

SECOND SESSION

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AAA Foundation for Traffic Safety, Presiding

LAW, HIGHWAY ACCIDENTS AND RESEARCH

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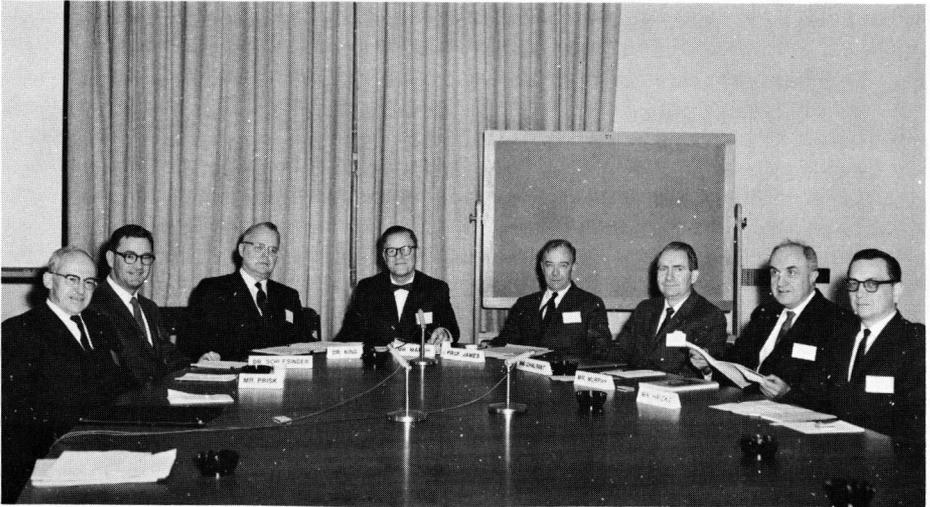
There is, I have been told, increasing reliance being placed on medical evidence in the formulation of standards for legislation, supporting administrative action, determining accident causes according to the principle that legal liability goes with negligent conduct, and in determining the extent of personal injury attributable to traffic accidents. This is clearly a subject area that calls for greatly increased research activity. There is a requirement for reliable data in the medical and behavioral sciences to provide a directly relevant and sound factual basis for such medical evidence.

If laws and medicine are to work far more closely in the future in this area—and this appears to be essential if we are going to reduce the great number of fatal and nonfatal moving motor-vehicle accidents—we should become better acquainted professionally. We should each learn about the problems and the concepts of our colleagues in the different collaborating professions and disciplines. This is a prerequisite to an attempt to relate and coordinate our activities toward the common goal of reducing traffic deaths, injuries, and property damage.

This report then, is designed to present the general scope of the public-health and medical activities in the prevention and control of accidental injuries, and the amelioration of the seriousness of the consequences when injuries occur. It will present some of the concepts of the life sciences which are recognized as relevant to injury prevention. I hope that some elements of the medical and public-health problems will serve to stimulate the expression of professional viewpoints of the attorneys, motor-vehicle administrators, engineers, and legislators participating in this colloquy.¹

I have received a strong impression that I am expected to include comments on physical and mental fitness for drivers, and on alcohol and driving. I accept these assignments. In turn, I ask permission to discuss such things as alertness, motivation, and communication as elements common to all our approaches—medical, legal, and administrative—to safeguard the health and property of the public from accidents.

¹ Some questions which were anticipated by an attorney who was kind enough to review the material in this draft are shown in the Appendix



Second Session (left to right): Charles Prisk, U. S. Bureau of Public Roads; Dr. Lawrence Schlesinger, George Washington University; Dr. Barry G. King, U. S. Public Health Service; Burton W. Marsh, AAA Foundation for Traffic Safety; Fleming James, Jr., Yale Law School; Milo Chalfant, Michigan Department of State; Joseph Murphy, D. C. Motor Vehicle Department; and Andrew Hricko, Insurance Institute for Highway Safety.

Extending Horizons

The incantation "education, engineering, and enforcement" was for many years the proprietary remedy confidently recommended by those concerned with accident prevention. Unfortunately, this did not make accidents "go away." It is apparent that we must have knowledge of causal factors and their interrelation as a substantial base for education. There must be a sufficient knowledge of man (e.g., the extent of his capacities, behavioral characteristics, physical dimensions, and stress tolerances) as a substantial basis for engineering design and construction of devices intended to be safe for use by man. We have to have laws and ordinances that accomplish their intended purpose—this requirement is the subject of a refreshing and stimulating article by an attorney and municipal judge.² Thus "education, engineering, and enforcement" represent only an incomplete categorization of types of measures for prevention and control of accidents. Further, such a concept restricts imagination and comprehensive treatment of the accident prevention problem.

We are now more sophisticated in our approach. We emphasize factual knowledge and understanding as prerequisites to effective control programs. We must also emphasize utilization of the art and ingenuity essential for application of control measures once they have been developed.

If we are to make real advances in the research and technical aspects of the problem, we will have to agree not to establish boundaries which would limit those in pursuit of the knowledge and understanding necessary for solution of

² Isaacson, I., "A New Approach to Accident Prevention," Reprinted from the *Lewiston Evening Journal*, Aug. 1-5, 1961.

problems in their own technical field. At the same time, let us try to apply our primary effort in the areas of our competence, even when the solution to problems appears to be "obviously" far simpler—and "the grass much greener"—than in the subject areas in which we have special knowledge and experience.

The term "interdisciplinary approach to accident prevention" is a familiar one and indicates recognition that many professional, technical, and administrative specialists are essential for significant advancement. For this, each specialist can work alone on one aspect of an accident control program as a part of an effort coordinated by planning and free exchange of information by the collaborating investigators. Alternatively, various specialists can organize themselves into a team and, as such, work together on a common problem. I hesitate to list disciplines which can contribute in the interdisciplinary approach since I, too, may restrict imagination. However, I think we know that they include engineering, epidemiology, statistics, the medical, behavioral, social and political sciences, economics, jurisprudence, education, religion, journalism, operations research, and a more recent arrival into the technical constellation—management science.

Public Health and Medical Participation

The concept of disease and injury as resulting from interaction of the host, the agent, and the environment is a useful one. The primary frame of reference for public health and medical activities is the host factor, specifically with respect to injury, impairment, and death. Accordingly, it is necessary to develop knowledge relevant to the host's ability to escape involvement in potentially hazardous situations; i.e., accident avoidance, minimizing injury when involved in an accident, and amelioration of the consequences of injury when it occurs.

In the first category—avoidance—we are concerned with studies of man's body measurements, his motor and sensory capacities, i.e., ranges of capabilities; higher functions of the nervous system such as interpretation, integration and decision; knowledge and experience; the physiological and psychological condition such as motivation, alertness, attention, anxiety, fear, and anger at critical moments; degradation of sensory, motor, and intellectual capacities by alcohol, drugs, disease, and other stresses, and, finally, with the resulting performance or behavior—the extent to which he exercises his capacities as influenced by knowledge and biological state or condition.

In minimization of injury, we are concerned not only with the performance or behavior during the period of involvement but also with human tolerances to the single or the combination of stresses which may be acting.

In the third category—amelioration of the consequences of injury—we are concerned with the timeliness and adequacy of medical care. This involves the acquisition, transport, and emergency care of the patient, his course through the chain of medical management; and medical rehabilitation in the event of an impairment or disability.

It is necessary to develop prevention or control measures which are both feasible and appropriate for the population, the environment, and special circumstances or conditions which may pertain.

What are the control measures which are within the capability and are characteristic of public-health and medical methods? Such remedial measures include.

Mass Communication for dissemination of information for prevention and control of injury.

Directed communication to selected individuals and groups.

Motivation.

Education, training, and response conditioning for injury prevention.

Emergency medical services.

Medical regimens: nutritional adjustments, surgical restorative measures, medication, disease control regimens, psychiatry, physical conditioning, and extension of capability for compensatory responses.

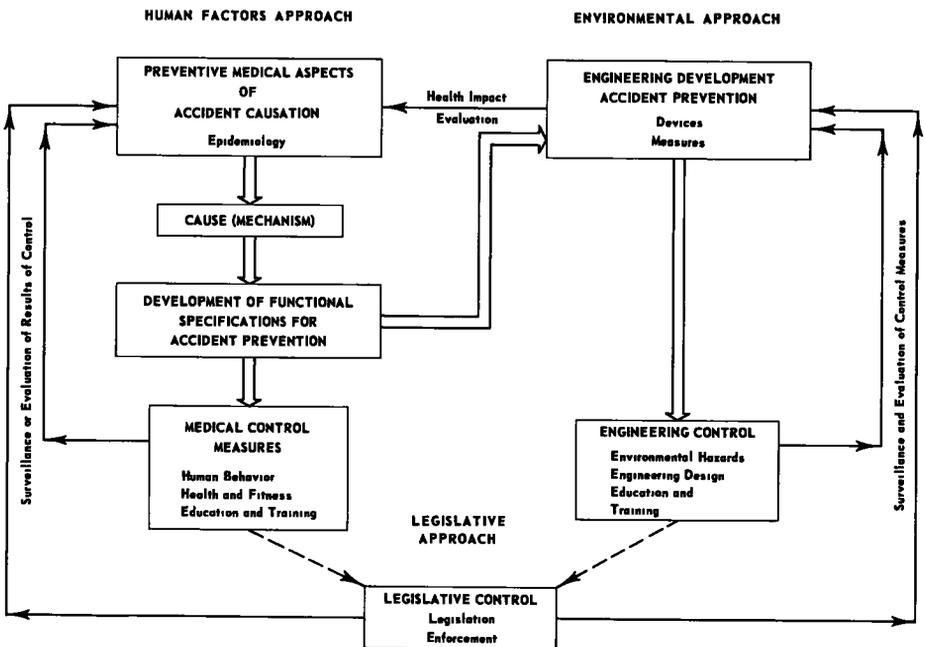
There is, in addition, a large measure of medical consultation for administration, management and instruction which would supplement the more conventional educational and training activities. Examples include:

Engineering solutions for public protection based upon the functional specifications for human requirements.³

Personal protective devices or equipment designed to meet functional specifications of human requirements.

Engineering review and analysis of specifications for structures and devices, or existing structures and devices, to determine that adequate physical characteristics such as strength, dimensions, energy dissipating characteristics, ease of maintenance, and use-instructions are provided for.

³ What are functional specifications for human requirements? They are intended to answer the following questions: What is the nature and extent of protection required? What are the limits in terms of time, force, complexity, amount, and role that must be considered in the engineering design? That is, in summary, specifications to insure compatibility with man's capability, physical, physiological, and psychological characteristics



Schema—Interrelation of approaches to accident prevention

One additional comment should be made in regard to scope before proceeding. The primary frame of reference for the colloquy is the motor vehicle. A listing of specific problem areas in prevention of moving motor-vehicle injuries would be appropriate—but it would not be feasible to read out such a list here. I can, however, refer you to reports by Goldstein^{4,5} and Fox⁶ which will provide examples of research problems confronting us.

Interrelations of an approach to accident prevention are illustrated in the accompanying schema.

ALCOHOL

It can be accepted as a fact that at some concentration within the body, alcohol affects driving adversely. Information on how alcohol is absorbed into the body and how it acts physiologically and psychologically contributes to the basis of decisions in legislation, enforcement, and motor-vehicle administration. For example, knowledge of the distribution of alcohol, with respect to concentration and time after being taken into the body, is important for interpreting the results of alcohol tests and relating the quantitative measurements to capability and behavior. Here, the interest is twofold. First, how alcohol is generally taken up following ingestion, and how it generally acts. Second, in the case of a specific individual at a specific time, what variables can influence the absorption and the actions of alcohol?

Routes of Entry

Alcohol can be absorbed through the membranes lining the mouth, stomach, small intestine, and colon; through the lungs by inhalation; from the subcutaneous tissues upon injection in moderate concentration, and reabsorbed from the bladder when urine concentration exceeds that of the blood. While all these possible paths of entry should be recognized, the stomach usually absorbs about 20 percent of ingested alcohol and the intestinal tract the remainder.⁷

The entry into the body of alcohol by means other than digestion would, of course, have implications for enforcement procedure. Harger and Hulpieu report the results of some investigations on absorption through the skin and through the lungs.⁸

Analyses of blood samples, taken at intervals during nine hours, failed to reveal any blood alcohol in subjects whose legs were swathed in cotton soaked in 200 cc of 95 percent alcohol and covered to prevent evaporation. Animal experiments, however, did show appreciable alcohol concentration following application of tincture of iodine to shaved, scarified skin of guinea pigs. In the inhalation studies on man, it was concluded that it would require about 10 hours, breathing two or three times the normal volume per minute of air containing 0.8 to 0.9 percent alcohol vapor, for the subject's blood alcohol to reach a concentration of 0.15 percent.

⁴ Goldstein, L G, "Human Variables in Traffic Accidents," Highway Research Board, Bibliography 31, Div of Eng and Indus Res, National Academy of Sciences-National Research Council, Washington, 1962

⁵ Goldstein, L G, "Whither Accident Research," *Traffic Safety Research Review*, 7, No 1, 1963

⁶ Fox, B H, "Some Miscellaneous Assessments in the Drinking-Driving Problem," *Alcohol and Traffic Safety*, U S Public Health Service Publication No 1043, 1963

⁷ Goodman, L and Gilman, A, *The Pharmacological Basis of Therapeutics*, (2d ed) Macmillan, New York, 1955

⁸ Harger, R N, and Hulpieu, H R, "The Pharmacology of Alcohol," *Alcoholism*, edited by G N Thompson, Springfield, Ill, Charles C Thomas, 1956

Absorption

Alcohol diffuses readily. According to the laws of diffusion, the greater the concentration of alcohol in the digestive tract, the more rapid the absorption. The concentration is determined by that of the beverage ingested and its subsequent dilution. Low concentrations of alcohol *per se* increase secretion of hydrochloric acid secreting cells of the stomach; high concentrations increase the secretion of mucus. Thus, both favor dilution. In beverages, however, extractives or cogeners may reduce secretions.

Food in the stomach tends to reduce the concentration directly as a diluent, and by its effect on gastric secretions. Some foods may influence the rate of absorption of alcohol by delaying the passage of the stomach contents into the intestine where the major portion is taken up. Tuoven has reported reduction in maximum blood alcohol when stewed beef or boiled potatoes are taken with alcohol; this reduction is greater than occurs when the food is taken before alcohol.

Alcohol passes directly through the lining of the digestive tract without change in chemical composition. Dubowski states that at the alcohol-distribution equilibrium the alcohol concentration in the body fluids and tissues is proportional to the water content.⁹ This is what would be expected in a diffusion process since alcohol and water are miscible. However, a gradient in concentration in fluids or tissues would be expected under conditions in which loss of alcohol can occur. For example, the concentration in blood drawn from a vein may be less than that in an artery. This is because the blood loses some alcohol as it passes through the lungs and some as it passes through the capillaries to flow into the veins. Absorption may continue for several hours when several drinks are taken, and for about 45 to 90 minutes after the last drink. The peak blood level may occur between 30 and 90 minutes after a single administration depending on the amount ingested.¹⁰ Blood concentration of alcohol is the resultant of absorption, its distribution throughout the body, oxidation, and excretion through the lungs and kidneys. Thus, there is a rise, a maximum peak or plateau, and then a fall in blood alcohol levels

Elimination

Ninety or more percent of the alcohol is burned in the liver with water and carbon dioxide as end products. The remainder is excreted. The rate of elimination of alcohol is independent of concentration down to the 0.005 to 0.010 percent (Dubowski, citing Mellanby, 1919, and Westerfield and Schulman, 1959). This means that the mechanisms for elimination are working at a maximum and can only eliminate so much alcohol per unit of time with the higher concentrations. When large amounts of alcohol are ingested, oxidation may not be complete—acetaldehyde and acetic acid are excreted in the urine. Unoxidized alcohol is also excreted by the kidneys. Values for oxidation of alcohol in the postabsorptive state are about 10 cc per hour (Mellanby). Blood alcohol clearances may vary widely; e.g., 0.006 to 0.040 percent per hour (Abele, cited by Dubowski).

⁹ Dubowski, K M, "Alcohol Determination—Some Physiological and Metabolic Considerations," *Alcohol and Traffic Safety*, edited by B H Fox and J H Fox, U S Public Health Service Publication No 1043, 1963

¹⁰ Fox, B H, "Some Miscellaneous Assessments in the Drinking-Driving Problem," *Alcohol and Traffic Safety*, U S Public Health Service Publication No 1043, 1963

The rate of oxidation may be influenced by concurrent digestion and metabolism of other foodstuffs, but this problem is as yet unsettled. However, Widmark, whose work has been confirmed by other investigators, found that the clearance rate in the postabsorptive state is sufficiently constant (13 mg/100 cc/hr) so that by determining blood alcohol, either the total amount in the body or the blood concentration at a prior time could be calculated (cited by Harger and Hulpieu). So far, we do not have data that would demonstrate a significant influence of disease, other than its influence on overall metabolism, on the blood-alcohol clearance curve.

Effects of Alcohol on Man

Alcohol, after absorption in sufficient amounts, affects nearly every body tissue. It is a primary and continuous depressant of the nervous system.¹¹ Like other general anesthetics, there may be an excitement stage as the lower centers of the brain are freed of the higher inhibitory control mechanisms. There is little margin between anesthetic and fatal doses. (This raises the question of death from alcohol *per se* among fatalities in moving motor-vehicle accidents.)

Alcohol interferes with the utilization of available oxygen; intoxication is a form of histotoxic anoxia.

The effects of alcohol at given blood-alcohol levels, within certain limits, depend not only on the individual, but also the circumstances—including the influence of others and that of the environment. At the higher levels, the effects show less evidence of variability in the fact that performance is degraded. With blood-alcohol levels between 0.15 and 0.25 percent, the clinical evidence of being under the influence of alcohol is generally sufficiently convincing to most physicians for the purposes of medical diagnosis. There is, however, always the question of bias—for the most part an unintentional and unconscious bias—when rendering medical decision on “being under the influence” following arrest. This may account for differences in medical opinion of the physicians reported in the Liljestrand study cited by Borkenstein, et al.¹² There was marked disagreement between two physicians on the percentage of cases with blood-alcohol levels at 0.10 to 0.20 “under the influence.”

The considerable variation in individual behavior at various alcohol levels has greatly complicated the problem of driving and drinking. I believe at least four points warrant emphasis in this regard.

1. Many of the experimental studies attempting to measure sensory or motor responses or both are subject to criticism for technical reasons.

2. Where experiments are well designed and conducted, there remains the problem of interpretation and importance (for traffic safety) of the findings. The development of highly sensitive methods of measurement and the detection of statistically significant differences, however small, constitute real challenges to the investigator. The fact that a measurable change has occurred in a sensory response does not necessarily establish that the change is of practical (as contrasted with statistical) significance in behavior or performance. The investigator, gratified at his success in measurement, should and will report it. He may

¹¹ Goodman, L. and Gilman, A., *The Pharmacological Basis of Therapeutics*, (2nd ed), Macmillan, New York, 1955

¹² Borkenstein, R. F., Trubitt, H. J., and Lease, R. J., “Problems of Enforcement and Prosecution,” *Alcohol and Traffic Safety*, U.S. Public Health Service Publication No. 1043, 1963

view his study as a very sensitive test for detecting the earliest possible effects on the nervous system, for example. Those with less scientific knowledge and experience, however, attempt to interpret the results as constituting evidence of a performance decrement. For the most part, the effects demonstrable in a group of subjects are of little help in determining the effects on a specific individual at a specific time.

3. The matter of relevancy must also be considered. Is the specific sensory-response used or related to the specific task under consideration? Does it represent maximum capability, or would it be increased or decreased under altered circumstances?

4. All biological as well as physical experimental measurement *per se* involve perturbation. In many experimental laboratory situations the experimenter occupies too great an area in the field of measurement and tends to amplify the true value; i.e., accentuate the effect. This is not a result of lack of objectivity of the experimenter himself, but may occur by virtue of interaction of subjects with the experimenter—the interpersonal factor.¹³

Some Assessments of Status of Knowledge

In spite of the large gray area of uncertainty with respect to capability and performance over about half the range of blood alcohol concentrations compatible with life, we are getting closer to a statement of the problem of the driving task and of drinking driving performance. Fox has made some assessments of research findings, and concludes: "that a case has been made for the logical picture that alcohol in amounts above a certain hazy range on the order of 0.5 percent is the cause of increased accidents and injuries on the road," but hastens to warn that "even if a perfect case were made logically, we would need hard data about driving behavior on the road of the kind that people do in real life." He cites as things we know: "(a) increase in variability of speed, (b) more variable steering movements, (c) changes in simple reaction time, (d) decrease in perception and complex reaction times, (e) decrease in motor skills and (f) increased sleepiness."

These are considered with respect to performance and adjustment to emergencies. Predictions as to consequences of these changes for driving performance should be made with the clear realization that they are inferences—and not to be reconstituted as "fact" by successive repetition. For example, in considering excessively greater variability in steering and speed behavior, it could be inferred to be "on the face of it more dangerous." Those who varied toward excessive speed might be more likely to have an accident. Those who crept along might be less likely to have an accident, but alternatively, unexpected demand on reaction in an emergency might increase the danger of an accident. These inferences, however, remain to be proved.

Immediately relevant to the subject of the colloquy are his comments on the statistical implications of certain laws and ordinances:

"When we consider behavior on the road . . . , we find that there is great overlap between performance with and without alcohol. The major question here may be: Is the separation of performance in the two conditions so great

¹³ King, B G, *A Critique—Mass Communications for Safety*, Presented at the Safety Communications Study Symposium, Denver, 1963

that performance with certain levels of alcohol will lead to unacceptable danger to the public?"

* * *

"(1) Variation in general terms exists within the same person and between people. (2) There is overlap in performance among people who have and have not drunk alcohol. This leads to a basic problem in legal philosophy. (3) Many regulatory laws have been passed on the theory that the danger to a few on a few occasions justifies rules applying to many occasions which prevent injury or danger on those few occasions. Some are based on engineering and some on intuitive grounds. All such rules imply someone's decision process as to a balance between greatest permissible danger (or least permissible safety requirement) and such things as cost, ease of enforcement, public acceptance, and the like. (4) The same situation exists in the case of drinking and driving, or speeding."

* * *

"From the above development, it is relatively easy to make the next jump. If this is the case with speeding, for example, why should it not be so with alcohol level? In both cases, some people did not endanger lives because their skill in driving was greater than the skill of the group that did. Should this lead to a definition of the illegal act as drinking to a certain blood level, followed by driving? Should this alone be the illegal act, rather than intoxication or alcohol influence leading to degraded performance [based upon statistical information available]?"

* * *

"I submit that the statistical nature of some regulations and ordinances would be added to the points already considered by others."

PHYSICAL STANDARDS

I have avoided including the heading, "driver licensing," in the section heading since this is far too comprehensive a subject, involves areas outside the realm of public health and medicine, and requires specialized knowledge in the fields of economics, legislation, and public administration.

Two statements by Paul V. Joliet with respect to medical condition and driving provide a useful frame of reference for the present discussion. "There will come a time in the life of some of us when we will become disabled to such a degree that we will no longer be able to drive with reasonable safety. Those who become so disabled should not have a driver's license," and "The goal we seek is a selective procedure which will make licensing an efficient screen to separate safe drivers from drivers unsafe because of medical conditions."¹⁴

R. A. McFarland has stated that there have been no experimental research findings which demonstrate that drivers with any disease have greater accident rates than those of a matched group without disease.¹⁵ This situation is not unique to traffic accidents. In a report in 1959, A. P. Iskrant, referring to all

¹⁴ Joliet, P V, Concluding Remarks, Presented at the National Conference on Medical Aspects of Driver Safety and Driver Licensing, Chicago, Nov 18, 1964

¹⁵ McFarland, R A, "The Epidemiology of Accidents," *Accident Prevention*, prepared under direction of Program Area Comm., Am Public Health Ass'n, with cooperation of the Public Health Service, Dept of Health, Education, and Welfare, McGraw-Hill, 1961

types of accidents, stated that sensory deficiencies, organic disease, and physical defects influence the occurrence of accident and/or ensuing injuries and/or consequent disability and death. He emphasized that the exact role of the individual conditions or deficiencies in their effects on accidents is not clear.¹⁶ The conditions or combination of conditions which affect the accident potential is speculative.

It is not known, and may not be possible to know, just how important disease and impairment may be in contributing to accident involvement, influencing the outcome of an accident when it occurs, or in determining the seriousness of the consequences of injury when one occurs

There is, however, a firm point of departure. These are physical disabilities which interfere with or make an individual unable to operate a motor vehicle. There are conditions involving loss of consciousness, and hence loss of control of the vehicle; there are mental conditions which are so extreme that the deficit or impairment prevents the performance of tasks essential in driving.

In the case of physical disabilities, the assessment of functional capability of the driver under specified conditions of operation, traffic, etc., can be determined by direct test. It has not been considered essential in the past to involve medical determination. I do not know whether this might have certain legal implications. I mention it only because at this conference we are trying to learn more about one another's problem areas. Certainly, the subsequent driving experience of those with disabilities who are tested and licensed should be determined. This would appear to be a worthwhile area of research collaboration by physicians, medical and behavioral scientists who are knowledgeable about the extent and prognosis of the condition and about physical and behavioral compensations for the impairment, and by the public administrators and enforcement officers who have responsibility for decisions with respect to the nature and conduct of the test and denying the license.

Sudden incapacitation by loss of consciousness or other reasons falls directly into the area of medical problems. Studies have been reported which determined the prevalence of cardiovascular impairment, epilepsy, "black out" spells, and nervous and metabolic conditions among populations of drivers. In one study involving over 27,000 drivers who had accidents, there was no evidence that sudden incapacitation had occurred or that the condition and the accidents were causally related.¹⁷ In another, the recorded histories and the results of physical examination of a group admitted to a hospital emergency ward because of accidental trauma and those of another group admitted to emergency for nontraumatic conditions during the same period were reviewed; concomitant disease was considered to be causally related to trauma in 8.2 percent of 355 cases.¹⁸

In another report, a physician states that he accumulated newspaper reports of over 100 instances of death of a driver at the wheel attributed to heart failure occurring in New York City within the period of a year. This was without systematic examination of his customary daily paper. A large number of these

¹⁶ Iskrant, A. P., "Relationship Between Medical Conditions and Accidental Injuries," 1959 Governor's Traffic Safety Conference, Sacramento

¹⁷ Cannon, B. W., "Inattention Blamed in Majority of Auto Mishaps," *Medical Tribune*, Nov 21, 1960

¹⁸ Tannebaum, C. S., "The Relation of Concomitant Disease to the Occurrence and Management of Trauma," *Amer J Surg* 95 897, 1958

reports were probably completed without medical evidence.¹⁹ Even when autopsies are performed there is some question as to whether the medical condition caused the accident or whether the accident aggravated the existing condition and may have resulted in the sudden incapacitation. In spite of the fact that it is logical to assume that sudden incapacitation and accidents may be causally related, we must depend solely upon case histories as evidence that sudden incapacitation does result in accidental injury. R. A. McFarland²⁰ provides some such case histories. He cites 46 instances of a driver losing consciousness while operating buses of the London Transport System during an 11-year period. In the calculated value of approximately 220,000 "driver years" this would amount to one such instance every 10 months. Of the 46 cases, unconsciousness resulted in accidents in 26. Myocardial infarction was found in 14 of the drivers who lost consciousness at the wheel. Two of the vehicles were stationary at the time of the attack. In another 12 cases of loss of consciousness, the driver had sufficient warning to be able to stop without accident in seven instances but was involved in accidents in the other five.

In contrast to physical impairments, conditions involving sudden incapacitation, disease, and mental and emotional conditions cannot be effectively evaluated with respect to fitness to operate a motor vehicle by means of a driving test. It is frequently the fate of a physician to be questioned as to the likelihood of an individual's condition becoming disabling during the performance of a given task. It is not uncommonly his lot to be asked to show that not only is a condition adverse to the interest of public safety present but also that as a result the applicant would indeed become involved in an accident.

This latter requirement has imposed an insupportable burden on many physicians in earlier years when they were called to appear at official hearings on medical certification of airplane pilots.

Physicians are concerned not only with disease and impairment as such but are also necessarily involved in the problems of the effect of medication on driving capability and performance.

Steps have been and are being taken by physicians to provide medical guidelines in determining fitness to drive a motor vehicle.²¹ In addition, A National Conference on Medical Aspects of Driver Safety and Driver Licensing, cosponsored by the Public Health Service, the American Medical Association, and The American Association of Motor Vehicle Administrators, was held in Chicago in 1964. Activities such as these have provided general guidance with respect to medical conditions and driving.

It has been my personal observation that physicians are reluctant to render clinical judgment with respect to an individual on the basis of the existence of a condition *per se*. I have, for example, attempted to obtain judgments concerning the probable outcome of hypothetical cases of trauma and poisoning. Clinical judgment concerning a specific case is based upon a multitude of variables which the experienced physician appears to use as "inputs" to his mental "computer."

¹⁹ Smith, J. E., "Comments on Heart Cases in Transportation," *Conference Proceedings of Second Highway Safety Research Correlation Conference*, Nat'l Acad Sci -Nat'l Res Coun Pub No 328, Sec 316, 1954

²⁰ McFarland, R. A., "Research—Driver Capability," Presented at Nat'l Conference on Medical Aspects of Driver Safety and Driver Licensing, Chicago, 1964

²¹ Committee on Medical Aspects of Automobile Injuries and Deaths of the American Medical Association, *Medical Guide for Physicians in Determining Fitness to Drive a Motor Vehicle*, J A M A, 169-1195, 1959

Thus full exploitation of professional judgments requires examination or at least reasonably comprehensive information about a real life case. This can and is being accomplished by the use of medical advisory committees to provide medical consultation to motor-vehicle administrators on the medical fitness of specific drivers.

It has been said that medical factors in accident causation "is an area—because of the very tardy recognition of its importance—in which there is very little basic information upon which to construct a specific plan of procedure." Yet, quite understandably, those responsible for licensing want and expect a specific plan of medical collaboration or participation upon which definitive action programs can be based.

It is not unreasonable to assume that insurance companies share with the physician, the legislator, and the public administrator an interest in medical conditions of drivers.

When exploring ideas for discussions at this colloquy, I asked Dr. Netherton if ineligibility for life insurance would influence eligibility for casualty insurance. After inquiries among motor-vehicle administrators and insurance people, he reported that: "There appears to be no attempt, either by casualty insurers or motor-vehicle administrators, to correlate eligibility for life insurance and eligibility for casualty insurance for driver licensing. Motor vehicle departments do not ask license applicants whether they have ever been denied life insurance, although they do ask about physical defects either in general terms or as to certain specific conditions." The insurance companies' reasoning, if it is truly representative, is: "Insurers say that 10 years ago they might have made greater effort to correlate life insurability and casualty insurability, but progress in the control of physical conditions (such as heart disease and diabetic blackouts) has reduced the risk of unforeseeable disability to the point where it can be accepted by the insurers. With the risk thus minimized, the insurers are willing to pay the relatively rare claim that arises, and the motor-vehicle administrators are willing to grant licenses to drive."

The point of interest here is that insurance as well as medical standards, legislation, enforcement, and liability are all parts of the traffic safety system and as such must be considered. The fact that the decision criteria differ in different parts of the system simply makes our problem more complex. Again: "Under their very broad authority to screen and test applicants for driver licenses, motor-vehicle administrators may require various medical examinations and other tests to determine fitness. All motor-vehicle departments maintain records on licensees known to have physical conditions (such as diabetes and epilepsy) which require that the driver's license be limited. Accordingly, when the question of insurability to comply with State financial responsibility laws is raised, private insurers make use of the motor-vehicle administrator's records and powers to assist in determining what action should be taken. Where information on an application for casualty insurance reveals a known or suspected physical condition which may warrant limiting the applicant's driving license, the insurer usually requests the motor-vehicle administrator to certify the applicant's eligibility." The administrator can refer the applicant to a medical board for testing and/or review of medical files; the casualty company could then act in accordance with the board's determination.

As for the matter of availability of information concerning medical conditions, first, the American Medical Association, Committee on Medical Aspects of Automobile Injuries and Deaths, tells physicians that they should advise the patients to report any condition, which might make it inadvisable for them to drive, on their next application for renewal.

"If this information is not reported on the application and the applicant subsequently becomes involved in an accident to which the condition either directly or indirectly may be a contributing cause, in many States the insurance company may legally refuse liability."²²

The response will then depend upon the patient; if he does report, considerable time may elapse unless his condition becomes known as the result of an accident or violation.

As a final item of interest in looking at parts of our traffic-safety systems—again reported by Netherton, "Most motor-vehicle departments are now developing systems for using computers to process and store driver license and vehicle registration data. So far, however, medical data (except routine matters such as requirements that glasses be worn while driving) have not been included in the systems of automatic-data processing. It is considered that this type of information must still be processed 'by hand' and judgments made individually, 'case by case'."

The difficulties that face a research investigator in problems of medical standards are indeed formidable.

ALERTNESS, MOTIVATION, AND INJURY CONTROL MEASURES

The success of many if not all alternative approaches to prevention and control of accidental injury depends to a large extent upon the alertness and motivation of those we are trying to protect. Lehr points out that environmental safeguards are most likely to accomplish their intended purpose if used in combination with control measures based upon education and motivation²³

Great emphasis is placed upon safety exhortations via television, radio, the press, and posters designed to motivate individuals to adhere to safety practices. Biological factors are equally important in gaining public support for legislation and public compliance with laws and ordinances once they have been enacted.²⁴ Alertness and motivation are, without question, of major importance in education and for compliance to medical regimens.

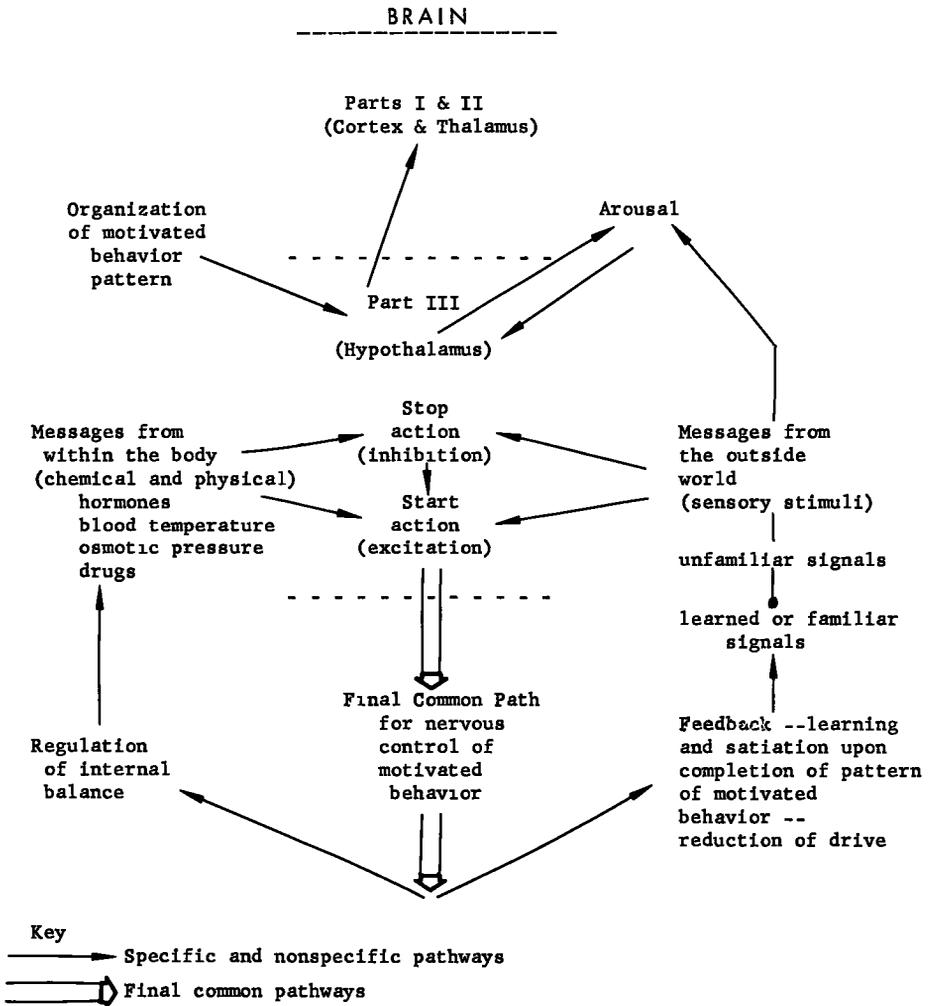
As a physiologist, I look for the implications of the basic and clinical medical science research for accident prevention. In this case, I think there is material that is especially relevant. Further, I believe it will afford some satisfaction to a number of you to examine a possible biological basis for some of the concepts you hold as a result of your observations on the effectiveness or lack of effectiveness of various laws, ordinances, and enforcement measures.

In a recent review of motivation theory, Berlyne states, "To attack motiva-

²² Committee on Medical Aspects of Automobile Injuries and Deaths of the American Medical Association, *Medical Guide for Physicians in Determining Fitness to Drive a Motor Vehicle*, JAMA, 169-1195, 1959

²³ Lehr, E L, "Accident Prevention—An Opportunity and a Challenge," *J Environ Health*, 27 1, 1964

²⁴ King, B G, "National Philosophy of Safety," *The Role of Human Factors in Accident Prevention*, Freeman, F, Goshen, C E, and King, B G, prepared for the Division of Accident Prevention, (Contract SAph 73670) Public Health Service, Dept Health, Education and Welfare, 1960



Drive and arousal, organization and control factor for motivated behavior

tional problems means to seek factors that govern the organism's degree of alertness and activation, that bias the organism toward certain forms of behavior, and that determine what events will provide reinforcement for learning processes and how effectively."²⁵

Advances in scientific research in recent years have yielded information on biological structures associated with alertness and motivation, further, they have helped to develop an understanding of how these structures function.²⁶

In our discussion we will be concerned primarily with three parts of the brain

²⁵ Berlyne, D. E., "A Decade of Motivation Theory," *American Scientist*, 52 4, 1964

²⁶ Stellar, E., "Drive and Motivation," *Handbook of Physiology*, Section 1—Neurophysiology, Vol 3, Physiol Soc, Washington, D. C., 1960

and two principal connecting systems.²⁷ These are the sites concerned with alerting and activating, with manifestation of certain forms of behavior, and with learning processes. Let's review a concept of how such a system works. Reference to the accompanying diagram may be helpful in understanding the system.

First, it is assumed that motivated behavior will involve an adequate degree of conscious alertness, activated or energized higher centers, and initiation of various patterns of response. This requires that stimuli or messages from the outside world and from the muscles and the various organs of the body be conveyed to the brain by both direct and indirect (nonspecific) nerve pathways acting together. There are, of course, various degrees of alerting. The return to consciousness from sleep is called arousal, a higher level of alertness, favoring perception and appropriate response, is called conscious alertness. The alerting process is associated with the activation, energizing various areas of centers and bringing about a pattern of response which we may call behavior.

Let us start with some familiar concepts involving alertness and activation as the result of messages arising from within the body. These are associated with what is called "self regulatory behavior." We know that hunger, thirst, and sex urge bring about appropriate responses in animals—we used to call this instinctive behavior. "Instinct" referred to the intensity of the behavior, i e., called for a high level of activity. Now we use the term "drive." It is important for relating all this to the subject of prevention and control of accidental injury that we recognize that these messages, traveling over the appropriate pathways, are highly significant for the condition and ultimately for the survival of the individual and the species. The messages related to important consequences "get through" to the appropriate centers—they start action. When the drives are reduced by satiation—the stop-action messages also "get through."

Let us now consider what happens to messages from the outside world, apply the concepts to man and consider another manifestation of drive. Here again, concurrent activity of both the specific and nonspecific pathways is necessary. You can demonstrate that a message can reach the highest level of the brain when a man is anesthetized and unconscious. Simply shine a light in his eye and pick up the electrical impulse on the cerebral center with suitable instrumentation. This does not result in arousal, alerting, or activation because the nonspecific pathway (at least the necessary part of it) is inactivated by anaesthesia.

This nonspecific pathway is highly selective in transmitting only messages which are unfamiliar to us, or messages which are both familiar and significant. It could be visualized as a system with filters which pass only certain frequency bands.

Consider the unfamiliar or unlearned signal. There is no basis of experience for determining whether an unfamiliar message is associated with an event that may have a beneficial or adverse effect. It "gets through" to the higher center bringing about alerting and activation involving perception, integration, decision, and perhaps action. If the message has no consequence, and hence no significance, it soon begins to be filtered out. When repeated, they are discounted and do not reach the level of consciousness. For example, we soon learn to disregard

²⁷ The structures referred to are the cerebral cortex, the thalamus, the hypothalamus, and the specific and nonspecific afferent pathways

familiar noises—we do not attend to the usual sounds of the city or country in which we live.

What happens if a previous experience has established that the message is associated with significant consequences? If it is, it “gets through.”

There are familiar examples of the phenomenon. While we disregard customary noises at night, we are aroused by breaking glass or unexplained footsteps. A mother may be alerted by the cry of a baby.

We do not disregard the sound of a police siren behind us on the highway. Neither do we disregard a marked police car. We have learned, or have been conditioned, to associate these messages with things that are important to us. Not only does the message “get through” but it biases our pattern of behavior. Once we establish a satisfactory response or behavior pattern, this pattern is reinforced as long as it is adequately successful. The drive for motivated behavior—or if you wish “motivation”—is increased. There is also evidence that satisfactory performance of a pattern of motivated behavior reduces drive for the time being. It is like a message—“mission accomplished—relax.” This involves not only the drive for specific behavior, but also the drive evoking general restlessness and nonspecific activity. The result is a comfortable feeling.

Further, we are just beginning to realize that the higher animals, including man, display many activities which are difficult to relate to familiar motives involving readily apparent rewards and punishments. The activities seem to be influenced by curiosity, novelty, and complexity of the external stimulation. These factors seem to be capable “of generating the kind of disturbance that motivates behavior and promotes acquisition of newly learned responses reconciling discordant reactions.”²⁸

We have also learned that there are structures in the areas of the brain with which we are concerned whose stimulation has effects which are closely similar to external rewards and punishments.

I believe that what I have attempted to explain in terms of neurophysiology and psychology is consistent with your own observations of your and other approaches to safety.

Implications for Accidental Injury Control Measures

We can summarize this concept of motivated behavior as follows:

1. In order to alert individuals and activate them for response, communications of any sort must convey information that a totally unfamiliar situation exists or that the information is familiar and is of importance.

2. The communications will bias the pattern of behavior. Where the behavior results in reward or avoidance of undesirable consequences, it is reinforced and drive is increased, and the behavior may be said to be highly motivated.

3. Some people can attribute significance to communications by learning specifics or values of certain behavioral patterns from others. We can deal with abstractions and maintain standards even when our immediate experience provides re-enforcement only occasionally, if ever.

If there are, indeed, biological principles, mechanisms, or laws, they will continue without change or relaxation. It is necessary, then, that we remain constantly aware of them, evaluate the compatibility of our accidental injury control

²⁸ Berlyne, D. E., “A Decade of Motivation Theory,” *American Scientist*, 52 4, 1964

measures with respect to them, and seek means to exploit these biological principles to their fullest extent.

Happily, we are beginning to recognize the inadequacy of many of our approaches in the past. Netherton points out the ineffectiveness of tort laws as applied for rehabilitation of the wrongdoer in motor-vehicle accidents and stresses, as a requirement for effective legislation, that its effect must be felt directly on the unsafe driver.²⁹

Moynihan,³⁰ O'Connell,³¹ and Isaacson,³² among others, point out that there are traffic laws which fail to accomplish their intended purpose to prevent accidents as well as control movement of traffic. They do not have moral sanctity in themselves³³ or logical appeal to bring about internal drive and behavior motivated by determination to avoid accidents.

We are attempting to understand the problem of communication of safety messages. This is evidenced by the National Safety Council, Symposium on Mass Communications Research for Safety, sponsored jointly by the Council, government and industry.³⁴

Earlier sections of this presentation were concerned with research relevant to driving and drinking and medical standards—to develop measures which will accomplish their intended purpose and have significance for the individual.

Some of the effective measures which will be developed will be re-enforced by obvious, immediate, and inevitable consequences.

Others will depend upon indirect re-enforcement or at best only occasional re-enforcement, but this again will depend on the extent the approach is significant with respect to logic, morals, ethics, and ultimate benefit. An especially difficult task lies before us in developing and maintaining an adequate level of drive for motivation with sound motor-vehicle operation behavior patterns. Here drive and behavior does not involve a single decision, but rather one which has to be made over and over again each time ultimate benefit is contrasted with immediate significance or importance for the individual.

An article on civil defense, in a recent edition of the *Scientific American*, includes a statement that applies equally well to all other types of messages as to safety and health in preventive medicine: "Indeed, in virtually no society is there any precedent for maintaining a large portion of a civilian population over a long time in trained readiness for a threatening event with a low probability of occurrence."³⁵

Future success in accidental injury control measures will depend upon facing up to our problem as it exists and undertaking the necessary research to develop understanding, and feasible and appropriate control measures.

²⁹ Netherton, R, *Highway Safety Under Differing Types of Liability Laws*, Ohio State Law J, 15 110, 1954

³⁰ Moynihan, D P, "Public Health and Traffic Safety," *International Road Safety and Traffic Review*, Summer, 1960

³¹ O'Connell, J, "Taming the Automobile," *Northwestern University Law Review*, 58 3, July-Aug, 1963

³² Isaacson, I, "A New Approach to Accident Prevention," Reprinted from the *Lewiston Evening Journal*, Aug 1-5, 1961

³³ Isaacson, I, "A New Approach to Accident Prevention," Reprinted from the *Lewiston Evening Journal*, Aug 1-5, 1961

³⁴ National Safety Council, *The Denver Symposium on Mass Communications Research for Safety*, edited by Murray Blumenthal, Chicago, 1964

³⁵ Waskow, A I, "The Sheltered-centered Society," *Sci Amer*, 206 46, 1962

APPENDIX

What is the relation of physical standards to the problem of determining fault for accidents?

Can we equate scientific test results to the basic problem of formulating generally applicable rules of conduct (re alcohol)?

Social view regarding acceptability of drinking does not deal in the same precise standards used by scientific tests. For purposes of legal standards, does this suggest that the old "objective symptoms" are more reliable for determining driving impairment? If not more reliable in the scientific sense, then more realistic in the social sense?

Should we recognize effects of certain physical conditions in determining existence of negligence? Should it be cause for requiring higher level of financial responsibility for drivers with certain types of physical defects? Should there be a "physical fitness rating" for all drivers?

Does legislation tend to motivate general public acceptance of safety practices, e.g., liability insurance for taxi drivers, seat belts in government vehicles? Which comes first, public acceptance, then legislation, or vice versa? Do we accept standards more readily if it involves cost and other manner of compliance by others—not by us?

Do standards expressed in legislation affect national philosophy of safety as it develops in the minds of juries? Do standards expressed in legislation influence thinking in relating thinking or behavior to that of a "reasonable man?"

Consider the motivational aspects of our "point system" under which a motorist can watch his point standing as he drives. Does this motivate him any more successfully than a system where he is not told in advance what scale the administrator is using to determine when his license shall be suspended? How about economic incentives for safer driving which the law authorizes through the insurance rates and the security features of the financial responsibility laws? (British insurance "no claim" discounts ran from 10 percent the first year to 25 or 33 percent the fourth year.)³⁶

How valid is the premise that traffic laws and enforcement practices should be designed to instill good driving habits generally rather than protect against specific, clear, and present dangers?

What about the vaguely disturbing feeling resulting from the costliness and inconvenience of settling an accident claim? The "nuisance value" of becoming involved in an accident may also represent a nonrational factor which works in opposition to our rational and logical concept of the legal procedure established for settling accident claims.

Here, again, we seem to be running parallel to the problem suggested by your concept of a "national philosophy of safety." If the national philosophy based on continued tension is not effective, where should our approach be directed? Should "habit forming" be our objective in law? If so, we need to study more closely the capabilities of the legal system to perform this function. In this regard, we should also ask whether formal legislation is the best method, or would it be better to use case law as formulated by juries reflecting the attitudes of the "reasonable man?"

³⁶ Netherton, R., "Highway Safety Under Different Types of Liability Laws," *Ohio State Law J.*, 15 110, 1954

ADDENDUM

Just after completing this presentation, I heard William G. Johnson, general manager of the National Safety Council, present a summary and a film on a newly developed Driver Improvement Course.

The course establishes as a major principle the preventable accident—one in which the driver did or did not do everything he reasonably could have done to prevent the accident. This appears to be directly relevant to the subject of this colloquy. It may be possible to find an effective method of communication which will get this “message through” and help motivate the additional vigilance and good driving practices needed. Could preventability be stressed as a tenet of a reasonable man? Some may respond on the basis of morality or social standards, others might be affected by having to share in the fault with respect to their license or perhaps at some future time in liability—perhaps this might suggest a new approach to be considered in legislation.

COMMENTARY

PROFESSOR FLEMING JAMES, JR.
Yale Law School

These studies of the human factors in causing accidents are directed primarily toward accident prevention, and I have not done any particular work in that field. But they do, nevertheless, raise some legal questions. While these are also not in my field, but in criminal law, administrative law and evidence, there are some things about them that interest me. If, for example, scientific research can isolate characteristics, physical or mental or both, which will tend to make a person an accident repeater—we used to say “accident prone”—and if tests can detect that condition, then certain questions of law arise.

The main question, I presume, would be whether to exclude from the highway those persons whom the tests show to be accident causers. This can be attempted by denying them a license to drive, or by revocation of a license after the condition is discovered. At least in the present stage of the science, one difficulty is that a course of action like that would exclude many drivers who would not in fact have accidents, and many more who would have no more accidents than chance would ordinarily allot to an individual's share. In other words, you cannot pinpoint accurately the accident causers.

Thus, serious problems are raised for the legislator or the administrator. Some of these problems are political, for it would be virtually impossible politically for either an administrator or a legislature to have licensing statutes that were so strict that they served only safety. The popular resistance to this would be too great. This certainly is a matter which should be studied, but it is not primarily the lawyer's study.

There are also constitutional difficulties, and along with the ones that already have been mentioned one other should be noted. Several speakers have already brought out the point that a license to drive is no longer regarded as a naked privilege which the sovereign can revoke by a simple action. In this respect the courts are simply reflecting what is a strong general feeling. Driving an auto-

mobile is an integral part of modern life generally, and it is bound to be treated by the courts with respect and something of a right—not an unqualified right, but *something* of that nature. If this is true, it leads to due process questions that are beyond the procedural ones previously mentioned. It certainly means that there is a right to a hearing, and so on, but it also means that the courts are probably going to strike down legislation or administrative rulings which they regard as being unreasonable and arbitrary. Certainly this is an area for lawyers to study, for this touches the lawyer's art very deeply.

In thus working out the areas of constitutionally permissible action, it will be well, also, if the other disciplines could be joined with the law in this type of study. If, for example, you have a driver licensing statute, it is always going to be a little broader than the need. The question is how much broader can it be without becoming unreasonable.

There is also the relationship that Dr. King has pointed out between the characteristics of legislation and the internal drive or motivation. Lawyers realize this, I think, in a general way. Certainly the Noble Experiment that some of us in my generation remember points this out. But I do not think that lawyers are going to be able to make any peculiarly valuable contribution as to where this line should be drawn. That matter does not pertain to the lawyer's art; it is something that we have to learn from the sciences. Lawyers ought to be very anxious to cooperate with scientific research in this process, but they probably should not try to be the leaders in this matter.

As for the rest, insofar as accident prevention goes, I can see some of these implications. In the first place, as more is learned about the kind of behavior that causes accidents, the question is how far should a court or legislature go in prohibiting it. Dr. King pointed up the question very neatly in connection with alcohol. There are two possibilities. Everywhere we have on the books statutes which make it a criminal offense to drive while under the influence of alcohol or drugs. Should we move this to a more specific standard, dealing in, for example, blood content? Or should it be left in these broader terms? Here is a problem with respect to which lawyers, physiologists, and people from social science disciplines should cooperate.

Another question which calls for cooperation among the disciplines deals with the kinds of evidence that might be received. This is pointed up by studies made in connection with alcohol tests and human capacities.

Still another question might be put in terms of civil rights. How far should the law go in subjecting persons to tests—alcohol tests, blood tests, etc.—and in putting on people some kind of pressure or compulsion to submit to these tests when they are involved in an accident or arrested for a violation? These are all problems that, as far as I can see, lawyers can help work out, but they will need a good deal of help.

This is as far as I think I had better go into a field in which I have no claim to special competence. My main concern in my professional life has been with the question of how to administer losses that have already occurred. This is not primarily a question of accident prevention, but a question of what to do about the consequences of accidents that have occurred.

The traditional method of the Common Law, which is still very much with us in this field even though it is regarded as passé, was the tort action—the civil action for damages for a tort. Originally the tort action was between neighbor

and neighbor, one user of a highway and another. Here the only solution the law offered was either to leave the loss where it fell on the injured party, or shift it entirely to the other party. These were the only two alternatives that the law then saw. But before the law would make the defendant pay for the plaintiff's loss, it came to insist on fault.

This was actually a refinement, for originally the law called for strict liability. Social Darwinism of the Nineteenth Century felt that it was both unfair and impolitic to burden affirmative activity with liability unless the actor was at fault in causing the injury. That is the tradition that came down to us in this century and the tradition which the automobile law inherited from the horse and buggy days. And the fault that would make it fair to hold a man liable was something that had the flavor, at least, of personal moral shortcoming. In accident cases this was negligence, which meant generally the failure to meet a reasonable and attainable standard of conduct, a failure to do what a reasonably prudent man would have done under the circumstances.

But it was decided fairly early in the Nineteenth Century (about 1830 or 1840) that a person would be held to an objective standard of care, that is the standard of care that the reasonably prudent man would have observed under the circumstances shown by the evidence. The defendant's own individual mental or emotional shortcomings—his personal equation, as it was popularly called—was to be disregarded, largely, perhaps, because of the impossibility of measuring those idiosyncrasies that made up the personal equation. This, in turn, meant that people who were substandard in some way might be held liable in damages for failure to meet a standard of conduct which they could not in fact attain. If one were dumber, more awkward or hasty than the reasonably prudent man and he acted to the best of own personal gifts, he still might have been held liable for not coming up to this community average. In such case, liability would not rest on ethical fault, but would be imposed for a consequence which the actor could not help, given his own emotional and physiological makeup.

As research into the human factors that cause accidents progresses, it becomes increasingly possible to measure the traits of individual actors and to tell more surely whether they have performed in any given situation as well as could be expected of them in the light of their own individual makeups. It would appear, no doubt, that much substandard conduct in accident situations does not reflect moral shortcomings, but shortcomings of some other kind—physiological, personality, physical, etc. The question will then arise whether the existing, largely objective, standards should be replaced by some geared more closely to the individual's own capacities, and thus refine the fault notion. But I wonder whether we really want to make the matter of compensation to injured parties entirely dependent on real moral fault. What it would do would be to deny compensation to the victims injured by the extra hazards of substandard groups like the learner, the young, and the old. In other words, it compels the victims to subsidize the extra hazards which society permits by allowing substandard groups to drive at all.

This raises the still further question of whether even objective fault—unreasonably dangerous conduct as objectively determined—is a sound basis for civil liability, i.e., for determining whether a motor-vehicle accident victim is to be compensated.

For example, Dr. King pointed out that licensing authorities today will give restricted licenses to people with heart conditions, diabetes, and epilepsy when these conditions are under reasonable control. Surely such people can hardly be guilty of fault in driving with official sanction based on a finding that the risk is not unreasonable. But even when such conditions are controlled, they will occasionally produce blackouts and accidents. Should the victims of these accidents be denied recovery because the driver was not at fault? Should they pay with their injuries for society's choice to allow these people to drive—a choice in which the victim may have taken no part whatever?

Another factor which makes fault somewhat artificial as a determinant of accident liability is that the people who pay for tort recoveries today are largely innocent absentees—not the participants in the accident who may have been at fault. When the faulty driver is an employee, it is his employer or his employer's insurer who will pay. If it is an individual with liability insurance, it is his insurer. If it is an uninsured individual, usually he is judgment proof and nobody pays. In the days when it was the defendant who paid a judgment out of his own pocket, it made a good deal of sense and fairness to condition liability on the defendant's personal fault. But in these days of vicarious atonement by absentees, that justification has largely disappeared.

It still remains to consider whether basing liability on fault will make a serious contribution to accident prevention. The deterrent effect of tort liability has always been assumed and has been accepted as one of the proper objectives of tort law. But I know of no studies which tend to prove that it is an effective promoter of safety in the motor-vehicle accident field, where each actor is an active participant in the risk and has his own neck at stake anyway. Here again it must be recalled that the actors—the drivers—are not the ones who actually pay. This does not necessarily remove deterrence; it may effectively be employed by the employer or the insurer who does have to pay.

One further important point should be noted. If fault should be abandoned as the basis for accident liability, the move would be not away from liability, but rather toward strict liability. And if liability is an inducement to safety at all, strict liability—which would require a perfect score to avoid payment—may well be a greater inducement than the present scheme where the actor has a chance to escape paying for an injury he causes.

DISCUSSION

MILO W. CHALFANT, *Chief*

Driver Improvement Control, Michigan Department of State

Motor-vehicle administration operates within a framework of enabling legislation which is both specific and general in direction. This administration is an essential and complex process, serving the operation of the motor-vehicle transportation system which is vital to our national economy. The continual growth of the system creates new and increasing management problems in need of research.

Dr. King pointed out such a need in his discussion of the medical conditions which impair the performance of tasks essential to driving. The laws grant

broad responsibility on the part of licensing officials to rule off the highways those persons who are unsafe to drive. Yet there is a great shortage of information upon which to make such decisions. Desirable information could be furnished by school counselors, physicians, insurance companies and others in business and industry. Licensing officials have been handicapped with inadequate storage facilities and lack of reporting of medical conditions.

The availability of electronic equipment can solve the storage problem, but a better system must be devised for the reporting of desirable medical information in making determinations of persons' capabilities of driving. Such information is generally considered as being privileged or confidential, although its disclosure is essential to public welfare.

Professor James pointed out a problem which is equally important to the prevention of accidents, namely, the compensation of accident victims. The question of administering the losses which have already occurred has been of great concern since the Columbia Study in 1930, although an ideal solution to the problem has not been formulated into legislation. This is a good example of an area in which further legal research is needed.

Motor-vehicle administrative legislation has created many problems which require remedial study, experimentation, and evaluation. Dealing with the unlicensed driver or the person driving after a license has been withdrawn is such a problem. Hopefully, an interdisciplinary approach could result in a solution.

Drafting of problem-solving legislation is of vital importance. Too often a jurisdiction "borrows" a law without discovery as to whether the law can solve the problem. Experimentation of legal administrative devices for problem solving is too often neglected. The "point system" is an example of one of the most nonuniform laws in existence. Surely, one law is better than another, but how could any administrator or legislator know the best requisites of such a law.

Our laws dealing with the ownership and use of motor vehicles must be better known and their objectives better understood if they are to serve the motorists fully. Motor-vehicle and traffic laws must be analyzed, their deficiencies identified and appropriate corrective action taken.

ANDREW HRICKO, *Attorney*
Insurance Institute for Highway Safety

I shall direct my remarks to what might be called research into practical penalties that can be adopted by the state legislatures and applied by the courts.

For example, in the case of prosecutions for driving while under the influence of intoxicants, some statistics indicate that the defendant has a better than 50-50 chance of being let off. In other cases the charge is reduced by the authorities to reckless driving or public drunkenness. It has been advanced that the main reasons for these reductions in charges and dismissal of cases is that juries assume the attitude of "There, but for the grace of God, go I."

Research may be in order to determine exactly what penalty for this type of offense a defendant's "peers" will accept. Increased fines and imprisonment, coupled with loss of operating privilege, do not appear to work as either a deterrent to the offender or a just penalty for juries to impose.

This type of research could be expanded to the entire penal provisions of motor-vehicle codes. What is a just penalty for speeding or reckless driving? In

this modern auto age what do motorists consider just punishment for an offense? What penalties will have a deterring effect on their driving habits?

Fines and imprisonment have been the time honored method of imposing penalties on errant citizens. These punishments have been carried down from the criminal law for larceny, assault and battery, etc. Changes appear to be needed to update punishment to fit the crime. What type of punishment? No one really knows; research I am sure could throw some light on this subject.

DR. LAWRENCE E. SCHLESINGER, *Director*
Driver Behavior Research Project
The George Washington University

Motivation to comply with traffic laws and regulations may be one of the most significant human factors related to traffic accidents. Studies of the relationship between a variety of human factors and accident involvement have shown that the frequency of traffic law violations has one of the highest correlations with participation in accidents. These motivational factors may then constitute major determinants not only of the level of safe driving of particular individuals but of the level of safety of the vehicular transportation system as a whole.

For motivation to comply with the law reflects the characteristics of the driver, the enforcement system and the relationship between them. Put simply, the relationship between the driver and the legal system is a social exchange. Most drivers tend to "give" in the form of compliance as much as they "get" in the form of safety, predictability and convenience. Some drivers try to gain more than they receive. These are the habitual traffic offenders. Other drivers tend to comply with the system perhaps beyond the point of fair return. These are the compulsive compliers who never attempt to beat the system.

To understand these individual differences in attitude toward traffic law, as well as the general level of motivation to comply with traffic law, let us turn to a more formal analysis of the motivational patterns in individuals and the conditions necessary in the legal system to elicit these motivational patterns. Most of us could, and would willingly, describe the traffic laws and their enforcement in both highly colorful and emotional terms. The description that follows is much flatter, but hopefully more useful as an analytic tool for identifying the research needs in this area. Five motivational patterns, their consequences, and the conditions necessary to elicit them are examined.

1.—ROLE COMPLIANCE OR CONFORMITY TO SYSTEM NORMS

Conformity to the rules of driving is a significant motivating factor for certain types of driving behavior. Though people may conform for many different reasons, and the degree of conformity to the rules may vary, one basis for driving performance is the general desire to perform according to the norms that have been established.

1.1—*Consequences for Performance*

A great deal of driving behavior can be predicted simply from a knowledge of the rules. The major impact of compliance with the legitimate rules of driving influences is mainly the person's ability to obtain a driver's license, and perform

dependably and predictably according to rule specifications. The standards insure minimal performance of driving requirements. If the rules were to become more stringent, they would become unenforceable. Obviously, compliance does not apply to the area of behavior covering spontaneous voluntary behavior on the part of the driver, as rules cannot cover the complexity of conditions encountered.

1.2—*Conditions Influencing Rule Acceptance*

Motivation to follow the rules is influenced by two sets of conditions: (1) characteristics of the rules as they are experienced by the driver, and (2) individual differences in motivation to comply. Characteristics of the rules that influence their effectiveness are their source, credibility, clarity, fairness, and reinforcement.

Source of the Rules.—The acceptance of the rules as a basis for driver action depends upon his accepting the authority of the rule-makers and enforcers. Generally, the driver will accept rules that he sees as emanating from a source whose authority he respects. Since driving rules are made and enforced by a variety of sources, the relationship between rules and source is probably a matter of considerable confusion. The extent to which these rules are seen as emanating from a credible trustworthy, expert source, concerned with the driver's well being must vary considerably. The rules are usually communicated to the driver impersonally via a driver's guide to motor-vehicle law, and signs and signals. They are enforced by a variety of sources, including the police, judiciary, motor-vehicle administrators, and sometimes insurance companies, which utilize violation and accident records in assigning insurance costs.

The authoritativeness of the rules is also influenced considerably by the mode of administration. The more dignified, unhurried, thorough and serious driver examination communicates to the driver the importance of the ritual and of his knowledge and willingness to comply with the rules and regulations. Similarly the nature of the police apprehension, traffic court, and judicial proceedings, communicates to the driver the authoritativeness of the rule system and its significance to the enforcing agents.

Another way in which acceptance of the rules is modified by their enforcers is in the consistency and impersonality of their enforcement. Agreement among enforcement agencies in the import of a rule will increase its acceptance whereas disagreement will decrease its acceptance. The driver whose case is thrown out of court by the judge who "can't understand why the police bring such ridiculous cases to court" is understandably less motivated to follow such rules. Similarly, speed laws and directives not enforced by police, who may feel that "traffic engineers put up a lot of silly signs and then expect us to enforce them," contribute to weakened motivation to comply.

Another requirement for acceptance of rules is their impersonal character. The driver who feels that punishment for breaking the rules is evaded by portions of the population is less motivated.

Credibility.—A related condition for the acceptance of legal norms is the belief that the rules are in fact relevant to the objectives of traffic flow and safety. Drivers who believe that following the rules will protect them and enable traffic to move more smoothly and efficiently are more motivated to comply. The status of many of the driving rules with respect to their efficacy is suspect both from the point of view of evaluative data, and in the opinion of the driver himself. The driver who is caught in a radar speed trap often feels that enforcement is

more relevant to the economic condition of the arresting jurisdiction than it is to safety.

Clarity.—Laws can be so ambiguous and inconsistent that people may simply not know what the law is, or be amazed to find the differences that prevail as they move from one jurisdiction to another. The patchwork of variability in signs and signals, motor-vehicle regulations, and the confusion of statutes undermines the legitimacy basis of compliance.

Reinforcement.—To maintain the internalized acceptance of legitimate authority there has to be some reinforcement in the form of penalties for violations of the rules. If there is no policing of laws governing speeding, speed limits will lose their force over time for many people. The concept of law as an imperative binding upon everyone in the system requires penalties for violation. Where there is no enforcement, the rule in question becomes a dead letter.

Summary, Conditions Conducive to Rule Acceptance.—Improvement in the characteristics of the rules depends largely upon the institutions responsible for their development and implementation. It seems clear that the number of separate institutions that have developed to control drivers legally are not currently capable of that task. To some extent, the chaos of institutional management is reflected in driver motivation to comply.

1.3—*Individual Differences in Compliance Motivation*

In our society we build up during the course of the socialization process a generalized expectation of conforming to the recognized rules of the game. This readiness to play almost any given role according to the established norms in these systems in which we become involved obviously differs systematically. Several studies indicate that drivers who break the rules in other social areas are also rule breakers on the road, as indicated by their violation and accident records. Younger persons, who have had less socializing experience are also less likely to be motivated to follow the rules than older persons. Some other data indicate that females are more likely to be rule compliant than males. Since readiness to follow the rules is related to the benefits of having learned to follow the rules, it would be expected that socio-economic status and compliance were highly correlated.

2.—INSTRUMENTAL REWARDS OF DRIVING

Clearly the major motivations for driving are the benefits that accrue from having the use of an automobile. The benefits of using a private vehicle for driving to and from work, for shopping, for social visits and pleasure are available to all drivers. These rewards are instrumental in that they provide incentives for becoming a driver and meet some of the needs that people have.

2.1—*Instrumental Rewards and Performance*

Instrumental rewards will motivate drivers to want to become drivers who meet minimum standards of performance. The more attractive the benefits of driving, the more the person should be motivated to meet the requirements for remaining a licensed driver. The benefits of driving depend on whether driving is a means of livelihood, a necessary convenience, or simply a hobby. Companies that employ professional drivers have noted that performance on-the-job is superior to the driver's performance off-the-job. The benefits of driving are considered

so important that efforts to raise the standards of performance are unlikely to be successful if they are used to keep people from driving. Physical mobility via the private vehicle is regarded as a prerequisite to many aspects of social life.

2.2—Conditions Conducive to Effective System Rewards

Since the benefits of driving are so great, it might seem reasonable to raise the standards of performance on the reasonable assumption that drivers will be motivated to perform more dependably in order to maintain access to these rewards. A number of difficulties, technical and social, prevent raising standards. The fact that we want drivers to be safe and efficient seems plausible, but at present we have no effective means of determining either of these driver attributes. If we wanted to use accident-involvement as a measure of safe driving, as a means of eliminating unsafe drivers from the road, we would find that accident involvement of the driver is not a highly stable characteristic. Accident status in one period of time is not highly related to accident status at another period of time. Nor do we have a measure of efficient driving.

Safe and efficient driving has proved itself elusive to measurement, and, similarly, attempts to obtain predictors of safe and reliable driving have been far from successful. Research to date indicates that tests will not enable us to eliminate the unsafe and inefficient driver from the road unless we are also willing to eliminate a great number of good drivers at the same time. Drivers in the public transportation system cannot be selected by this means at present.

Drivers seem very unwilling to accept a changed definition of their driving status. Most experienced administrators and several studies report that many drivers whose licenses have been revoked or suspended continue to drive. Attitudes of the judiciary toward the import of the driver's license are close to that of the driver. Most judges are very hesitant to revoke a driver's license. Again, the criterion measures of driving performance are so poor that it is difficult to make a legal revocation stick against the assault of the lawyer for the defense. Generally, the standards of performance for the driver would seem to be most lenient. Even manslaughter on the highway rarely involves punitive consequences of as much as a one-year sentence, according to a Michigan study. In brief, the problems of developing adequate selection procedures, evaluating driver performance on the highways, and enforcing decision to remove unsafe drivers limit the effectiveness of using system rewards as a source of motivation to performance beyond minimal compliance.

It should be noted, however, that any improvement in our ability to identify safe and efficient drivers at the time of examination or at periodic examinations—to develop improved standards of performance, monitor driver performance more effectively, and enforce judicial and administrative decisions—probably would be successful in raising levels of performance. As we improve our technological capability to decide which drivers should have access to the public highways and to enforce these decisions, the motivational basis for improved performance will increase.

2.3—Individual Differences in Responsiveness to Instrumental Rewards

A reasonably well established principle in social psychology asserts that the power of a group to influence an individual group member depends on the attrac-

tiveness of group membership. It would seem reasonable to extrapolate this principle to the willingness of drivers to perform according to minimal standards as a function of the benefits they receive from driving. Differences in this source of motivational input, then, may be directly related to the rewards received by the person from having a driver's license

At the simplest level, a driver's license may be a prerequisite for a job. We have observed that many of the drivers whose licenses have been revoked reapply when they need the license to get a job. More generally, the benefits of driving seem to be closely associated with changes in social role behavior with age. For young males, obtaining a driver's license is a ritual indication of manhood. More males in a suburban high school apply for licenses soon after completing their driver education course than do females of the same age. For the male, the car is often necessary for dating and related activities associated with role change.

The married person who needs his license to drive to work, shop for his family and use the car for family recreation is more motivated to comply than the single person. Some data we have examined in the District of Columbia on traffic violations indicate that among persons of similar age, race and sex, traffic violations are more frequent for the person who changes address more frequently, the transient. We would speculate that traffic accidents differentially distributed among groups in the society on the basis of the benefits they receive from the society that are dependent on their driving, with the lower socio-economic status groups having the worst accident records and accident records improving with increases in socio-economic status.

3.—INSTRUMENTAL REWARDS GEARED TO INDIVIDUAL PERFORMANCE

The rewards or benefits of driving accrue to everyone who is able to drive. Individual rewards of an instrumental nature are attained by differential performance. A number of efforts have been made to gear individual rewards, both financial and social, to the quality of driving performance. Insurance companies attempt to make policy costs commensurate with driving records of violations and accidents. Although the concept of letting each individual reap the fruit of his own behavior is appealing, the technology for accomplishing that task has not yet been sufficiently developed. Generally, insurance companies have found it simpler to assign policy costs on the basis of risk-related characteristics of drivers, such as age, sex, place of residence, rather than characteristics of individual performance.

3.1—*Individual Instrumental Rewards and Performance*

Generally, monetary rewards and social recognition for performance contribute to the achievement of a safe and reliable level of driving performance or outstanding driving. When persons are employed to drive and adequate assessment of individual performance is feasible, individual rewards can be applied most readily to obtain optimal performance. Individual rewards are difficult to apply to instances of behavior that indicate a high quality of performance, although companies do single out drivers for recognition on the basis of their response to emergencies or handling of difficult situations. In the public realm, the application of individual rewards has often been suggested, but not implemented on any large scale.

3.2—*Conditions Conducive to Effective Individual Instrumental Rewards*

If individual rewards are to be effective, assessment of individual performance must be feasible; the rewards must be large enough to justify the effort required to obtain them; the rewards must be seen as directly connected to the required performance and follow directly on its accomplishment, and the rewards must be seen as equitable by the majority of drivers including those who will not receive them.

Differential performance of drivers is exceptionally difficult to assess. Records of violations and accidents suffer from a number of problems which make them difficult to use as indices of error-free driving. From an ideal point of view, reliable and valid samples of each driver's performance would be needed as the basis for a system for rewarding drivers according to their proficiency. Such a sampling procedure would also have to consider the potential variability in driver performance. An unknown factor to date is the extent to which driver performance is variable. An alternative assessment procedure might be geared to a series of increasingly complex tasks, such that the rewards to the driver were increased on the basis of his ability to pass these tests. The beginning of such a testing system is represented by the driver's license and the insurance company premium rates for younger drivers who have had a driver-education course.

The success of a series of increasingly complex tests for drivers would depend on whether drivers saw the rewards as large enough to justify the additional effort to obtain them. One of the difficulties with collision insurance is the inability of repair costs to operate as a deterrent when the driver is insured against those costs regardless of personal responsibility. However, the difficulties entailed in assigning responsibility for an accident are comparable to the general problem of developing a fair method of evaluating driver performance.

In brief, a system for rewarding individual drivers on the basis of their performance has not yet been achieved. Such a system would have to be able to assess each driver's performance, providing sufficiently motivating, equitable, and timely rewards.

4.—INTRINSIC REWARDS OF DRIVING

Much of the motivation for safe, efficient and lawful driving stems from the satisfactions derived from the activity itself. The individual may enjoy his ability to drive smoothly, easily, and efficiently; to anticipate traffic events and blend with the traffic flow. The man who derives enjoyment from the task of driving has a sense of accomplishment in being able to guide and control the vehicle effectively, a sense of his own abilities and skills in solving driving problems.

A second source of driving enjoyment, much neglected in traffic safety planning, is enjoyment of the driving scene. The driver who enjoys the view from the road is more likely to be motivated to drive efficiently and safely to maintain that enjoyment. In contrast, the driver whose aesthetic sensibilities are assaulted, distracted or numbed will be motivated to get the driving task completed as soon as possible.

4.1—*Conditions Conducive to Arousal of Intrinsic Satisfaction from Driving*

If driving is to be motivated by characteristics of the driving task itself, then the job of driving a car must be sufficiently complex, variable, and challenging to engage the capabilities of the driver. The relationship between task complexity

as a source of motivation and performance is generally curvilinear. As the task becomes more routine, performance that is dependent upon motivation declines. As the task increases in complexity, motivation-based performance improves. However, the improvement in performance reaches a limit depending upon the complexities of the task as they interact with the capabilities of the driver. Increasingly complex tasks result in poorer performance.

The driving task which presents no problems to the driver produces more efficient and reliable traffic flow, but at the cost of reduced driver motivation. This motivational decrement becomes apparent when the driving task suddenly becomes more complex and the driver is not prepared to meet the change in driving conditions. The rear-end collision on superhighways, which occurs when the driver sees another vehicle as he comes over the crest of a hill but is not sufficiently alerted to estimate speed differentials accurately, may illustrate an attention decrement due to low motivational arousal. At the other extreme, the driving task, which is highly unpredictable because of increased complexity, may result in motivational arousal, which interferes with efficient driving by instigating responses that are incompatible with safe driving.

In sum, two characteristics of the driving task contribute to reliable and safe driving. One is the complexity or predictability. An optimum degree of uncertainty is necessary to maintain driver motivation. The second condition is perceptual enrichment of the driver's experience which serves to motivate him to focus on the driving task.

4.2—*Individual Differences in Response to Intrinsic Rewards*

The complexity of a task is relative to the skills of the driver. For some drivers the problems of anticipating traffic conditions, estimating speeds, gaps and distances, solving driving problems, is sufficiently stimulating and challenging to motivate them to stay tuned in to the driving task. For other drivers this task is not sufficiently challenging and they do not remain as alert to the shifting conditions.

A second attribute of drivers which relates to intrinsic rewards is aesthetic value. Several studies have noted a relationship between high scores on aesthetic values and accident production. One might speculate that the more aesthetically inclined person is likely to tune out experiences that are repugnant in the visual environment in favor of paying attention to more satisfactory aesthetic experiences.

5.—INTERNAL VALUES OF THE INDIVIDUAL CONSISTENT WITH SAFE AND EFFICIENT DRIVING

The individual may be motivated to drive well because the goals of safe driving match his own goals. There are two learned motives that are directly relevant, the desire for safety and fear of the consequences of having an accident. Although these two motives are related, there is no reason to assume that they are perfectly correlated. A strong desire for achievement of safety is not necessarily accompanied by strong fear. Nor is strong fear necessarily accompanied by a high value placed on the achievement of safety. A third motive which may be hypothesized to operate is a generalized concern for other persons. This motive is based on the capacity to empathize with other persons, to be able to

predict their experiences of reward and punishment, and to desire to minimize punitive experiences for them even though it entails some cost to the individual. A basic level of social cooperation involves the exchange of these acts so that the rewards and costs are somewhat evenly distributed, as when merging lines merge alternately.

5.1—*Internal Motives and Performances*

The effect of physical fear on driving has not been studied. On the basis of observation it seems that high fear keeps some people from obtaining a driver's license and from driving under conditions which they do not feel capable of handling. Many people avoid driving on high-speed highways, at night, in heavy traffic, on holidays, etc. In other words, fear motivates people to avoid threatening situations. It is somewhat more difficult to speculate about the effects of fear on dependable driving and response to emergency conditions. It seems likely that fear will operate to motivate avoidance of fear arousing situations, and motivate the person to learn how to reduce the probability of encountering a fearful situation by taking the proper precautions. Under certain conditions, a high fear level may disrupt performance and lead to ineffective performance. For example, a highly fearful person who does encounter a fear producing situation is more likely to perform ineffectively.

A high value on safety is more likely to motivate behavior aimed at increasing driver safety, reliable and dependable driving, as well as a skill in handling difficult traffic situations and responding to emergencies. There is one exception to this generalization. The person who is concerned with his personal safety, but has a low degree of concern for other drivers, may be a safety hazard to the other drivers. He drives too slowly on high-speed highways, blocks single-lane traffic forcing many drivers to pass, etc.

Concern for others, including other drivers, pedestrians, and passengers, is a major source of motivation for both dependable driving and handling of emergency situations.

5.2—*Conditions Conducive to the Arousal of Individual Motives*

The behavior of other drivers has a strong influence on safety motivation and concern for others. Observations of the differences in headways and related indicators of safety, as well as concern for pedestrians in crosswalks and drivers emerging from side streets, indicates the possibility of differences in norms toward these two values. Drivers seem to be stimulated by the examples set by other drivers to raise or lower their levels of safety and concern for others.

One of the most familiar techniques for the arousal of social concern, safety and fear is impersonal communications. The use of symbols to instigate fear has been experimentally studied, and the results indicate some difficulty in effective communication. Fear-arousing communications produce emotional tension with effects which may interfere with successful delivery of the message intended by the communicator. The conditions for effective arousal of these motives parallel the conditions for activating the acceptance of legal rules.

5.3—*Differences in Strength of Motives*

Fear Motivation. The strength of fear motivation differs with age and sex. Women are more likely to express fear of driving than men, and adults more than younger persons. Evidently the association of fear with driving is learned

by experience as the driver personally encounters accidents or observes them among his friends and associates and on the highways. The high rate of accidents among younger males suggests that fear may not operate as a restraining counterbalance to lack of skill, since younger drivers operate under high risk conditions.

Safety Motivation. Attitude toward safety might be defined as the level of risk the person is willing to take. The subjective risk, defined as the risk the person thinks he is taking, may not correspond to the objective hazard, the risk defined objectively. In an English study bus drivers were given the task of driving an 8-ton double-decker bus between two wooden posts 6 feet high placed at various distances apart. Each subject was asked how many times out of five he thought he could drive between the posts without knocking either. On the average the more experienced drivers took less risk and were involved in less hazard, as a group they varied less than the inexperienced drivers.

Social Motivation. It seems likely that avoidance of harm to one's self will be a stronger motivation than looking after the interests of others. Authors of a survey of adults in Britain have suggested that self-esteem is another variable that influences the elicitation of social motives by communications. If the communications suggest that one should correct one's own bad behavior in the interest of others, acceptance of these messages implies a negative judgment of one's own performance. These authors conclude that road users will be moved more effectively to behave well by encouraging them to do so in self-defense against the poor performance of others than by encouraging them to correct their own bad behavior in the interests of others.

6.—SUMMARY AND CONCLUSION

Five patterns of motivation to comply with traffic laws and the conditions necessary to elicit these motivational patterns have been examined. These conditions include characteristics of both the drivers and the driving system. This presentation is intended to serve as a source of hypotheses for research designed to answer specific questions on the relationships between traffic law, traffic safety and the driver.

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I was very much interested in the comments made by Dr. King which illustrate the lack of what he terms the "interdisciplinary approach to accident prevention." For a good many years the District of Columbia, specifically, and other jurisdictions, inferentially, have attempted through the legislatures to introduce somewhat novel legislation dealing with alcohol and the driver. Many questions raised by Dr King are still unanswered.

In some jurisdictions, there are laws which can be called "prima facie under the influence" laws. In other jurisdictions there are "implied consent" statutes, which when combined with a "prima facie under the influence" statute, bring about a legal form of social control of persons under or suspected of being under the influence of alcohol while operating a motor vehicle.

Having observed hearings on such legislation, having struggled with the painful process of steering proposed legislation along these lines through at least one bar association for its support, and having prepared statements for the use by legislators in the consideration of such legislation, I know only too well the lack of evidence tending toward agreement among medical scientists as to when and under what conditions the presence of alcohol in the blood constitutes a demonstrable road hazard on the part of a drinking driver.

Dr. King referred to the legal problem of adopting standards which would be applied across the board to all drivers who have ingested at least some alcohol before driving an automobile. It is here that the lawyer, administrator and legislator need critical guidance.

He asked whether a single rule should be adopted treating all drinking drivers alike, those who were under the influence as a physical fact as well as those who were not. There is another question implicit here. It is the question of whether such a standard would not open the door to a situation in which equal protection (administration of the law equally to all who have ingested a certain percentile of unoxidized alcohol regardless of effect) might not result in many cases, perhaps in most, of equal repression rather than equal protection.

With the adoption of laws based on simple statistical sampling of individuals, no two of whom are affected alike by the presence of alcohol while driving a motor vehicle, who is to say which side of blind justice most defendants are on?

In most of the discussions in which I have participated in dealing with proposed legislation concerning this subject, the facts are presumed based on a norm with which we are familiar and which has been adopted in a considerable number of jurisdictions, the effect of which is to establish a hard and fast prima facie rule. In my experience, this is not a prima facie rule at all, but an irrebuttable presumption even before juries.

The point is that Dr. King's paper points out to us the possibility that a great deal of legislation dealing with alcohol and driving may well be grounded on intuitive grounds backed by some statistical evidence that there is in fact a cause and effect phenomenon in driving following drinking. But the lines on which administrators must exercise social control of drivers is simply not so clear that we may assume medical research has validated present laws.

In fact, it may well be that we could take a legally valid position in a medical sense and proscribe all driving after any drinking. At least one court has so suggested (*Wall v. King*, 206 F.2d 878, 1953), premised, we may presume, on the assumption by the First Circuit Court of Appeals that any drinking followed by driving could be defined constitutionally as a misdemeanor.

On the other hand, it seems to me, the legislatures have taken the other extreme and provided for a standard which, while medically certain in most cases, may not be adequate, in my judgment, even in a statistical sense in promoting safety on the highways. This is simply because the minimum alcohol blood content prescribed does not reach the majority of drivers who actually are influenced adversely by the presence of less than the statutory minimum prescribed for a prima facie case. Indeed, the higher minimum prescribed in most laws presently on the books tends, in my judgment, to relieve the jury or judge subjectively of making a finding of guilty in cases in which there is less than the prima facie minimum found in the blood, although it is their prerogative to do so. Here again, the lack of conclusive knowledge on the matter leads me to believe

that the interdisciplinary approach advocated by Dr. King must be supported by those of us who seek to apply the law equally to those who constitute road hazards. Without the firm knowledge that our criteria for safety on the highways are at least reasonably based in established facts, we are led to wonder how equal protection can be demonstrated when percentage numbers divert attention from an illegal act (degraded driving performance) to a legal act (drinking alcoholic beverages—at least in most communities).

The inevitable result, it seems to me, is that the degraded act is ignored in many, if not most, cases where the percentile cannot be established by blood testing, whereas the degraded act is demonstrably present. Convictions without a percentile finding are few in most jurisdictions, but the number of accident reports by police shows the presence of drinking by drivers of one or more vehicles or pedestrians involved in accidents in numbers greater by comparison than many major traffic offenses which contribute to serious accidents.

Dr. King also spent considerable time on the subject of physical standards, including disease and emotional conditions and the futility of attempting to discover such factors by simple driving tests now being used in all jurisdictions. In this connection, he also referred to the possibility of an all-inclusive collaboration between administrators who license drivers and the medical profession. He made an interesting observation when he stated that there is at present no attempt to correlate life insurance insurability with motor vehicle licensing procedures.

His point seems to be that insurance criteria when an individual's insurability is considered are material in determining whether that individual should be qualified to drive a motor vehicle. Perhaps life insurance standards, being directly concerned with an unforeseeable disability, are a valid factor subject to little, if any, question of legal validity since physical ability is a prime requisite in the licensing of all drivers.

Dr. King mentioned that insurers use motor-vehicle administrators' records of an individual's physical fitness to determine whether casualty insurance will be written for him.

If we go one step further, we may wonder whose decision should control. The matter of contracts is a question of law between the insurer and the applicant. At this time at least, it is left in great measure to the two parties to enter or not to enter into an insurance contract. Dr. King adverted only to evidence of physical defects found in the administrators' records. Suppose we consider the total record and relate to it the casualty insurer's decision to insure or not to insure.

When an individual must comply with financial responsibility laws, he must do so only because he has in some manner demonstrated by his past activities that his ability to operate a motor vehicle is at least questionable. His traffic record of offenses is of such seriousness that the administrator must require him to show evidence that he is financially responsible at least to a minimum degree prescribed by law. Here we find a curious anomaly, or perhaps anomalies.

If the administrator's records show evidence of physical disability, the insurer requests the administrator to certify the applicant's eligibility to operate a motor vehicle under motor-vehicle laws. The insurer may then refuse or approve the application, even though the applicant has been certified by the administrator as eligible to drive. If the applicant has been certified and refused insurance, he

may apply under an assigned risk plan and it is here that the traffic record *per se* becomes important. Within clearly defined limits, insurers must insure persons to whom admittedly none would have otherwise issued insurance contracts. Physical disabilities are usually relegated to heart ailments or mental ailments, neither of which is really important so long as two physicians certify that the condition is not likely to interfere with safe operation of the vehicle.

The result is that, in effect, the administrator has prescribed the insurability of the applicant. A few years ago, insurers in California took the matter to the U. S. Supreme Court on the ground that this was an invalid interference with the right of contract. The Supreme Court held the assigned risk law valid on the ground, speaking broadly of the opinion, that the problem of payment for damages arising out of motor-vehicle accidents is a complex one. The solution, the Supreme Court felt, was one in which its judgment should not be substituted for that of the state, even though there might be some impairment of the contract right.

Suppose further that the administrator is ready to license the driver on condition that he obtain a certification of insurance coverage under the financial responsibility law. His record, however, is such that even under the assigned risk law or plan he is uninsurable. In effect, we now have the insurer prescribing what I have in the past referred to as the "driveability" of the applicant for a license.

The question then inevitably becomes, it seems to me, whether the criteria of both the insurer and the administrator are valid. Can we not, by some administrative arrangement, equate driveability with insurability, within the constitutional structure of the police power and the right of contract?

Here, too, the disciplines of medicine and the law must meet in order to establish one criterion in lieu of the three being used today, namely, the physical, in which the physician's opinion may vary from the administrator's; the traffic record, with which the administrator and the insurer may well disagree, and the combination of both physical and traffic record with which all the parties may be in disagreement.

Professor James made an interesting point concerning our law of negligence. He said that perhaps it is a failure on all counts in its endeavor to accomplish its two prime objectives: (a) payment of injuries "caused" by negligent drivers and (b) prevention or determent by way of the threat of legal retribution in the form of money judgments. For some years Professor James has been writing extensively on the matter which goes to the heart of negligence law, i.e., the individual's blameworthiness as a criterion by which we judge whether or not his victim should recover a money judgment. He treats of the usual objective standard of negligence which, by definition, abandons any pretext of moral fault on the part of the defendant. We must, therefore, admit that individual moral fault plays little part in the administration of negligence law.

I have noted that Professor James' writings have dealt extensively with another factor which is closely related to the matter of moral fault of the individual, namely, the matter of accident proneness. This is related to moral fault because if a person can be accident prone, then moral fault in the sense that such a person has control over his activities is really irrelevant.

However, if one examines the literature on the subject, it seems that the accident repeater, or the "accident-prone" person, is really an unproved phenomenon

Most of the authorities to which Professor James and others have referred are studies made many years ago. The statistical interpolation is somewhat vague, and I was led long ago to the conclusion that at best, the concept of an accident-prone driver is a possibility, but nothing more.

In fact, I could cite from memory some of the later studies which tend to conclude otherwise. Or at best these studies show that accident proneness, whatever that turns out to be, is a condition through which every individual passes at some time during his driving life. This condition can be brought on by emotional states due to work, neighborhood irritations, and the like. I recall a serious accident, for example, in which I was involved with a driver whose only son had committed suicide the night before the accident. His first words to the police were "I shouldn't be driving a car right now." Was he not accident prone, but for the first time in his life, possibly?

This is not to disparage the concept, since I also believe there is more than just a suspected factor in motor-vehicle accidents here. What I do suggest is that the disciplines which are capable of isolating this concept have not done so, at least not to my satisfaction. And I dare say they have not proved the conclusions which would tend to corroborate Professor James' thought that moral fault has no place in either the civil or criminal action against accident-prone drivers. On the other hand, were we to have the evidence in this regard, a great deal more could be accomplished in establishing the framework for the administration of highway losses, which under the present system of negligence law, is far from satisfactory. This obviously cannot be the task of lawyers or any other single group. This situation points up the need for the concerted activities that Dr. King outlined.