Pedestrian Protection through Vehicle Design

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There are several vehicle related countermeasures that can reduce pedestrians casualties. This slide illustrates the countermeasures that I will cover in my talk:

- Pedestrian protection ratings published by the Australasian New Car Assessment Program
- Blind-spot mitigation systems
- Daytime running lights
- Intelligent speed assistance (ISA)

ANCAP Pedestrian Protection Ratings

- 84% of fatally injured pedestrians were struck by the front of a vehicle
- This represents 15% of all Australian road fatalities

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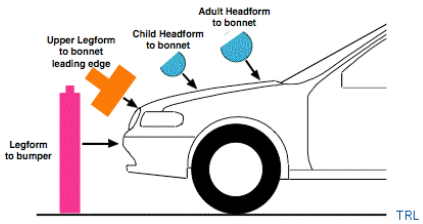
Currently there are no Australian regulations to minimise the risk of injury to pedestrian. Europe is introducing some regulations in two stages. In 1997 Euro NCAP started to assess the risk of injury when a pedestrian impacts the front of a vehicle. These frontal impacts comprise about 84% of all pedestrian fatalities, or 15% of all Australian road fatalities.

ANCAP Pedestrian Protection Ratings



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ANCAP commenced pedestrian protection tests at the University of Adelaide in 2000. Four sub-system tests are performed.

- Legform into bumper
- Upper legform into leading edge of bonnet
- Child headform into bonnet
- Adult headform into bonnet and windscreen pillars

ANCAP Pedestrian Protection Ratings

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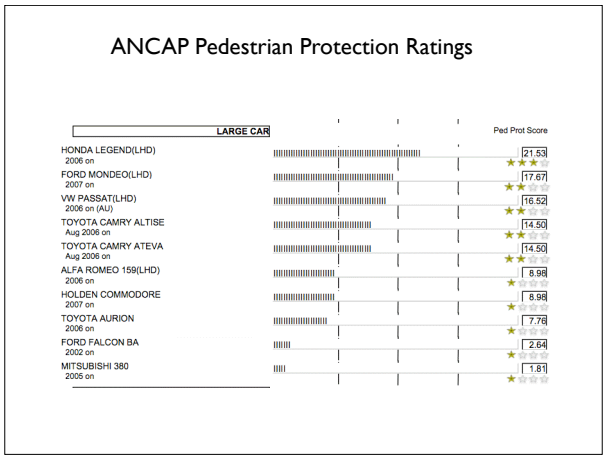
This TRL video illustrates the tests



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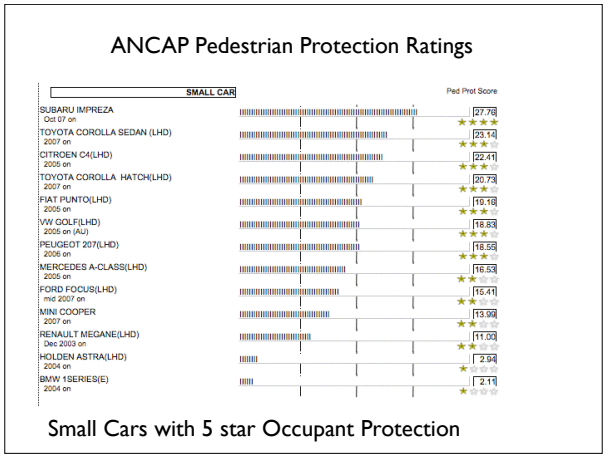
A pedestrian protection score and star rating is derived from the measurements taken during the sub-system tests.
A large spread in scores is evident within each vehicle class. This graph shows large cars.



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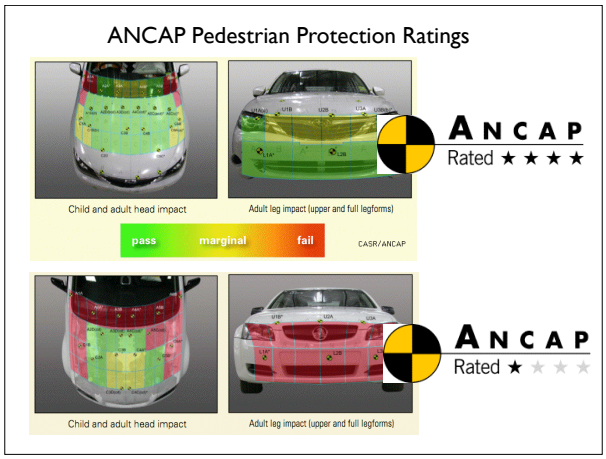
This graph shows pedestrian ratings for small cars that have a top 5 star occupant protection rating



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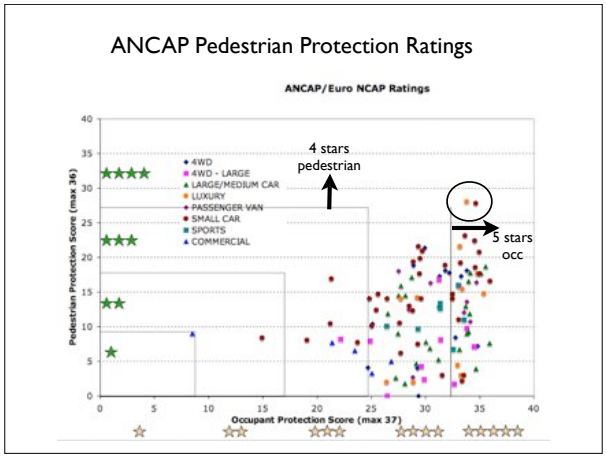
The new Subaru Impreza was the first model to receive a top 4 star pedestrian protection rating from ANCAP. Compare this result with the 1 star rating of the VE Commodore



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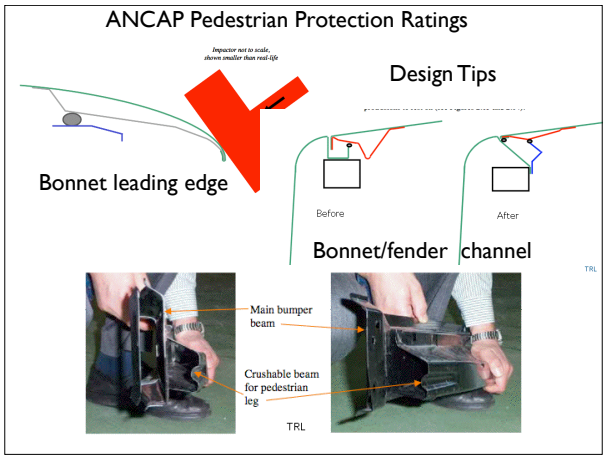
ANCAP also conducts crash tests of vehicles and assigns occupant protection star ratings.
This graph shows the pedestrian protection and occupant protection ratings for vehicles tested by Euro NCAP and ANCAP since 2000. Notice the wide spread of pedestrian scores for vehicles that perform well at occupant protection. I have circled the Impreza and Citroen CV6 results. These show that designs which protect pedestrians do not put car occupants at greater risk.



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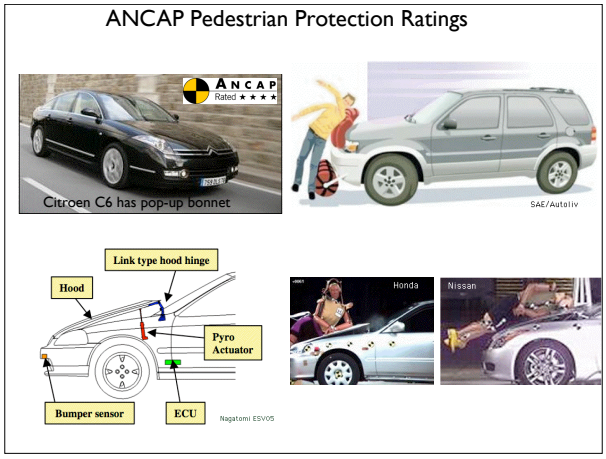
Relatively simple changes to the vehicle can greatly reduce the injury risk to pedestrians.
NCAP test labs are working with manufacturers to try and improve designs



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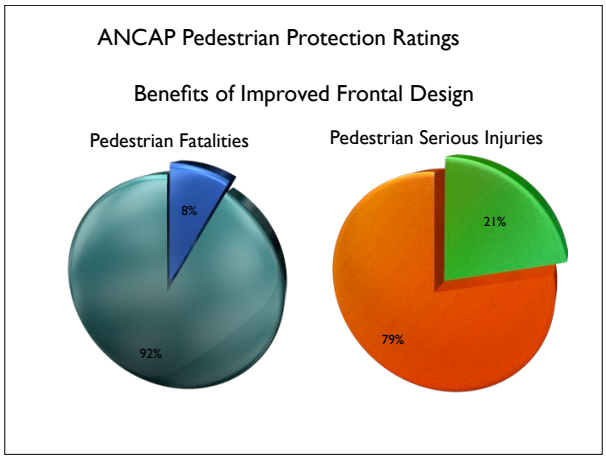
More advanced systems will detect a pedestrian and raise the bonnet to reduce injury. External airbags are also being developed.



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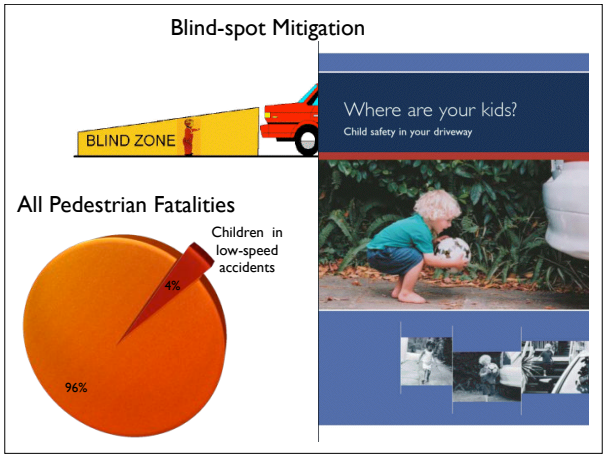
Estimated that good performance in NCAP pedestrian protection tests could save 8% of all pedestrian fatalities and 21% of all pedestrian serious injuries
Benefits exceed costs by at least 7 to 1



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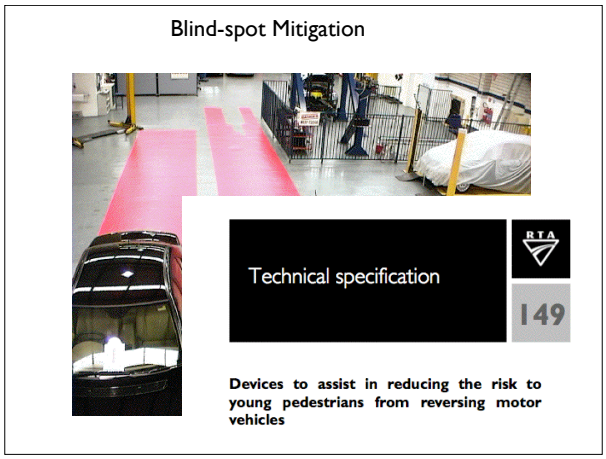
All vehicle have blind spots that pose a danger to pedestrians. The combination of a reversing motor vehicle and young children is a particular concern. In Australia typically 12 children die each year in low-speed vehicle accidents and many of these are reversing vehicles.
The NSW Motor Accidents Authority has developed a range of countermeasures for this problem.



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NRMA Insurance now measures and rates the rearward field of view of vehicles. They also rate all round visibility.
The NSW RTA has published a technical specification for assessing reversing aids such as cameras and ultrasonic sensors. It is stressed by all organisations that children need to be closely supervised by adults when near vehicles – technology can reduce but cannot eliminate the risk.

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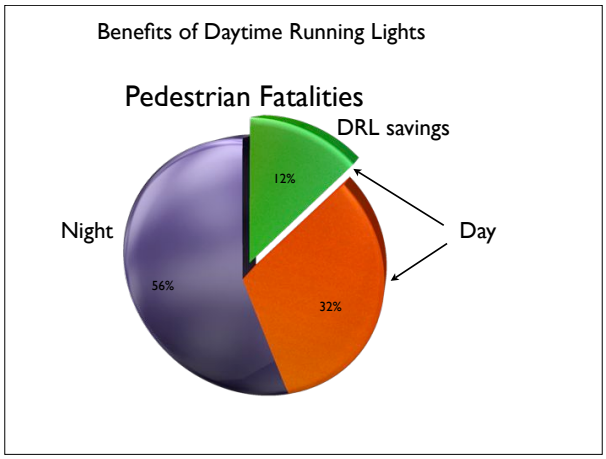
About 30% of struck pedestrians fail to see the car before the accident. Most of these happen during the daytime. Well-designed daytime running lights make the vehicle more conspicuous to pedestrians.
Efficient LED systems will soon be available in Australia. With intelligent DRLs, light-sensitive switches ensure that headlights automatically come on, and the DRLs switch off, when the ambient light fades.



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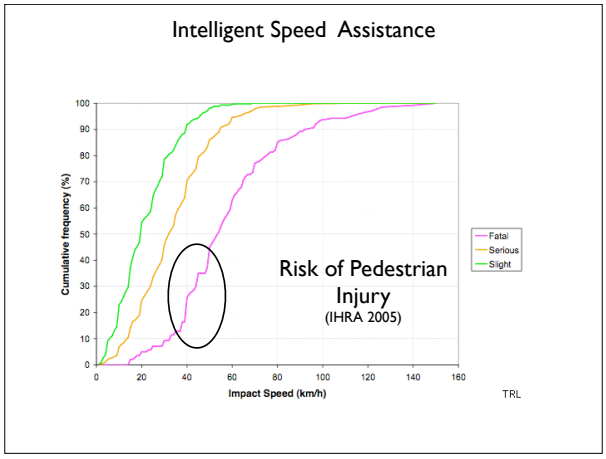
It is estimated that DRLs could prevent 12% of all pedestrian fatalities. Claims of vulnerable road users being "masked" by vehicles with DRLs have been shown to be unfounded. Well designed DRLs do not "distract" other motorists – they instantly make the vehicle more conspicuous. This is an advantage because other road users can devote more time to detecting less conspicuous objects.



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Crashes studies have found that the risk of a fatal pedestrian injury rises steeply for **impact** speeds above 40km/h. Since impact speed is related to initial travel speed this means that just a few km/h over the speed limit can make a dramatic difference to the outcome. This has been demonstrated by the recent change from 60km/h to 50km/h speed limits on residential roads where pedestrian fatalities dropped by more than 30% in many areas. Pedestrians have much to gain if cars obey the speed limits.

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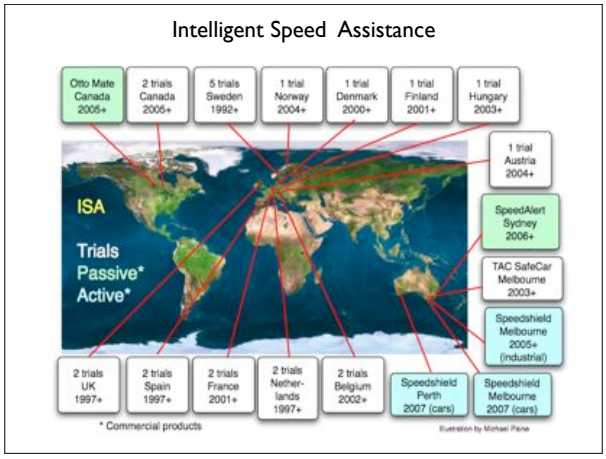
It is likely that unintentional speeding makes up a large proportion of the speeding problem
These days cars are smoother and quieter – it is easy for speed to creep up!
In urban areas speed limits frequently change and a reduction may go unnoticed
Car advertising does not help!
Drivers could do with some technical assistance in keeping to the speed limit



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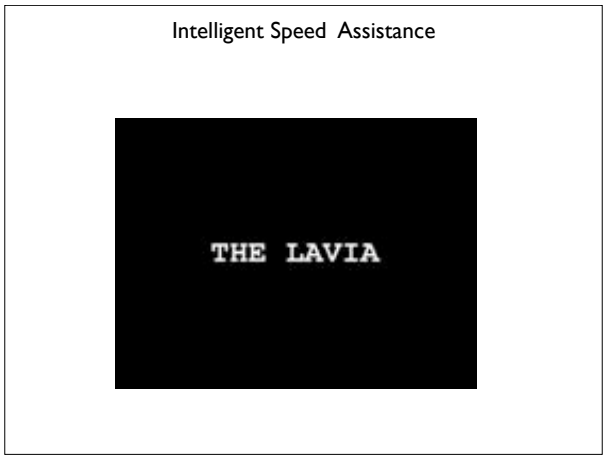
Highly successful trials of intelligent speed assistance, or ISA, have been underway for more than a decade
A breakthrough with ISA has been improvement to Global Positioning Satellite systems (GPS)
GPS can determine the location **and** speed of the vehicle. Speed accuracy is better than 1%.
A database of speed zones enables the ISA system to alert driver to speeding ("Passive ISA") or to prevent the vehicle from exceeding the speed limit ("Active ISA")



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This video illustrates a French system

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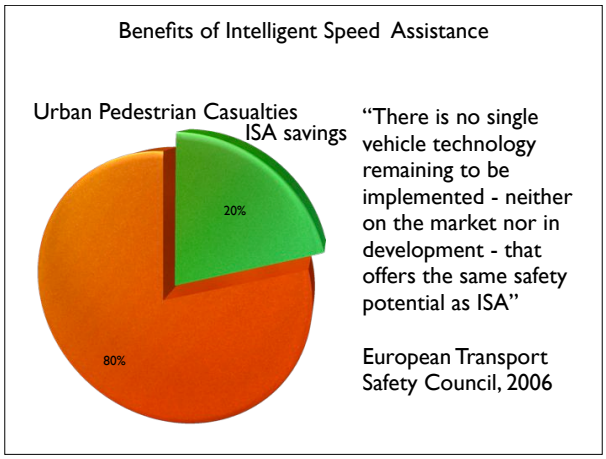
That was a French prototype system. While ISA trials continue in Europe and Canada, Australia has taken the next step - Passive and Active ISA can now be purchased in Australia. SpeedAlert is a passive ISA that operates on Windows PDAs and, soon, advanced mobile phones. Speedshield is an active ISA that intercepts the signal between the accelerator pedal and the engine it is similar in operation to the French system
Collecting and updating speed limit information is the greatest challenge that these products face - no state authority is currently equipped to tell you where every speed zone is or when there is a change. Sometimes speed limit signs go missing during roadworks!



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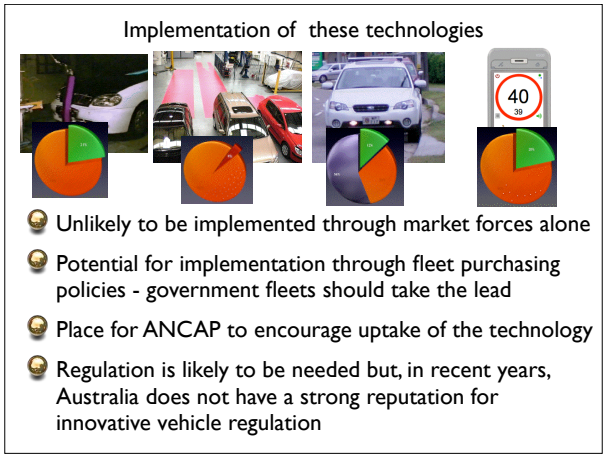
The European Transport Safety Council estimates that around 20% of urban pedestrian casualties could be saved through ISA technology. ISA also has substantial safety benefits in most other types of road accidents and is likely to exceed those of electronic stability control.



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