. Therefore, a great deal of effort was placed on determining how best to simulate actual driving situations. Large blocks and sheets of foam rubber and Styrofoam were used extensively, rather than "traffic cones" alone.

The mini-program was made up of two distinct elements: A) Lectures and a brief "stationary car" session on the first day. B) A second day of "in-car" instruction and practice, with short sessions in the classroom.

- A) Lectures – The initial day of the program covered a series of short lectures, which used a black board, viewgraphs, and some automobile models to describe car steering and wheel paths. Day one concluded with a "stationary car inspection", which covered tires, mirrors, and seating position.
- B) Driving Course – The second day was totally an "in car driving experience", with an instructor in the right front seat during the instruction phase. Clients made 1 or 2 laps of the "primary" driving course, (in their own cars), prompted by the instructor. The clients then were instructed to take 2 or 3 practice laps of the course, with the instructor observing part of the course to evaluate their performance. Upon completion of the practice laps, they returned to the classroom to discuss performance and problems. As agreed to by the client and instructor, the instructor could either take the client out for another lap or two of instruction, or return the client to the course to practice again. Part way through the day, depending on the client and the instructor, the instructor took the client through the "reverse" course. The process of practice, discussion with the

instructor, perhaps another lap of instruction or continued practice on the “reverse” course, was repeated.

The general course layout and exercise areas are shown in figure 1. There are essentially two courses, the “primary” one and the “reverse” course. There are several parking and open areas which were used to set up exercises.

Exercise Areas – See Figure 1, ① - ⑦.

- 1) “Area 1”: was designed for clients to determine their car’s boundaries, front, rear, and both sides. The problem is more acute with newer cars, which have fewer reference fixtures to determine (from the driver’s seat) the car’s boundaries. Results: the study found little problem with the driver being able to bring the driver side of the car close to an obstacle, but the front, back, and right side, caused considerable problems. Here, the difference between the use of traffic cones, (of any size), and bulk elements were very clear. When asked to drive a car through a gap, defined by cones, the drivers never hit the cones on the driver side, but frequently hit the cone on the right side. If the cone on the right side was replaced with a bulk element, the driver became much more conscious of the marker, and seldom ever touched the bulk element.
- 2) “Area 2”: was designed to determine the minimum U-turn the car could negotiate, and to practice parking. Results: few drivers could estimate how tight a U-turn (steering wheels locked, right or left) that their car could negotiate. The parking exercise was dedicated to two tasks: “slot parking”, and “parallel parking”. The parking slots were typically dimensioned. A curb was required to make the test appropriate, and practice made a considerable difference.
- 3) “Area 3”: was designed to practice lane changes, both right and left, and then return to the original lane. The program was laid out primarily to get the driver to concentrate on “Anticipation”. Results: Few clients were able to negotiate this exercise without instruction and practice.
- 4) “Area 4” was designed to check “gap” estimation and to practice ABS initiation. It took place along the straight section of the road following exercise Area 3. A gap had to be negotiated (traveling faster than in exercise 1). Also, along this section of road, ABS was exercised. Results: the use of cones versus bulk elements made a significant difference in the “gap” test. Also, it was clear that most drivers had never really activated ABS. The right leg thrust (no pumping) was something that had to be gone over again and again.
- 5) “Area 5”: was designed to force the client to back up along a straight section of the road, around a 90⁰ corner, to another straight section. It emphasized the use of the side view and rear view mirrors. Results: most clients had considerable difficulty.
- 6) “Area 6”: Serpentine – was designed as a series of curves (some tighter than the minimum U-turn capacity of the cars). It was designed primarily to force Anticipation. Results: training and practice helped considerably.

- 7) “Area 7”: Slalom course – with block elements at both ends, changing to cones of unequal spacing in the middle. This, again, was designed to foster Anticipation. Results: similar to exercise 6).

The observation of the client’s driving alone, by the instructor, was limited to certain areas of the driving course. At the end of the day, all clients returned to the classroom for review, comments, etc. and a written evaluation of the program. There were small differences between the groups and the driving course as the program continued. The changes in the course were limited to the replacement of cones by bulk elements or sheets.

Remarks and Conclusions

Primary observations (the author):

- 1) Most drivers in the program had never practiced with ABS, although, most cars had it. Most people were amazed how fast their cars could be stopped, once they learned how to use ABS.
- 2) The “stationary car” review was included, in the original concept, as a “quick introduction”. The author found that it requires much more time and is much more important than originally considered.
- 3) There’s no question, in the author’s mind, that the drivers performed quite differently with the instructor in the car versus their practice sessions alone. Since most driving will be done alone, this poses a problem for instructors. There was a clear difference in driving when cones were used to define the driving course, as compared to the use of bulk elements (which clearly are much more realistic).

Specific details

- 1) Training and practice are a major aid in improving performance.
- 2) Training and practice with ABS is critical. Almost all clients were either “tentative” or “pumped” the brakes.
- 3) It is very difficult for most drivers to determine the right front corner of their car. Most seemed to be helped by a rod taped to the bumper.

Future activities

- 1) Written manuals, for both the clients and the instructors, are required.
- 2) The author found it is impossible to decrease the time needed for instruction and practice. Thus, the classical training (with an instructor) and practice techniques will be very expensive to implement in the full program.
- 3) Further examination of instrumenting the car and the driving course holds the potential to significantly reduce the cost of the program.

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References

1. Approximately 100 “Driver’s Education” sessions on road tracks in the eastern United States, i.e. Watkins Glen, Mid-Ohio, Road Atlanta, Mosspoint (Canada), Lime Rock, etc.
2. Seymour M. Bogdonoff BEI’s Driver Skill Enhancement Program (D-SEP) – Brief Outline of the program and comments April 1999 BEI – 000
3. Kevin Roche BEI Driver Skill Enhancement Mimi-Program, summer 1999 Summary and evaluation March 20, 2000 BEI – 001
4. Seymour M. Bogdonoff BEI’s Driver Skill Enhancement Program – (D-SEP) – 1999 Experimental Mini-Program and Conclusions May 201 BEI – 002