

You all have a copy of my paper; I would prefer not to attempt to simply stand here and read through it again but rather rapidly to review the general outline of the plan developing in Adelaide and then to talk around some wider issues that are of more general relevance to studies of this type.

f → The general aims of the project in Adelaide are - and these are almost so trite I hesitate to repeat them - to study the safety of road users in that area, to identify factors detrimental to safety and to evaluate the effectiveness of existing counter-measures such as the Vehicle Design Rules and to recommend relevant additions and changes to these counter-measures and, of course, the areas to be studied will include the road users. We propose to accomplish these aims by collecting data at the scene of accidents to which an ambulance is called. This obviously restricts the range of cases we would expect to get and some of the reasons for this are discussed in the paper. These data are to be supplemented by the results of follow-up investigations of aspects of the environment, i.e. in simple terms, going back to the scene in large part and of the vehicles and the treatment of any injuries sustained by the participants will be recorded and an attempt will be made to also determine certain psychological characteristics of road users who are involved in the events leading up to each accident and where practical, corresponding data on a control group of road users will be obtained. Now all of these points are treated in greater detail on the paper and I would urge you to refer to them for those issues that are of particular interest to you.

~ The methods adopted in data collection, of course, will be such as to render meaningful such comparisons that may be attempted with data from similar studies, we will be hearing about shortly, being conducted elsewhere in Australia and with the previous study in Adelaide about ten years ago. The intention at the moment, and this may possibly be modified, is to operate with two teams - each team consisting of a medico, an engineer and a behavioural scientist - I find if I say psychologist people say "Why don't you want a sociologist?" and behavioural scientist is one of those useful umbrella terms that includes anybody (almost). These teams will be operating during the same period but not at the same time of day, we would propose that they gather data for one year so that we would have two teams operating in the same area for one year but one team for example might work from 9 in the morning until 5 in the evening and the other one go on duty at say seven in the evening and to through until 2 in the morning. In addition, we would hope to have a third psychologist - I have just briefly mentioned control group data and I'll elaborate on the duties

of the third psychologist in a moment. Proposed time table is that from the date of funding, which we hope will be some time later this year, to start with recruiting of staff and this is unlikely to be a particularly simple matter and we propose to allow possibly six months to recruit staff and to perform adequate training, getting the equipment together, getting out on the road, so that accidents become a relatively routine thing rather than a rather glamorous event because certainly based on my own experience, the first twenty accidents one goes to are pretty much a write-off as far as useful information that is recorded - you tend to stand and look and not write anything down. Then, as I have indicated, with proposed one year of data collection and then a period of probably eighteen months for the reduction of the data preparation for formal reports and I would hope that the formal report would be completed in time to allow a further few months perhaps to be spent on re-writing the formal report in a form which makes it more amenable for wider circulation, i. e. circulation to a general audience rather than to a technical or scientific audience, and I would include in this for example, the possibility of preparing film strips with associated commentaries that are reasonably self-contained and could go out to groups in the community so that they could sit and at least learn in advance what sort of accidents they might have; hopefully it might do a little more than that but at least it would go that far.

Now with regard to some of the wider issues that I would like to mention - I have issued perhaps almost a disclaimer in a way in this paper that data from these studies (by these studies I mean the various studies either underway or proposed in Australia) should not in general, there are exceptions, but should not in general be pooled together and analysed as one group. This is a practice which has been followed for some years now in the United States where considerable effort is being devoted to the development of a computer data bank, - it's a great phrase, it covers a multitude of sins in many areas - derived from the results of many in-depth accident investigation teams. Now the establishment of such a data bank is a logical and an efficient procedure if the subsequent analyses are based on each individual set of data, i. e. if the analyses are based on the data being collected in Sydney or Brisbane or in Adelaide rather than on all the data lumped together. Unfortunately, pooling together all of this information and treating it as one large data set greatly exacerbates one of the major problems in the analysis of this type of essentially observational or non-experimental data. I call it observational not experimental - most of our work in this field we can set up an experiment, that is we can control what happens or what we want to happen and then look and see actually what does

happen - volunteers for accident research are alarmingly in short supply and we are restricted, quite obviously, to sitting back and just watching what happens; we can't arrange for it on this weekend or have three head-on collisions, two right-angle collisions, etc. There has been relatively little - somewhat to my surprise, I've only realised this in recent years - there has been relatively little scientific theory going along behind to back up observational studies. Many of the problems are recognised but the resources to deal with these problems aren't terribly well developed. One of the major problems is the thing that you record may not be, you may not be able to go in directly and record what you want to know - with regard to the vehicle, of course, we would like to know the forces acting on the occupants in a collision; obviously we can't record this directly we have to rely on the degree of vehicle damage and what, to use a term statisticians love, "<sup>Bias</sup>Buyer's can enter here", in other words we might measure something and use it as a guide to something else but it may not be an accurate guide. It would be a bit like throwing darts at a dart board and being told the dart board is there when it is actually over there; you might throw quite well over there but you are not scoring too well on the dart board. Another problem is that all of our statistical theory by which we come up with ..... test, whatever, the fundamental assumptions underlying all of these statistical tests are grossly distorted, if there is bias present in our measurements, and one can go on for a long time with this but this is not the time to do so.

When I talk about not lumping data together obviously there are quite obvious things like the different teams should record their data in the same - allocate the cases to the similar categories, should have the same codes and so on and so on but there is one characteristic we can't control and that simply is the way in which the individual investigators go about collecting their data and the circumstances under which they do it. There has been quite a lot of work done on the matter of basically the fact that in behavioural research and observation studies, people have a great tendency to find what they are looking for whether or not it is actually there and this tendency varies in one respect to another from one individual to another and because we have data being collected by different teams we have to at least be aware of the possibility of this problem and it has been wisely said, I believe, that without an understanding or without recognition of problems of this type in the data collection situation, we can no more hope to acquire accurate information than could astronomers and zoologists of days gone by who did not understand the operation of their telescopes and microscopes.

Now in one respect here I mentioned we hoped to have a third psychologist to collect control ~~data~~ group data. One problem with this is that if this psychologist before going out to interview people in the accidents and people who weren't in the accidents knows in advance who was in the accident and who wasn't the conclusions that this psychologist comes to quite unwittingly can be very heavily coloured by this information so I would hope that somehow or other we would be able to have a person on the team but not in the team who would even perhaps be housed in a completely different area and rarely talk to the team members so that there's little risk of this psychologist knowing what happened in the accidents and going out maybe to the person who was the driver in the accident perhaps a month later and interviewing that person, not knowing whether this is a person who is not known to have had an accident or in fact did have an accident. These, as I say, are issues that can be quite firmly supported from research on methodology in this area but which I realise, may appear to be nit-picking on first exposure.

What sort of accidents do we expect to study? Speaking as an accident investigator myself I have a very strong preference for those that occur on warm sunny days with no wind and little traffic but the selection of individual cases does need perhaps to be a little more rational than this, and I've set down in the paper the fact that we will be following the approach that was used in the previous Adelaide Study. There are some problems, fairly obvious problems with regard to this but we talk a lot in this work about getting a representative sample and unfortunately this is around about the stage - it's one of these wise words that having said "representative sample" you can then sit down and feel as though you have made a great contribution but I think we are just about at the stage in this game now where the word "why" needs to be used fairly often and "what" such as "what do you mean by representative sample?" "Why do you want a representative sample?" and I'm afraid I must admit that I'm at the stage now where I'm not sure that we have an adequate answer to these questions. Obviously we don't want to get all accidents, end up with a batch of accidents selected on the basis of the fact that the driver had red hair, was travelling north on a Japanese motor cycle - to use quite a ridiculous example - but is quite easy, unless one sets out in advance to define the type of accidents which we are after, it's quite easy to end up with almost as ridiculous situations as that. I have set down earlier on in the paper some of my thoughts on this, including ways in which we might assess things that I think may be of some importance and ways in which we can evaluate the

representativeness of any sample we get; I won't repeat this now but I would hope that those who would perhaps even be associated with using data from studies of this type might look at it.

What can we hope to come out of an in-depth study? We talk a lot about evaluation, evaluation of vehicle design rules, evaluation of traffic rules, of counter-measures that have been adopted in the road system but it's evaluation, in some ways in a quite special and specific sense. We can certainly find - and this is a unique attribute of in-depth studies - we would expect to be able to determine specific causes of specific injuries and I could keep on using the word specific ad nauseum, in specific vehicles, in specific types of accidents and so on and so on.

We can also expect to find specific factors which contribute to accident causation; here the situation is not quite as clear as with injury causation because we often have a multitude of factors all operating together. We can expect to be alert for cases in which safety features do not perform as expected. One example was ~~Ern Reagan(?)~~ presented to the Seminar, *Howe* cases in which the energy-absorbing steering column which basically telescopes, absorbing energy as it does so, but there have been quite a few cases in which some designs of energy-absorbing columns have actually bent and in bending, of course, they are no longer able to telescope and absorb energy in the manner intended. We can keep our eyes open for matters of this type but I would like to emphasise quite strongly that I do not regard in-depth studies as an alternative to large-scale studies based on mass data; they are, however, complementary. And I would say that the evaluation of a safety standard is best done on mass data but, having said that, I would then like to point out that I think with our present situation in Australia no one State has an adequate number of accidents for us to be able to expect to do this and I would add my voice to those who have been crying in the wilderness for years that there is a critical and an urgent need for at least those items that are necessary for the evaluation of vehicle safety features, for these items to be gathered by each State routinely in such a way that we can have a large enough data pool in Australia to evaluate the safety features that we are requiring at great expense on the vehicles in this country.

From my experience in North Carolina last year at Dr. Campbell's Centre - I thought I understood this problem but it's not really until you have worked with it that you realise what a tremendous number of cases are needed to

o/  
c/ the task is the collection of data on a clearly defined set of items but this is not the sole objective of studies of this type. There is an additional component which has been described in this way - and I suspect I'm quoting Dr. Hadden here in a book of which he was co-editor - "The essence of this type of study is the open-ended observation and description of phenomena to discover variables which deductably seem to be of importance and without continuing research of this type there can often be no assurance that variables more formally investigated have been realistically or even wisely chosen" and, to quote our present Keynote speaker "The system must not be static but must respond to new questions and in-depth studies are an extremely valuable way of coming up with these new questions".

evaluate what would appear to be straightforward issues. As Dr. Campbell has indicated, they now have virtually complete information for safety research purposes on nearly 600,000 vehicles out of the total of 1,000,000 cases and for an evaluation, for example, of side door reinforcement beams I've found that as soon as one starts to control for different types of accident and different types of vehicle and so on, the numbers just disappear almost as though they were evaporating before one's eyes and this is because we need to control for the fact that elderly people in general are more likely to get hurt than younger people; there is frequently a difference in injury susceptibility between men and women and obviously there are matters such as the severity of the collision. To give one fairly obvious sample, if you have a safety feature fitted to a sporty car and the only possible control group is a car that is normally used for running down to the supermarket, it should be no surprise if you find the people in the sporty car ~~fair~~ worse even though their car is supposed to be safer than the people who have just popped down to the supermarket because the people in the sporty car are likely to leave the road at terminal velocity on their way to their accident.

We can expect however from the in-depth study - and again, this is virtually a unique attribute of in-depth studies - to get clues as to what changes need to be made in the specific features of our vehicles, in specific aspects of road design. It's perhaps one thing to say roadside obstacles are related to the injuries sustained by vehicle occupants when their cars run off the road but we need to get some idea of what actually happens when a car hits a utility pole, for example; take a look at the situation in which it occurred and decide whether it just was the luck of the draw that the car ran off the road and hit the pole or is the spacing of the poles and the speed of the traffic and the angle at which a vehicle is likely to run off the road such that a collision with a pole is almost inevitable, and so on and so on.

Finally, I would like to just touch on a point that we have said that in-depth studies are studies in which our professionals go out to the scene of accidents and I would like to finish off by saying - why use professionals rather than technicians and in fact, many studies in the U.S. have relied on technicians rather than professionally qualified team members. There is probably not much to choose between these two groups of people when the