APPENDIX c

STATEMENT AT THE AUTOMOBILE COLLISION DATA WORKSHOP

B.J. Campbell
HIGHWAY SAFETY RESEARCH CENTER
University of North Carolina

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STATEMENT BY B. J . CAMPBELL
University of North Carolina
Highway Safety Research Center

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In acquiring automobile accident data several approaches are used in the U.S.: First, are intensively investigated accident crashes of which several thousand have been collected. The advantage of this approach is that the cases are extremely detailed with photographs and good injury data. The most important disadvantage is that by virtue of the changing sampling criteria and the small sample size, the ability to generalize these few cases to the population is restricted heavily.

I believe too much reliance has been made on this type of data for guiding NHTSA decisions. It leads one to situations in which too much is made of a small number of cases. For example, in interpreting the 35 or 40 crashes in which air bags are present some feel the crashes support air bags because relatively few moderate or serious injuries occur. However, what if these air bag cases were matched with several hundred cases in which no protective systems are used at all (i.e. no belt or bag)? What if one found pretty much the same proportion of injuries in both series? Wouldn't that suggest that 40 cases is just not enough?

Second is an approach called the tri-level system. There the samples are larger, but the negative aspect is that the reporting threshold is based on accident severity which results in eliminating certain cases in which safety belt and perhaps other safety device effectiveness is greatest.

Third, and at the other extreme from individual case studies is the attempt to use an entire state accident data system as the basis on which to do research and make decisions. The biggest advantage in this case is the perspective gained from very large sample sizes and the ability to partition and control the data. But on the negative side many such systems contain too few content variables of interest. The quality of reporting may be poor and the injury data is crude.

In my opinion a crucial need in the field of crash injury is the means to forge a meaningful link between laboratory test crash data and events as they occur in the field. Much can be gained from laboratory sled and full-scale crash tests involving dummies, Cadavers or even live subjects, and also much can be gained from the study of actual crashes on the highway. But each lacks a significant variable.

In the staged crashes in the laboratory, telemetric procedures are used for recording data and one can specify in considerable detail the physical system in which the crash occurs--the "g"-forces, the rate of onset, delta “v” etc. But when one is forced to use nonhuman subjects then one is left in the situation of knowing a great deal about the physics of the crash but knowing little of the actual injuries that might have occurred in such a crash. On the other hand, in real world automobile crashes one can learn about the actual outcomes in terms of survival and injuries, but the input variables mentioned before are unknown.

The need to link these two systems is apparent. Engineers who design protective systems need to know about stopping distances, forces, decelerations, etc. But knowing these things is of too little help unless one has a way to relate them to real world injuries. An

illustration of the need for this data link is the NHTSA analysis conducted in connection with the air bag. This NHTSA analysis initially indicated that lap and shoulder belts would only reduce fatalities by 35-40 percent, and that lap belts alone would be of almost no benefit at all in reducing injuries. These conclusions were presumably based in large measure on results of crash tests involving cadavers and dummies. The problem is that these conclusions disagree sharply with studies of tens of thousands of crashes that have occurred on the highways. Studies from all over the world indicate that in actual crashes injuries are reduced by lap belts, and that lives are saved, and that the degree of lifesaving is much higher than 35 or 40 percent NHTSA has indicated.

It is the very occurrence of this type of disagreement that shows that the analysis system in each sector (laboratory vs highway) by itself is inadequate and that means must be found to bridge the gap. The primary advantage of a crash recorder program would be a means to forge this link between the two data systems. It would finally be possible to gather data on a few thousand actual highway crashes in which crash conditions, the decelerations, the forces, the amplitudes and so forth would be knowable as well as the injury.

By using these several thousand crash recorded events as a calibration standard it would be possible to work outward to the hundreds of thousands of other actual crashes in which recorders weren't available, and the thousands of lab tests in which recorders are available but human injury is not.

It is not necessary to have an "infinite" number of crash recorders in the field, only enough to validate other approaches. I personally

do not see the crash recorder program as an end in itself but one which would support and validate other types of crash studies.

My remarks do not suggest the level of detail needed from the crash recorder, but in any case, the program will be expensive. For six million dollars one could equip 100,000 cars with crash recorders that cost $60 each. It would also be possible to equip more cars with a simpler, less costly crash recorder.

It is for others to determine the needed complexity of the crash recorder. Perhaps it is not necessary to have a crash recorder that records force time histories in three dimensions. Maybe vertical accelerations can be sacrificed.

Perhaps it would also be useful to consider a "tri-level" crash recorder program; this could involve a modest number of cars equipped with a very complex recorder and a larger number of cars equipped with a simpler, less expensive recorder system.

As a prelude to the program it might be appropriate to have a research project to synthesize past laboratory crash data to try to agree what measure in the field is the one that would account for the most injury variance. Would it be impact speed, barrier equivalent velocity, delta "v" or what?

The crash recorder, of course, is not the only need in studying and understanding actual crashes. Much better and much larger collections of highway crash cases are also necessary. I stated my belief that too much reliance has been placed on the small number of intensively investigated crashes. This country needs a multi-state data collection program which would accumulate records on 600,000 to 1,000,000 accident-involved vehicles per year. This would require three to five states the size of North Carolina.

For a surprisingly small additional cost it would be possible to collect that many cases with reasonably good deformation data, an operationally defined injury scale, vehicle identification numbers, belt usage, and various file linkage numbers to cross-link accident data and driver history files, road data, etc. It is extremely important to have this quantity of data in order to get timely answers to questions. If a safety device has gone astray or a dangerous car is coming onto the market--we need to know it soon--not after ten years.

I would be pleased at some future time to discuss some of the characteristics such a multi-state data system should have.