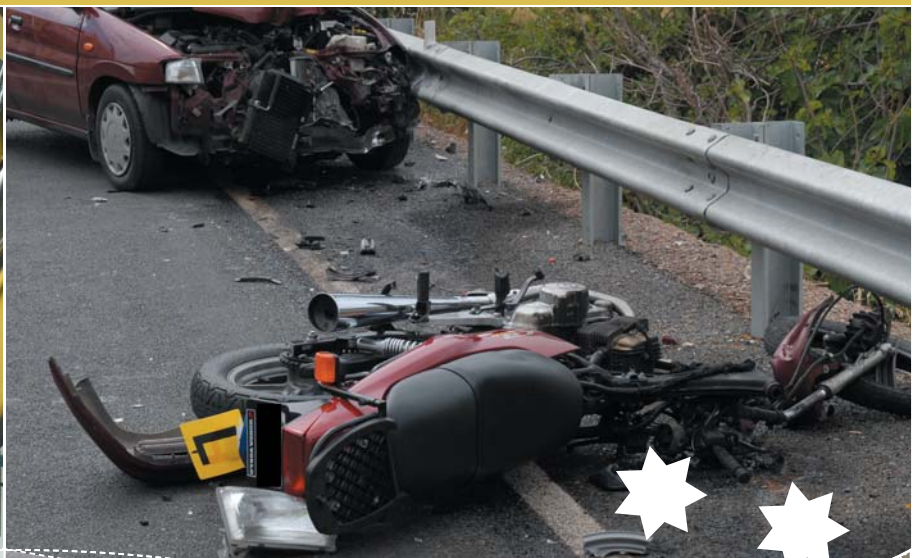


Centre for
Automotive Safety Research



THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

2007 Annual Report



A MEMBER OF



Group of Eight

AUSTRALIA'S LEADING UNIVERSITIES

Life Impact The University of Adelaide



Contents

Director's report	1
Research highlights	4
Collaborations	6
Teaching	8
CASR overview	10
Library	14
Project summaries	15
Staff profiles	20
Publications	23
Tribute to Jack McLean	25

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Government
of South Australia

Department for Transport,
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MOTOR ACCIDENT
COMMISSION

> Centre for
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Director's report



2007 was marked by a substantial increase in collaborative activities between CASR and road safety research centres in other countries.

The Malaysian Government has established the Malaysian Institute of Road Safety Research (MIROS) with Professor Radin Umar as the Director General, a staffing complement of about 100, and an operating budget of \$7 million (AUD) per year. Two engineers from MIROS spent two months at CASR on a course involving training in at-scene crash investigation and lectures and tutorials by CASR staff.

The current project in our collaboration with INRETS (the French National Institute for Transport and Safety Research) involves assessing the validity of our computer models of pedestrian/vehicle collisions using French data from an actual collision and a reconstruction using a post

mortem human subject, and a physical reconstruction of the head and leg impacts in our Impact Laboratory. Alexandra Long, from CASR, worked in France for one month on this project and Dr Thierry Serre, Chargé de Recherche of the INRETS Laboratory of Applied Biomechanics, worked at CASR for two months. CASR's involvement in this project is funded by the Vehicle Safety Standards Section of the Australian Department of Transport and Regional Services (now the Department of Infrastructure, Transport, Regional Development and Local Government).

Commercialisation of the Laser Speed Measurement Device (LSMD), developed by Luke Streeter and Robert Anderson for

use in our Impact Laboratory, is proceeding in association with Cellbond, a company based in the United Kingdom. Cellbond has demonstrated that the level of accuracy of speed measurement by the LSMD is superior to that of similar devices in use in testing laboratories in Europe.

Jack McLean and Robert Anderson were invited to participate in a two day symposium on brain injury research convened by the National Highway Traffic Safety Administration (NHTSA) in Washington DC at the end of February. The previous NHTSA symposium on this topic was held in 1994. Despite the obvious importance of brain injury there is comparatively little current research into



brain injury mechanisms and prevention underway in any country. Robert Anderson's development of a sheep model of axonal injury and the CASR data bank on more than 400 fatal road crash cases, which includes details of the impact to the head and the resulting injury to the brain, remain at the forefront of research in this area. Jeff Dutschke, a CASR doctoral student, is studying the biomechanics of brain injury using finite element methods.

NHTSA, in collaboration with INRETS, convened the 20th International Technical Conference on the Enhanced Safety of Vehicles (ESV) in Lyon, France in June. Robert Anderson presented a paper on a collaborative study with Honda R&D in which we evaluated use of the Honda Polar II full-scale pedestrian crash test dummy to reconstruct three pedestrian/vehicle collisions which we had investigated in

Adelaide. Jack McLean was presented with a US Government Award for Engineering Excellence at this Conference.

Hunan University in Changsha, Peoples Republic of China, extended an expenses paid invitation to Jack McLean to present a paper on in-depth crash investigation in a seminar held in conjunction with the Fifth International Forum of Automotive Traffic Safety in December. Collaboration with this University will continue with funds provided by the Chinese Government.

Collaboration with industry in Australia included participation by engineers from Ford Motor Company, Autoliv and Bosch Australia as lecturers in the final year Automotive Safety elective course conducted by Robert Anderson in the Department of Mechanical Engineering at the University of Adelaide.

Bosch Australia is assisting Jamie McKenzie, a CASR doctoral student, in a study of the predicted effects of the Electronic Stability Program on actual loss of control crashes investigated by CASR in rural areas of South Australia. Vehicle dynamics software, provided by Bosch together with training in its use, enables comparison of the outcome of a loss of control crash involving a non-ESP-equipped vehicle to the predicted outcome if the vehicle had been equipped with ESP. Almost half of the single vehicle rollovers we have investigated occurred on straight roads, in circumstances in which ESP is likely to be particularly beneficial.

A study by Craig Kloeden of data from police reports and our at-scene investigations of crashes at signalised intersections in the Adelaide metropolitan area showed that almost 27 percent of all





casualty crashes at these locations involved a right-turning vehicle. These crashes, which cost the community about \$27 million per year, can largely be prevented by full control of right turning movements at traffic signals, albeit at some cost from restricting the flow of through traffic.

Craig Kloeden's development of a web-based system of accessing the Traffic Accident Reporting System (TARS) of police reports on road crashes has greatly facilitated the use of this data source in the above studies and also in a review of head on collisions to identify locations where the installation of a median wire rope barrier might be expected to reduce the frequency of this type of crash.

Craig has also studied the crash and moving violation (offence) experience of about 50,000 young drivers in South Australia over five years. Funded by Austroads, the report on this work is expected to be released early in 2008.

During 2007 Lisa Wundersitz was awarded the degree of Doctor of Philosophy for a thesis entitled

"Characteristics identifying young drivers at a higher risk of crashing".

A highlight of our on-going testing of new vehicles for the level of protection they provide for a pedestrian in the event of a collision, as part of the Australasian New Car Assessment Program (ANCAP), was the outstandingly high rating of four stars out of a possible four assigned to the new \$25,000 Subaru Impreza. It is only the second car to be assigned this level of pedestrian safety, the other being a \$100,000 Citroen C6. The test results imply, inter alia, that an adult pedestrian hit from the side by an Impreza at 40 km/h could expect to sustain no lower leg fractures or ruptured ligaments in the knee joint.

The safety of children in cars was addressed by Robert Anderson in an assessment of the relative benefits of advising parents when to move their child from one type of child restraint to the next in terms of the weight or age of the child. There are good reasons to rely on age as the better criterion in the instructions accompanying a child restraint.

CASR staff continued to contribute to the work of the South Australian Road Safety Advisory Council and its sub-committees and task forces, and Jeremy Woolley entered a second year as President of the South Australian Branch of the Australian Institute of Traffic Planning and Management.

We acknowledge with gratitude the sustaining support we receive from the South Australian Motor Accident Commission and the Department for Transport, Energy and Infrastructure which continues to be of great importance in enabling us to attract and retain highly competent and dedicated staff.

This is my last annual report as the Director of CASR. It gives me great pleasure to welcome the next Director, Professor Mary Lydon, who comes to CASR from the ARRB Group where she has been General Manager, Research.

Research highlights

Ambulance project

The South Australian Ambulance Service (SAAS) approached CASR in 2007 to obtain guidance in the choice of a new livery for its emergency ambulance fleet. Dr Matthew Baldock reviewed the literature on emergency vehicle markings and, on the basis of the review, provided recommendations to SAAS for the components of a livery that would enhance the conspicuity and safety of their ambulances. The new fleet of ambulances, prepared in accordance with Dr Baldock's recommendations, can now be seen on South Australian roads.



ATSB research grant awarded

Jamie McKenzie, a PhD student with CASR, obtained a research grant of \$21,000 from the Australian Transport Safety Bureau to observe the effects of the Electronic Stability Program (ESP) on real rural crashes within Australia through the use of accurate vehicle dynamics simulations. (This project was one of only two that were funded by ATSB out of 47 submissions.) Of particular interest is how the ESP system affects a loss of control situation in order to lower the severity of a crash or prevent the situation from occurring at all.

No studies to date have shown the link between the statistical reduction in vehicle crash rate and the way in which ESP is designed to function.

Bosch Australia has supplied this project with two generic vehicle models equipped with ESP. These models are a rear wheel drive sedan and a front wheel drive small car. Using these models in software simulations of the crashes obtained from the CASR rural crash database, it will be possible to compare the outcomes of a crash involving a non-ESP-equipped vehicle to the outcomes if the vehicle had been equipped with ESP. The software being used for this project is a powerful vehicle dynamics simulation package, also provided by Bosch Australia, called 'CarSim'. CarSim will be able to interact

directly with the vehicle models supplied by Bosch and display the sequence of events during a loss of control situation both graphically and numerically.

In summary, the aims of this project are to:

- Identify the critical features of ESP systems which contribute to real world crash avoidance
- Identify the crash types in which ESP tends to be more or less effective in avoiding crashes
- Show the benefits, in a loss of control situation, of a vehicle equipped with ESP on Australian rural roads



My view is that the CASR team has made (and continues to make) an outstanding contribution to road safety, and the quality of their work is second to none. Their work has been outstanding in terms of:

- selection of strategically important topics
- making good use of research resources (including multiple uses of important data collections)
- innovative research designs and analysis
- quality of analysis
- communication of results: clear, crisp research reports, and also effective communication of messages to a wider, non-technical audience.

Chris Brooks,
Senior Advisor, Road Safety, Australian Transport Safety Bureau

Seminar presentations / affiliations

SA Police Traffic Policing Forum

CASR was invited to talk at the inaugural SA Police Traffic Policing Forum held at Football Park in June attended by several hundred traffic police. Jeremy Woolley presented on the topic of "Crash Research Findings" and highlighted the importance of police crash data to road safety research and demonstrated how the data was used to assess the outcomes of the move to a 50km/h Default Urban Speed Limit.

Australian Institute of Traffic Planning and Management (AITPM)

Jeremy Woolley is the current branch President of the Australian Institute of Traffic Planning and Management (AITPM), an organisation whose aim is to advance traffic planning and management; to increase the knowledge of its members by encouraging free discussion, exchange of ideas and research in this field; and to provide a central point of reference for practitioners. The organisation holds a series of regular technical forums, an annual day seminar and an annual conference that rotates around the capital cities. Highlights for the year included a highly successful seminar



on the Green Triangle, held in Mt Gambier in August and the creation of a Local Government Traffic Practitioners forum for discussing Local Government Traffic issues as a collective group.

Australasian College of Road Safety (ACRS)

Jeremy Woolley is currently on the South Australian committee of the Australasian College of Road Safety, a position he has held since 2002. Jeremy brings a research perspective to the State Chapter and assists with the organisation of regular "Lunchtime Dialogues" and special seminars.

CASR has had strong representation at these functions and in 2007 was represented three times.

- Rear End crashes - presented by Matthew Baldock (March)
- Road safety and mass media - presented to the Whyalla Community Road Safety Group - presented by Jeremy Woolley (October)
- Older drivers - presented by Matthew Baldock (November)

Jeremy also represents the College on the Road Safety Advisory Council's Speed Management Task Force.

Visitors to CASR during 2007

Visitor	Position	Institute
Professor Radin Umar	Director General	Malaysian Institute of Road Safety Research (MIROS)
Datuk Suret Singh	Director General	Road Safety Department Malaysia
Dr Bella Dinh-Zarr	North American Director	MAKE ROADS SAFE - The Campaign for Global Road Safety
Dr Thierry Serre	Researcher	The French National Institute for Transport and Safety Research
Dr Jean Shope	Associate Director	University of Michigan Transport Research Institute (UMTRI)
Iain Cameron	Executive Director	Office of Road Safety (Western Australia)
Iskandar Hamid	Research Officer - Vehicle Safety & Biomechanics Research Centre	Malaysian Institute of Road Safety Research (MIROS)
Abdul Rahmat	Research Centre - Vehicle Safety & Biomechanics Research Centre	Malaysian Institute of Road Safety Research (MIROS)

Collaborations



INRETS - French National Institute for Transport and Safety Research

For some time CASR has been involved in the investigation and reconstruction of pedestrian crashes. Through involvement with an international experts group charged with developing test procedures for pedestrian protection (the IHRA Pedestrian Experts Group) the centre has previously worked with experts in the field from INRETS, the French National Institute for Transport and Safety Research (Institut National de Recherche sur les Transports et leur Sécurité). Two departments in particular conduct research work into pedestrian safety that is complementary to that at CASR. The accident investigation team, EDA (Etude Détaillée des Accidents) at the department of Accident Mechanisms, MA (Département Mécanismes d'Accidents)

based in Salon de Provence is one of the few centres in the world to also conduct at scene in depth crash investigations. The Laboratory of Applied Biomechanics, LBA (Laboratoire de Biomécanique Appliquée) based in Marseille, studies and reconstructs accidents investigated by INRETS-MA both with computer simulation and by conducting full-scale tests with post mortem human subjects (PMHS), more simply known as cadavers.

The focus of the collaboration with INRETS is a project to improve the modelling and reconstructions of pedestrian crashes, which would lead to determining testing procedures for vehicle regulations and for consumer awareness. CASR has been developing a pedestrian accident reconstruction methodology which involves using the evidence collected during at scene investigation, computer modelling

of the vehicle and pedestrian, simulation of the impacts between the vehicle and the pedestrian and sub-system testing to yield material properties of the vehicle components. This allows more accurate simulation of the crash event over a range of initial conditions leading to better estimates of pedestrian injuries and the forces and accelerations involved in the impact.

During our collaboration with INRETS the two centres have jointly studied a particular accident case. Alexandra Long from CASR travelled to France to work with the INRETS MA EDA team, exchanging experience and techniques relating to crash investigation and participating in their on call period to be able to bring knowledge of their practices back to the crash investigation team at CASR. In this time Alexandra also met with Dr Thierry Serre and colleagues at LBA, to learn about their research activities and to plan and

prepare a full scale PMHS reconstruction of a case investigated by INRETS-MA. This test was successfully completed providing extensive data on a pedestrian crash case. Professor Jack McLean and Alexandra Long attended the test and the following autopsy which identified the injuries sustained during the crash.

Following this Dr Serre spent two months working with CASR in Adelaide to work on the simulation and reconstruction of the PMHS test, observe and learn about our subsystem testing, and to gain experience of CASR's crash investigation program.

CASR and INRETS benefit from this collaboration by having a valuable knowledge exchange between the centres on crash investigation and pedestrian modelling and reconstruction. By following the CASR methodology of reconstruction and simulation using the PMHS test as a 'real' crash case,

we can compare the injuries of the pedestrian and the details of the crash with our simulation and reconstruction to validate our method. Working together towards improved methods of pedestrian modelling we hope to contribute to knowledge in the area and to the determination of test procedures for regulations to decrease the injuries and severity of injuries to pedestrians and vulnerable road users.

Outcomes of this collaboration will be reported through papers in international journals and presented at conferences from 2008.

MIROS - Malaysian Institute for Road Safety Research

With growing concern about death and injury from motor vehicle accidents on Malaysian roads, the Malaysian Institute for Road Safety Research (MIROS) was

established by the Federal Government in January 2007 as a focal point for road safety research in that Country. With a vision of emerging as a world renowned road safety research institute, MIROS had grown to 80 staff by the end of 2007, with a planned complement of 102 staff supported by an annual budget of 20 million Ringits (about \$7 million AUD).

The Director General of MIROS, Professor Radin Umar and Mr Suret Singh, the Director General of the Road Safety Department Malaysia, visited CASR in March, and Jack McLean visited MIROS in July. Arrangements were then made for two MIROS engineers, Iskandar Hamid and Abdul Manap, to spend two months with CASR commencing in November 2007 for practical instruction in in-depth crash investigation.

(See 'teaching' for information on course content).



Teaching

Undergraduate course

The undergraduate course taught students about the principles of passive and active safety in automotive design, and the role of safe vehicles within a broader context of road safety. The course was coordinated and substantively delivered by CASR staff, but also involved guest lectures from Ford Australia, Autoliv Australia (who design and manufacture restraint systems) and Bosch Australia (who develop electronic stability control systems). The course was also supported by Advea Engineering who donated the software tool MADYMO. This meant that the students were trained in the use of the software and could use it to study the theory of energy management as applied to the design of seat belts.

Postgraduate program

CASR's postgraduate program allows students to enroll in the Centre itself; previously postgraduate students involved in the Centre's projects were enrolled elsewhere in the University. The new arrangements allow us to actively promote positions and recruit students who may be interested in pursuing a research career in road and vehicle safety.

In 2007 one PhD candidate graduated with a Doctorate in Philosophy and two other PhD students continued their PhD studies.

PhD summaries

Lisa Wundersitz - Characteristics identifying young drivers at a higher risk of crashing

PhD (School of Psychology) – Awarded May 2007, Graduated July 2007

In Australia and other developed countries, young drivers are more likely to be involved in crashes than older, more experienced drivers. Interventions need to recognise the heterogeneity of young drivers. Rather than treating all young drivers in the same way, interventions should be matched to the needs of young drivers identified as

CASR has an established research role within the University. It is now expanding to train the future researchers and engineers who will have to apply and extend current knowledge about road and vehicle safety. In 2007 CASR undertook three major teaching initiatives; the provision of a semester subject on vehicle safety for final-year Automotive Engineering students, the provision of a short course on crash investigation for a small team of engineers from Malaysia and the continuation of a postgraduate research program within the Centre.

being at a higher than average risk of crash involvement. Consequently, this thesis aimed to examine characteristics that identify young drivers (aged 16 to 24 years) at a higher risk of crashing and to validate driver subtypes among different young driver populations.

The first of four studies examined the possibility of using previous driving behaviour, reflected in driver records, to identify high-risk drivers, that is, drivers deemed culpable for a fatal crash. Based on a wide variety of questionnaire measures, the second study involved an examination of personality characteristics, driving related attitudes, and behaviours to ascertain whether they could differentiate drivers detected engaging in risky driving (young traffic offenders) from other young drivers (students). Considering that young drivers are not a homogenous group, the third and fourth studies examined whether personality characteristics and attitudes could identify different subtypes among the two young driver populations, specifically subtypes with an elevated crash risk.

Findings confirmed that it was possible to identify young driver subtypes based on personality characteristics and

driving-related attitudes. The existence of high-risk young driver subtypes was confirmed in the two different young driver populations and these subtypes were characterised by similar attributes to other high-risk young driver subtypes identified in the literature. The ways in which interventions and campaigns can be tailored to the needs of these high-risk young driver subtypes were discussed.

Jamie McKenzie - Potential benefits of electronic stability control for Australian rural roads

Started in 2006

Many European, American and some Australian papers have shown that electronic stability control (ESC) provides a large reduction in crash rate. Most papers point out that the greatest reduction is in crashes where a driver loses control of the vehicle. In Australia, this type of loss of control crash occurs mostly in rural areas comprising higher speed limits and unsealed roadside shoulders.

Australian roads differ from European and American roads in many ways. Long stretches of rural highway with unsealed

shoulders are not encountered in most European countries. The materials used on road surfaces will also differ from other countries. In addition, the Australian climate is unique in that there is little rainfall and virtually zero snow or ice compared with America and Europe. The results of overseas studies, while being a useful indication, cannot be simply applied to Australian roads and conditions.

The aim of this research is to predict the effect which electronic stability control will have upon Australian rural crashes. Working closely with BOSCH Australia, a set of simulations will highlight how electronic stability control prevents crashes. Data from a South Australian crash database will also be used to display how prevalent loss of control type crashes are on rural roads.

In 2007 Jamie McKenzie was awarded an Australian Transport Safety Bureau (ATSB) grant to the value of \$21,205. The grant allowed CASR to purchase high fidelity simulation software. The grant also allowed Jamie to travel to Bosch Australia

in Melbourne for three weeks to become familiar with electronic stability control systems and the simulation software.

Jeff Dutschke - Modelling the biomechanics of intracranial trauma

Started in 2006

Blunt head impact, and its associated injury from instances such as car accidents, falls or assaults has been identified as a major cause of loss for the community in both social and economic terms. Despite many decades of research into the area of head injury from blunt impact, debate still exists as to the form a criterion for head injury should take.

This research will take the injury data from some previous experiments where anaesthetised sheep were struck in the head and compare these data against a finite element model of the same sheep experiment. The comparison will be made with criteria that exist in the literature with the aim to elucidate the potential of these criteria for a predictive capability in finite element models.

In-depth crash investigation course - Malaysian Institute for Road Safety Research (MIROS)

There is growing concern about the number of traffic accidents in Malaysia and the number of fatalities and injuries arising from these accidents. Two MIROS engineers spent two months studying in-depth crash investigation at CASR. The training provided the engineers with the practical and theoretical knowledge behind in-depth crash investigation. MIROS is creating a crash investigation unit of its own incorporating the knowledge the engineers acquired while studying at CASR.

The procedure for in-depth crash investigations involves the investigators visiting the scene of the crash, talking to involved parties and witnesses and examining the vehicles. Later investigators find out from medical sources what injuries were sustained by those involved. Investigators aim to reach the scene of the accident before the vehicles are moved and while witnesses are still present. A detailed site plan is prepared and an attempt is made to understand why the crash happened and determine the movements of the vehicles during the crash.

While actively participating in crash investigations, the MIROS engineers were also given a series of lectures and tutorials by CASR staff on many aspects of road safety, including computer-aided crash reconstruction and modelling techniques.



CASR overview

In-depth crash investigation

In 2007, CASR was active in its program of in-depth investigation of South Australian road crashes. The activity was focused on completion of a major end of project report for the Metropolitan In-Depth Crash Investigation Study, and on continued case collection for the Rural In-Depth Crash Investigation Study.

In the Metropolitan Study, CASR investigated a total of 298 crashes that matched the selection criteria. A report has been finalised in which a detailed description is provided for each of these crashes. These descriptions include basic information such as crash type, crash injury severity, types of vehicles involved, day of week, time of day, weather conditions, lighting conditions, road characteristics, road surface conditions, and speed zones. There is also a detailed narrative description

CASR's research program covers a number of areas of road and vehicle safety. From injury biomechanics to the analysis of mass crash records to understanding younger and older drivers, CASR's breadth and depth of knowledge make it a sought after resource for research and information.

of the events of the crash, and photographs of the crash site and the vehicles involved. A surveyed map of the crash site is also included, showing all relevant site characteristics, and the movements and final positions of all crash-involved vehicles (or pedestrians). Finally, details are provided of the vehicles involved in the crash, the positions of the crash participants within those vehicles, the types of restraints available to vehicle occupants and whether

they wore them (or safety equipment used, in the case of cyclists or motorcyclists), and the injuries of all crash participants.

The Rural In-Depth Crash Study continued in 2007 and by year's end, a total of 86 crashes matching the selection criteria had been investigated. All crashes investigated in the study occur beyond the metropolitan area but within 100 km of Adelaide. The crashes also occur



on roads with speed limits of 80 km/h or more and involve transportation to hospital of at least one crash participant.

In 2008, the in-depth crash investigation program will involve the production of a final report on the Metropolitan In-Depth Crash Investigation study, in which the most common factors (human, environmental, vehicular) contributing to the occurrence of each different type of crash (e.g. rear end, pedestrian) will be identified and examined. Case collection and review will also continue in the Rural In-Depth Crash Study until the end of the year.

Analysis of mass data

There are several types of routinely-collected data that are useful to our research and which are collected and collated routinely. The most important is the information about road crashes that is recorded by the police. This has some limitations, but is nevertheless invaluable for tackling many research questions. Mortality and hospital inpatient statistics often give better information about injury. Other databases or datasets are useful for converting crash numbers to crash rates, for example, datasets on how much travel people do, driving licences, and vehicle registrations.

CASR is often tasked with answering questions that can involve the interrogation of any of these datasets. This is achieved through complex queries and, sometimes, data-matching different sets of data. For example, the licence records of thousands of novice drivers were matched with crash records to study the relationship between how, where, and when licences are obtained and the likelihood of crashing in the months following licensure.

Other recent examples of CASR projects that have used such techniques include examining trends in crash numbers in South Australia and analysing the effect of reducing the default urban speed limit from 60 km/h to 50 km/h.

CASR is also developing a web-based interface to mass accident data. The interface, known as WebTARS (Web interface to the Traffic Accident Reporting System), allows simple statistics to be compiled, such as the annual road toll over a period, to more complex reports on site-specific, crash type-specific crash numbers and cross tabulations between different variables. This is providing a powerful tool to both CASR staff and personnel at Department for Transport, Energy and Infrastructure and Motor Accident Commission for studying and exploring the nature of crashes within South Australia.

Computer modelling & reconstruction of pedestrian crashes

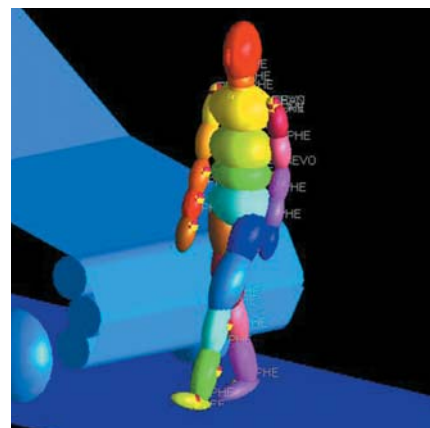
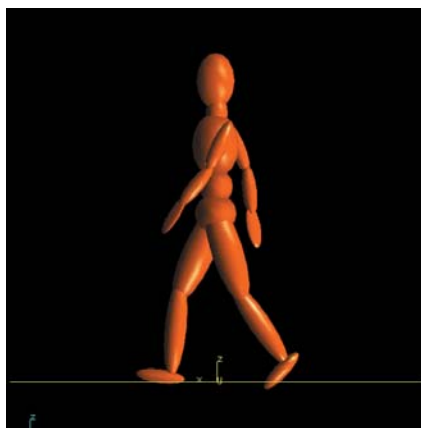
CASR continues to devise simulation tools to study how pedestrians are injured in collisions with vehicles. The simulation represents the pedestrian as a 'multi-body' model of segments connected by kinematic joints. The properties of the model are based on the properties of the human body as measured in human volunteer tests, and validated against published data from tests on human cadavers.

The modelling provides information on head impact speeds typically encountered in pedestrian crashes. This in turn is used to develop test methods to assess the

pedestrian safety of vehicles. Our current interest extends to developing methods of modelling crashes that account for any uncertainties in the reconstruction of the crash.

In 2007 we embarked on an important new collaboration with the French Institut National de Recherche sur les Transports et leur Sécurité (INRETS) on the reconstruction and simulation of pedestrian collisions. This work is focused on validating our methods through the use of physical experimentation. As part of a researcher exchange, Ms Alexandra Long from CASR spent a period in Marseilles at INRETS and we were pleased to be able to welcome Dr Thierry Serre from INRETS, who worked with us for two months in 2007. More details on this collaboration are contained in the Section "Collaborations".

We have also extended our methods to examine secondary effects of bull bars on pedestrian collisions: it is well understood that bull bars are more aggressive than the unprotected front of a car in pedestrian crashes, but little had been done to examine their effects on the motion of the pedestrian in a crash. More information on this project is given in the Section "Project summaries".



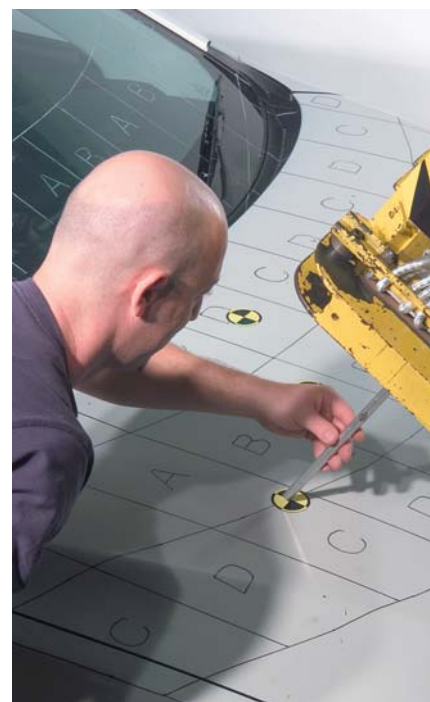
Impact laboratory testing

CASR studies the influence of vehicle design on pedestrian injury in a collision. The Streeter Impact Laboratory is a central component of our pedestrian safety research, which considers both accident prevention and injury mitigation through vehicle design.

It is the only laboratory in Australia able to conduct pedestrian “sub-system” impact tests on vehicles. It is equipped to assess the danger posed by the front of a vehicle to a pedestrian. Our study does not use crash test dummies, as is done with studies on occupant protection, but “sub-systems” that represent, separately, the head, upper leg, and lower leg of a pedestrian. These sub-system impactors are launched at the stationary vehicle. The laboratory’s main client is the Australasian New Car Assessment

Program, which regularly publishes the results of the pedestrian sub-system tests (see “Pedestrian testing for the Australasian New Car Assessment Program”).

Quantifying and studying the impacts between a pedestrian and a vehicle in a crash can lead to a better standard of pedestrian protection. We have used the laboratory extensively in the reconstruction of actual pedestrian crashes to relate injuries to the head to the forces that produced the injury. Our expertise in the laboratory complements the unique data on real-world pedestrian injury we have compiled, in building a knowledge bank that will help ensure greater protection of pedestrians in the future.



Pedestrian testing for the Australasian New Car Assessment Program

One of our most significant clients is the Australasian New Car Assessment Program (ANCAP). ANCAP is a consortium of Australian and New Zealand motoring clubs, State government departments, and motor injury insurance authorities. It provides vehicle buyers with information on the crash performance of vehicles, including side impact tests, offset-frontal tests and pedestrian tests. Since 1999 we have been contracted to perform the pedestrian tests, and since 2000 we have tested about 70 vehicles for the program.

The tests are designed to measure the risk of injury to pedestrians in a collision with the front of the vehicle. Many kinds of crash tests use instrumented dummies to measure injury risk, but, for pedestrian safety tests,

'sub-system' impactors representing different regions of the body are used. The different impactors represent the head of an adult pedestrian, the head of child pedestrian, the upper leg of an adult pedestrian and the knee/lower leg of an adult pedestrian.

The headform tests are conducted on the bonnet and at the base of the windscreen at a speed of 40 km/h. An impact on the windscreen itself is considered to be 'safe' and unlikely to cause serious injury. Twelve different locations are tested, and manufacturers can nominate extra tests and different locations to modify the test score. The results of the headform tests contribute most strongly to the overall assessment of the vehicle. The headform measures impact deceleration, and this is used to rate the severity of the impact.

The upper legform tests are conducted along the leading edge of the vehicle

bonnet. The impactor measures the severity of the impact and the risk of fracture to an adult pedestrian's femur and pelvis.

The full legform tests are conducted along the front bumper of the vehicle. They measure the risk of ligament damage to the knee and the risk of fracturing the tibia and fibula.

Individual test scores are summarised by a star rating between 0 and 4. Generally, the testing has shown a range of results, with some vehicles clearly designed to ensure some level of protection for pedestrians, while other vehicles have performed poorly. The test scores generally lie in the range of one to three stars but this year the Subaru Impreza received a four star rating, only the second vehicle in the world to do so.

For more information on the program, please visit <http://www.ancap.com.au>.



Library



CASR holds the largest and most comprehensive collection of road accident material in Australia.

The highly specialised library provides support for the research staff of the Centre by way of literature reviews, current awareness services and inter-library loans, and also provides limited reference support to affiliated organisations and other libraries.

The library holds a comprehensive collection of local and international materials including the latest research reports, conference proceedings, journals and books.

The collection focuses on the areas of road accidents, road safety, crash injury biomechanics and injury prevention, road accident statistics and epidemiology.

The Centre's website (<http://casr.adelaide.edu.au>) facilitates the dissemination of this information and includes a link to the library catalogue as well as electronic copies of CASR

research reports and current awareness bulletins listing items recently added to the library collection.

The CASR librarian produces a weekly email news-alert service, which informs those involved in road safety research or policy of the latest Australian and international developments.

In 2007 the library provided research support to the students enrolled in the Automotive Safety course. One-on-one meetings were held with the students to discuss project topics, possible sources of information and to assist the students in locating resources. Research support and basic online research training was also provided to the in-depth crash investigation course participants.



Project summaries

Safety benefits of conspicuous traffic signals: mast arms

Traffic signal conspicuity is likely to be a causal factor behind difficulties in detecting traffic signals. There is increasing interest in South Australia in providing mast arm mounted traffic signals at intersections to increase traffic signal conspicuity and reduce specific crash types. This report reviewed best practice principles in the conspicuity of traffic signals and examined the extent to which poor conspicuity of traffic signals contributed to crashes at signalised intersections. The literature, mostly from the United States, indicated that around 40 to 55 per cent of drivers involved in crashes at signalised intersections claimed that they "did not see" the traffic signal. Consequently, measures that can improve the conspicuity of traffic signals, such as mast arms, are likely to reduce related crashes.

This report also attempted to quantify any road safety benefits in terms of crash reductions of installing additional traffic signals and specifically traffic signals on mast arms at intersections. Research evidence from a number of evaluations showed that the installation of mast arms at intersections was associated with effects ranging from an estimated 89 per cent reduction in the total number of crashes to a 21 per cent increase in crashes. The greatest crash reductions were reported for right angle crashes (15-100%) while left turn crashes (equivalent to right turn in Australia) were associated with small crash reductions. Although this review shows that mast arms were mostly associated with crash reductions, it is important to note that these findings are not conclusive as many of the evaluations suffered from poor methodological design.

For more information, please contact
Lisa Wundersitz
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Evaluation of the Adelaide Hills 80km/h speed limit change

At the beginning of 2002 the speed limit on sections of Department for Transport, Energy and Infrastructure roads in the areas of the Adelaide Hills Council and the District Council of Mount Barker were changed from 100 km/h to 80 km/h. The changes occurred in areas having a high proportion of winding or hilly road sections where a speed limit of 100 km/h was considered unjustifiable.

Previously, public perception of the change has been reported on, as well as changes to measured travelling speeds before and after the speed limit change, for a limited period and number of sites. This study evaluated crash numbers before and after the speed limit reduction, on the affected roads, to detect any change in crash occurrence attributable to the speed limit change. This report was in the final stages of editing at the end of 2007.

For more information, please contact
Paul Hutchinson
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Review of the literature on coffee stops as a road safety measure

Caffeine is a widely available mild stimulant thought to promote alertness. It has been suggested that the consumption of caffeine could be promoted at designated 'coffee stops' by the side of the road in rest areas. However, there is some concern that coffee stops might encourage driving when a driver should be resting. Although such roadside initiatives have been operating in Australia and overseas for many years, there are few quantitative evaluations examining the road safety benefits of such programs. Based on empirical research evidence, there is some support for the provision of coffee at roadside rest stops to temporarily alleviate fatigue when driving. However, the combination of drinking caffeine



(approximately two cups of coffee) and napping (i.e., 15 minutes) during a break appears to be more beneficial than caffeine alone. Therefore, to enhance the beneficial effects of coffee stops, drivers feeling fatigued should be encouraged to take a 10 to 15 minute nap and to consume coffee. Even though caffeine has a beneficial effect in alleviating fatigue, these effects are only temporary, lasting for about two hours. Consequently, caffeine alone should not be promoted as a substitute for sleep.

For more information, please contact
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Project reports are available
online at:
casr.adelaide.edu.au/reports



Review of tailgating literature

An obvious cause of rear end crashes is following too closely - tailgating as it is called. A review is being made of the importance of tailgating in rear end crashes in South Australia, and of potential countermeasures.

For more information please contact
Paul Hutchinson
paul@casr.adelaide.edu.au

Courtesy campaigns

Courtesy on the roads refers to both behaviours (the presence of some and the absence of others), and to the attitudes and habits of mind that accompany behaviours. As behaviour, courtesy is mostly safe but sometimes not (when it is in conflict with the conventions of driving). As an attitude - thinking about possible actions of other road users and adjusting one's own behaviour, and avoiding any aggressiveness in one's driving - courtesy certainly should be encouraged. A report is being prepared on what place there might be for road courtesy within road safety advertising.

For more information, please contact
Paul Hutchinson
paul@casr.adelaide.edu.au

Key performance indicators of enforced driver behaviours

The Centre for Automotive Safety Research is commissioned by the Department for Transport, Energy and Infrastructure to produce an annual report quantifying performance indicators for selected enforced behaviours (drink driving, speeding and restraint use) in South Australia. These annual reports are then tabled in State Parliament.

The drink driving section includes data concerning the number of random breath tests conducted, the percentage of licensed drivers tested, the number of drink drivers detected, the number of drivers detected using random breath testing, blood alcohol levels of seriously and fatally injured drivers

and riders, roadside drink driving surveys, and expenditure on anti-drink driving publicity. The speeding section provides data concerning the number of hours of speed detection, the number of drivers detected speeding, speeding detection rates, the extent of excessive speed as the apparent error in serious and fatal crashes, on-road speed surveys, and expenditure on anti-speeding publicity. The restraint use section provides data concerning levels of restraint use enforcement, restraint non-use offences, restraint use by vehicle occupants in serious and fatal crashes, on-road observational restraint use surveys, and expenditure on restraint use publicity. For some categories of information, comparisons are made with jurisdictions in other states.

For more information, please contact
Matthew Baldock
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Best practice review of SA drink drive enforcement

Drink driving continues to be a major causal factor in fatal and injury crashes. The Alcohol and Drugs Taskforce of the Road Safety Advisory Council requested a project to determine what was considered best practice in terms of drink drive enforcement in the South Australian context. The aim of the project was to examine ways in which police drink driving enforcement could be optimised. The project reviewed enforcement practices that had the greatest potential to reduce the incidence of drink driving and ultimately the number of drink drive crashes in SA. This involved a review of international literature, analysis of police data, comparison with interstate data, a review of SA enforcement practices and discussions with managerial and operational officers of the SA Police. Ways in which drink drive enforcement can be enhanced in South Australia are discussed.

For more information please contact
Lisa Wundersitz
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Young driver cohort study

CASR completed a major study on the offence and crash experience of nearly 50,000 young drivers over a five year period during 2007. The main aim of the project was to search for patterns or trends which may lead to the development of measures to reduce the crash risk of this group of drivers. Based on police accident reports and driver licensing data, the final report on this study has been submitted to Austroads.

For more information, please contact
Craig Kloeden
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Development of a Sturt Highway Roadside Hazards Reduction Strategy

CASR was commissioned to assist the Department for Transport, Energy and Infrastructure (DTEI) with the development of a Roadside Hazards Reduction Strategy for the Sturt Highway between Nuriootpa and the State border with Victoria. The objectives of the project were to: 1) develop a proactive roadside hazards reduction strategy that targets the removal or shielding of roadside hazards adjacent to the Sturt Highway; 2) determine if such a strategy is likely to have safety benefits that would justify the investment required to undertake the treatments identified by the strategy; 3) if found to be warranted, develop a prioritised and costed programme of works in collaboration with DTEI for roadside hazard shielding or removal; and 4) create a log of the most significant hazards along the Sturt Highway. This was to be achieved with a combination of crash analysis (both aggregate TARS data and in-depth cases), the creation of a roadside hazards log and the estimate of a 'whole of road' benefit:cost treatment program in cooperation with DTEI engineers. The project is due for completion in 2007.

For more information, please contact
Jeremy Woolley
jeremy@casr.adelaide.edu.au

Benefits of the introduction of an Australian Design Rule on pedestrian protection

Improvements to vehicle frontal design can improve a pedestrian's chance of survival and reduce the risk of serious injury in a collision. Europe and Japan have introduced vehicle design regulations to improve the safety of pedestrians who are struck by a passenger vehicle, but there are no similar design rules pertaining to pedestrian protection in Australia. However one consequence of overseas regulation is that there may be a flow of safer designs coming into the Australian vehicle fleet through the importation of vehicles; this might mean that Australia is benefiting to some extent, even though it does not have any design regulations of its own.

To assess the size of this effect, CASR compared the distribution of pedestrian safety performance of the new car fleet of Australia with those of France and the United Kingdom. This showed that new passenger vehicles rated less than 2-stars for pedestrian safety by the European New Car Assessment Program (Euro NCAP) and the Australasian New Car Assessment Program (ANCAP) accounted for a greater proportion of all new passenger vehicles sold in Australia than in France and the United Kingdom. Furthermore, the proportion of the French and British car fleet that is made up of recently released vehicles performs better than the equivalent segment of the Australian new car fleet – although improvements are evident in the Australian fleet too. This period corresponds with the introduction of new vehicle pedestrian safety regulations in Europe.

The gap in the level of pedestrian protection between Europe and Australia might be largely overcome if Australian made vehicles also included some pedestrian safety countermeasures and an Australian Design Rule (ADR) would assist in their introduction. This project is also

examining the likely change in vehicle test performance if an ADR was introduced and the consequent benefits.

For more information, please contact Robert Anderson
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Bull bar prevalence

Continuing the theme of research on bull bars, CASR conducted a survey to examine their prevalence on the roads in Adelaide. While bull bars are easy to spot on urban roads in Australia, very little has been done to try and measure the exposure of pedestrians to bull bars in crashes.

We went to the locations of 30 randomly selected pedestrian crashes that occurred in 2005, at the same time of day and day of week. The aim of this sampling design was to look at locations most relevant to where pedestrians are known to have been struck by a vehicle. Vehicles were observed and counts were made of heavy and light vehicles and also of bull bar numbers, by type of vehicle.

Overall, 8.6% of vehicles were equipped with a bull bar. Bull bar prevalence was much greater amongst heavy vehicles (28%), but heavy vehicles formed only a minor component of the traffic volume at the locations we visited. The average site prevalence amongst light vehicle traffic was 7.5%. Site prevalence was lowest in the CBD (average 5.5%) and highest in the outer metropolitan area (average 9.1%). 4WD vehicles are the most common vehicle type to have a bull bar fitted and 4WD vehicles with bull bars are twice as prevalent at the sites of crashes as the next most common type of bull bar equipped vehicle, work utilities.

For more information, please contact Robert Anderson
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Bull bar geometry

Previously, CASR conducted tests on bull bars to assess how much more potentially injurious they are in a pedestrian crash compared to the front of the vehicles to





which they attach. (All vehicles tested were high ground clearance 4WDs). While that study was able to quantify the effect of bull bars in the primary impact, we were also interested to examine if there were secondary effects too: it is well understood that bull bars are more aggressive in pedestrian crashes, but little has been done to examine their effects on the motion of the pedestrian in a crash.

The test data that was recorded in the tests was analysed so that the stiffness and energy absorption properties of the bull bars could be modelled using the simulation software MADYMO. The geometry of the vehicles and bull bars was also modelled and simulations were set up to examine the motion of an adult pedestrian in a typical crash at 30 km/h.

An interesting finding was that, despite a range of contact-impact properties (i.e plastic bull bars are softer than steel bull bars), all designs had a negative effect on the motion of the pedestrian. Typically, the head impact speed on to the bonnet was increased, which would increase the risk of head injury from that impact.

A publication presenting the results of this study is being prepared.

For more information, please contact
Robert Anderson
robert@casr.adelaide.edu.au

The self-regulation of the driving behaviour of older drivers: A longitudinal assessment.

In 2007, James Thompson, an Honours Psychology student from the University of Adelaide, jointly supervised by Matthew Baldock from CASR and Associate Professor Jane Mathias of the Psychology Department, undertook a follow-up study to Matthew Baldock's PhD study of older driver behaviour. Fifty four drivers from the initial study were re-contacted and asked to complete the questionnaire about driving behaviour and the functional tests previously administered five years earlier. The questionnaire measured health, driving confidence and self-regulation (specifically, the avoidance of difficult driving situations). The functional tests included measures of depressed mood, state and trait anxiety,

visual acuity, contrast sensitivity, cognitive functioning, information processing speed, visuospatial memory and visual attention. In addition to the repeated tests, participants completed a personality test.

Since the previous study, participants overall had exhibited declines in visual acuity, contrast sensitivity and visual attention, and had increased their use of medication. There was no change, however, in the degree of self-regulation of driving behaviour, suggesting that declines over time in functional ability do not lead to increasing avoidance of difficult driving situations. Therefore, if self-regulation is to be encouraged, interventions are necessary to prompt older drivers to respond to changes in functioning. It was also found that self-regulation was not associated with any aspects of personality that were measured (extraversion, neuroticism, openness to experience, agreeableness and conscientiousness).

For more information, please contact
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Speed surveys

CASR has been involved in the development of a metropolitan speed monitoring program and database for Department for Transport, Energy and Infrastructure. The program is designed to provide speed data on a sample of Adelaide roads so that trends may be monitored over time. Prior to 2007, no regular speed measurement programs existed for the metropolitan area. The inaugural set of speed measurements were conducted in late 2007 at 81 sites consisting of 50 km/h local and collector roads, and 60km/h and 80 km/h arterial roads. CASR will be analysing the data on an annual basis and reporting trends to DTEI. Rural data will be obtained from existing DTEI measurement programs and also analysed by CASR.

For more information, please contact
Jeremy Woolley
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NTC heavy vehicles

On the basis of our previous case-control studies establishing a relationship between travelling speed and casualty crash involvement, CASR was asked by the National Transport Commission (NTC) to investigate the feasibility of replicating those studies for heavy vehicles. However, that a case-control study for heavy vehicles would involve considerable methodological difficulties, alternative approaches were investigated. An exploratory study of an alternative method using aggregate observational data matched with crash databases proved feasible but in most cases we could not obtain the necessary approvals to access the required data.

For more information, please contact
Jeremy Woolley
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Traffic management and infrastructure: Lessons from in-depth crash investigation

CASR was awarded a three year project by AUSTROADS to investigate the roles of traffic management practices and the performance of road infrastructure in crashes in our in-depth crash database. The objectives of the project are to: increase the availability of detailed information on the performance of road infrastructure and traffic management practices in casualty crashes; and to assist road transport agencies to identify and assess ways to further improve safety standards and road safety related management practices.

Current traffic management and engineering practices are doing much to reduce the frequency and severity of road crashes, but most judgments on effectiveness are based on traffic accident data routinely collected by the police. This may be adequate for aggregate analyses of crashes on the road network in general, but it lacks a level of detail that can be more enlightening about



factors that contribute to the causation and consequences of crashes. CASR in-depth crash investigations will be used to provide detailed feedback on the performance of road infrastructure and traffic management practices, including the circumstances surrounding the crash, the perception of the road environment by the crash participants and whether the road infrastructure actually performed as intended. In some cases this approach can identify possibilities for the further improvement of current standards and guidelines. The project will run over a three year period with a visit of all State road authorities in the final year to discuss the findings.

For more information, please contact
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Staff profiles



Jack McLean, Professorial Research Fellow in Road Safety, Director

Qualifications: PhD in Epidemiology and Biostatistics (Harvard University); MSc in Environmental Health (Harvard University); ME, University of Adelaide; BE, University of Adelaide

Specialised areas: Crash injury biomechanics, with emphasis on brain injury; Vehicle, road and traffic factors in crash and injury causation; Human factors in crash causation

Awards: Centenary Medal, Commonwealth of Australia 2003; Basil Hetzel Leadership on Public Health Award 2002; Widmark Award of the International Council on Alcohol, Drugs and Traffic Safety 2002; SA Great Award - Health 2001; Vulcan award for best scientific paper, Australasian Road Safety Researchers Conference 1998; Medal of the International Association of Accident and Traffic Medicine 1995; Graeme Grove Medal of the Royal Australasian College of Surgeons 1989; Volvo International Traffic Safety Award 1988

Professional affiliations: Australian Academy of Technological Sciences and Engineering; South Australian Road Safety Advisory Council; International Research Council on the Biomechanics of Impact (IRCOCI); International Council on Alcohol, Drugs and Traffic Safety (ICADTS); Australian Institute of Traffic Planning and Management; Society of Automotive Engineers (USA); Statistics Society of Australia; Institution of Engineers, Australia



Robert Anderson, Deputy Director

Qualifications: BE (Hons), University of Adelaide; PhD, University of Adelaide

Specialised areas: Brain injury biomechanics; Pedestrian injury; Simulation and modelling of pedestrians and occupants in crashes; Road safety evaluations

Awards: Elizabeth Penfold Simpson Prize 2003 awarded by the Brain Foundation (SA); Vulcan Award for best scientific paper, Australasian Road Safety Researchers Conference 2002

Professional affiliations: Institution of Engineers Australia Injury Biomechanics Panel; SA Road Safety Advisory Council Vehicle Restraint Use Task Force; CS-076, Standards Australia Committee for Protective Helmets for Vehicle Users; CS-085, Standards Australia Committee for Child Restraints For Use In Motor Vehicles

Current research: Multi-body models for stochastic modelling of pedestrian collisions; Design-for-age specifications for child restraints; FE modelling of mechanisms of brain injury; Estimating future benefits of vehicle electronic stability control in Australia; Pedestrian subsystem impact testing; Crashworthiness



Paul Hutchinson, Senior Research Fellow

Qualifications: MA, University of Cambridge; PhD, University of London

Specialised areas: Empirical studies of road crash data; Statistical modelling of road crash data; Traffic management and public transport; Mathematical statistics applied in other areas; Quantitative topics within psychology

Professional affiliations: Chartered Institute of Transport and Logistics; Institution of Highways and Transportation; British Psychological Society; Safety and Reliability Society; Royal Statistical Society

Current research: Accidents to pedestrians and cyclists; Changes in crash numbers; Similarities and contrasts between crashes and driving offences; Statistical description of why effects may differ according to circumstances; Design-for-age specifications for child restraints; Real-world randomised experimentation in road safety and transport; Personality and bad driving; Statistical modelling of injury severity; Routine recording and processing of crash data



Jeremy Woolley, Senior Research Fellow

Qualifications: BE (Hons), University of South Australia; PhD, University of South Australia

Specialised areas: Traffic management; Road design and infrastructure; Road safety audit and risk management; Road Safety Program evaluation; Road safety in developing countries; In-depth crash investigation; Enforcement practices; Traffic modelling; Mass media and communications; Environmental impact modelling

Awards: Outstanding paper award (co-author), 5th Eastern Asia Society of Transportation Studies (EASTS) Conference, Fukuoka, Japan (2003); Associate Supervisor of the Year, UniSA Student's Association (2003)

Professional affiliations: President, Australian Institute of Traffic Planning and Management (AITPM), SA branch; Committee Member, Australasian College of Road Safety, (ACRS), SA branch; International Scientific Committee, Eastern Asia Society for Transport Studies (EASTS); Member, Speed Management Task Force (on behalf of ACRS), SA Road Safety Advisory Council; Member, Heavy Vehicle Task Force, Fitness to Drive Task Force, SA Road Safety Advisory Council

Current research: In-depth crash investigation; Road design and safety; Road safety audits; Traffic management and safety; Enforcement practices; Heavy vehicle safety; Road Safety Program evaluation; Speeding and speed limits; Roadside hazard treatment



Matthew Baldock, Research Fellow

Qualifications: BA (Hons), University of Adelaide; PhD, University of Adelaide

Specialised areas: Older drivers; In-depth crash investigation

Awards: 1995 Australian Psychological Society Prize; 2005 Frank Dalziel Memorial Prize

Professional affiliations: Member of International Council on Alcohol, Drugs and Traffic Safety (ICADTS)

Current research: In-depth investigation of rural road crashes; Longitudinal study of the driving behaviour of older drivers; Performance indicators of enforced driver behaviours (drink driving, speeding, restraint use)



Craig Kloeden, Research Fellow IT

Qualifications: BA, University of Adelaide

Specialised areas: Large data set analysis; Crash reconstruction; Speed and crash risk; Young drivers

Professional affiliations: Member and Webmaster of the International Council on Alcohol, Drugs and Traffic Safety (ICADTS)

Current research: Developing a web interface to South Australian crash data; Tracking the crash offence experience of a cohort of young drivers over time



Lisa Wundersitz, Research Fellow

Qualifications: BA (Hons), University of Adelaide; PhD, University of Adelaide

Specialised areas: Young driver research; Driver attitudes and behaviour

Professional affiliations: Driver Intervention Program

Current research: Personality characteristics and attitudes of young drivers; In-depth investigation of rural road crashes; Performance indicators of enforced driver behaviours (drink driving, speeding, restraint use); Travel exposure measures



Giulio Ponte, Research Engineer

Qualifications: BE, University of Adelaide

Specialised areas: In-depth crash investigation; Computer aided reconstruction; Pedestrian sub-system testing; Vehicle safety testing and assessment

Awards: Vulcan award for best scientific paper (co-author), Australasian Road Safety Researchers Conference 1998, 2002

Current research: In-depth investigation of rural road crashes; ANCAP pedestrian testing; Pedestrian impact reconstruction; Vehicle design for pedestrian safety



Alex Long, Research Engineer

Qualifications: BE (Hons), University of Adelaide; BA, University of Adelaide

Specialised areas: MADYMO modelling of the pedestrian to vehicle interaction; In-depth crash investigation

Professional affiliations: The Institution of Engineers Australia

Current research: Collaborative research into pedestrian accidents with the Institut National de Recherche sur les Transports e leur Sécurité (INRETS), France; Evaluation of speed limit reductions

**Andrew van den Berg, Impact Laboratory Manager**

Qualifications: BE (Hons), University of Adelaide

Specialised areas: Pedestrian sub-system testing; Instrumentation and signal processing; Vehicle safety testing

Professional affiliations: The Institution of Engineers Australia

Current research: ANCAP pedestrian impact testing; Pedestrian impact reconstruction; Vehicle frontal protection systems performance testing

**Daniel Searson, Laboratory Research Officer**

Qualifications: BE (Hons), University of Adelaide

Specialised areas: Pedestrian subsystem testing; Instrumentation and signal processing; Vehicle safety testing

Current research: ANCAP pedestrian impact testing; Pedestrian impact reconstruction; Vehicle frontal protection systems performance testing

**Tori Lindsay, Research Officer**

Qualifications: RN RM; Dip App Sc, SA College of Advanced Education; BN Ed, Flinders University

Specialised areas: Medical conditions as contributing factors in crash causation; Abbreviated injury scoring; In-depth crash investigation

Professional affiliations: International Traffic Medicine Association (member)

Current research: In-depth crash investigation

**Sam Doecke, Research Officer**

Qualifications: BE (Hons), University of Adelaide

Specialised areas: At scene In-depth crash investigation; Computer aided automobile crash reconstruction; MADYMO modelling of pedestrian impacts

Current research: In-depth investigation of rural road crashes; MADYMO modelling of the effect of bull bar geometry on pedestrian impacts; Bull bar prevalence; Sturt Highway hazards and auditing the TARS database

PhD students**Jeff Dutschke, PhD student**

Qualifications: BE (Hons), University of Adelaide; BSc (Ma & Comp Sc.), University of Adelaide

Current research: Modelling the biomechanics of intracranial trauma

Administrative staff**Leonie Witter, Business manager****Jamie Mackenzie, PhD student**

Qualifications: BE (Hons) University of Adelaide

Current research: Potential benefits of electronic stability control for Australian rural roads

**Jaime Royals, Information Manager**

Qualifications: BA (Library & Info Mmnt), University of South Australia

Publications



Conference papers

Anderson RWG, Hutchinson TP, Edwards SA (2007) Using child age or weight in selecting type of in-vehicle restraint: Implications for promotion and design. Presented at the 51st Annual Scientific Conference of the Association for the Advancement of Automotive Medicine, Melbourne, Australia, 14-17 October 2007

Anderson RWG, Hutchinson TP (2007) Many children progress from one type of restraint to the next at too small a size: Should advice to parents be simple and based on child age, with variation in child size accommodated by overlaps in restraint specifications? Presented at the Conference of the Australasian College of Road Safety on Infants, Children and Young People, and Road Safety, Sydney, Australia, 2-3 August 2007

Anderson RWG, Hutchinson TP (2007) The feasibility of age-based criteria for child restraint selection in proceedings of 20th International Technical Conference on the Enhanced Safety of Vehicles, Lyon, France, 18-21 June 2007

Anderson RWG, McLean AJ, Ponte G, Streeter L (2007) Pedestrian reconstruction using multibody MADYMO simulation and the Polar-II dummy: a comparison of head kinematics in proceedings of 20th International Technical Conference on the Enhanced Safety of Vehicles, Lyon, France, 18-21 June 2007

Baldock MRJ (2007) Cannabis and the risk of crash involvement. Paper presented at the 20th Annual Conference of the Australian and New Zealand Society of Criminology, Adelaide, Australia, 23-26 September 2007.

Baldock MRJ, Wundersitz LN, McLean AJ (2007) Mobile random breath testing in Australia. Paper presented at T2007 International Council for Alcohol, Drugs and Traffic Safety Conference, 26-30 August 2007, Seattle, USA.

Hutchinson TP (2007) Matching a message to an audience - What does this mean? Presented at the 29th Conference of Australian Institutes of Transport Research, held at the University of South Australia, Adelaide

Hutchinson TP, Kloeden CN, Long AD (2007) Child bicyclist traffic casualties in South Australia. Presented at the Conference of the Australasian College of Road Safety on Infants, Children and Young People, and Road Safety, Sydney, Australia, 2-3 August 2007

Hutchinson TP, Kloeden CN, Wundersitz LN (2007) South Australia's Driver Intervention Program: Personality characteristics of participants, and their subsequent crash and offence experience. Presented at the 2007 Road Safety Research, Education and Policing Conference, Melbourne, Australia, 17-19 October 2007

Kloeden CN, Anderson RWG, Hutchinson TP (2007) Differences between groups of drivers: Offences contrasted with crashes. Presented at the 20th Annual Conference of the Australian and New Zealand Society of Criminology, Adelaide, Australia, 23-26 September 2007

Kloeden CN, Hutchinson TP (2007) Follow-up of subsequent crash and offence records of offending drivers who either did or did not attend an intervention program. Presented at the 30th Australasian Transport Research Forum, Melbourne, Australia, 25-27 September 2007

Kloeden CN, McLean AJ, Ponte G (2007) Active / passive safety: applying integrated solutions to rollover crashes in proceedings of 20th International Technical Conference on the Enhanced Safety of Vehicles, Lyon, France, 18-21 June 2007

Kloeden CN, Woolley JE, McLean AJ (2007) A Follow-up Evaluation of the 50km/h Default Urban Speed Limit in South Australia. Presented at the 2007 Road Safety Research, Education and Policing Conference, Melbourne, Australia, 17-19 October 2007

Long AD, Ponte G, Anderson RWG (2007) The CASR pedestrian crash analysis: at-scene investigation, computer simulation and sub-system reconstruction. Presented at the Conference of the XXI Congress of International Society of Biomechanics, Taipei, Taiwan, 1-5 July 2007

Ponte G, Anderson RWG, Searson D (2007) A comparison of the pedestrian passive safety performance of the new vehicle fleet in Australia, France and the United Kingdom. Presented at the 2007 Road Safety Research, Education and Policing Conference, Melbourne, Australia, 17-19 October 2007



CASR report series

Baldock MRJ (2007) Review of the literature on cannabis and crash risk. Adelaide: Centre for Automotive Safety Research

Baldock MRJ, Woolley JE, Wundersitz LN, McLean AJ (2007) Annual performance indicators of enforced driver behaviours in South Australia, 2004. Adelaide: Centre for Automotive Safety Research

Kloeden CN, Versteegh SL, Lindsay VL, McLean AJ (2007) Right turn crashes at signalised intersections. Adelaide: Centre for Automotive Safety Research

Wundersitz LN, Baldock MRJ, Woolley JE, McLean AJ (2007) Annual performance indicators of enforced driver behaviours in South Australia, 2003. Adelaide: Centre for Automotive Safety Research

Journal articles

Baldock MRJ, Mathias J, McLean J, Berndt A (2007) Visual attention as a predictor of on-road driving performance of older drivers. *Australian Journal of Psychology*; 59(3): 159-168

Hutchinson TP (2007) When the effect of one thing depends on another: Not a reason for complete pessimism. *Australian Defence Force Journal*; 174: 29-38

Hutchinson TP (2007) Promoting Child Booster Seat Use: Has No-one Ever Done High Quality Research?. *American Journal of Preventive Medicine*. *American Journal of Preventative Medicine*; 34(3): 268-268

Hutchinson TP (2007) Concerns about methodology used in real-world experiments on transport and transport safety. *Journal of Transportation Engineering (American Society of Civil Engineers)*; 133 (1): 30-38

Hutchinson TP (2007) Free-response operator characteristic models for visual search. *Physics in Medicine and Biology*; 52: L1-L3

Hutchinson TP (2007) How to find multiple systems underlying a two-way table of 0's and 1's, with applications to cognitive impairments and medical laboratory science. *Journal of Data Science*; 5: 335-356

Hutchinson TP, Kloeden, CN, and Long, AD (2007) Adult pedal cycle casualties in South Australia. *Transport Engineering in Australia*; 11(1): 1-11

Hutchinson TP, Meier AJ (2007) Evidence-based anything: priorities for librarians. *E-JASL: The Electronic Journal of Academic and Special Librarianship*; 8(2)

Jack McLean



During his time as Director of CASR, formerly the Road Accident Research Unit, he co-ordinated and conducted research into a wide variety of areas related to traffic safety, and in the process contributed directly to significant reductions in the road toll not only in Australia but throughout the world.

After completing a Bachelor of Engineering degree at the University of Adelaide in 1961, Jack McLean held a series of research posts in the UK, Australia and the US, before being awarded a Master of Engineering, again from the University of Adelaide, in 1968. Studies at Harvard University led to his being awarded further degrees: a Master of Science in Hygiene in the field of Environmental Health, and a Doctor of Science in the fields of Epidemiology and Biostatistics.

Upon achieving his doctorate, Dr McLean returned to Adelaide where he founded the Road Accident Research Unit in 1973. In the remainder of the decade,

On Friday, March 28, 2008, Professor Jack McLean officially retired as Director of the Centre for Automotive Safety Research, after a distinguished career in road safety research stretching back over 40 years.

he established the Unit as a centre for excellence and innovation in the field of in-depth at-scene road accident investigation. Not only did he help set the benchmark for in-depth investigation of road crashes, as recognised by the World Health Organisation, but also harnessed the knowledge he derived from these early crash studies to direct subsequent research towards the factors most significant in contributing to the spiralling road toll.

This resulted in Professor McLean being consistently at the forefront of research addressing both the causes and consequences of road accidents. In particular, he has been a world leader in the coordination of studies into alcohol impairment, vehicle speed, road infrastructure, head injury and the protection of pedestrians through improved vehicle design.

In addition to his influential research, Professor McLean has also contributed to road safety policy in Australia and overseas through his membership and participation in various boards and committees, and worldwide road safety bodies. Included in a long list of professional societies to which he has belonged is ICADTS, the International Council on Alcohol, Drugs and Traffic Safety. A member since 1986, he served as President from 1995 to 1997, and in 1995 helped host the ICADTS international conference in Adelaide. He was also one of eight select members of the Global Traffic Safety Trust, formed officially in 1989 to aid in the transfer of road safety knowledge to developing countries. The prior work of this group of researchers was recognised with the Volvo International Traffic Safety Award in 1988.

Professor McLean's legacy, however, will not be confined to his own research and other associated work but will also encompass the work done by the legion of researchers who have benefited from his expertise, guidance and mentoring. Having started the Road Accident Research Unit in 1973, Jack has had the opportunity to guide and instruct his research staff over a period of 35 years. It is a measure of the man that, for many of us, he not only helped shape us as researchers but also, more generally, as people. In addition to his own staff, he has also provided inspiration for countless colleagues from other institutions.

The staff of the Centre for Automotive Safety Research would like to express our gratitude to Professor McLean for everything he has done for us as Director of the Centre. We would like to thank him for providing us with an interesting place to work, where we can pursue a career conducting research that is directly applicable to a major health problem; for providing us with the benefits of his years of research experience; and, finally, for his unfailing good sense of humour. In conclusion, on behalf of CASR staff; on behalf of the University of Adelaide, for his contributions to the reputation of the University; and on behalf of the wider community, which has benefited so much from his work, we would like to congratulate Professor McLean on his fine career, and offer a heartfelt 'thank you'.

Although Professor McLean has retired as Director of the Centre for Automotive Safety Research, we are pleased that he will be continuing to work for us for two days a week.

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