



# ResearchFoundation



2011 NZRF / RIAA  
Roadmarking  
Conference  
Rotorua

24<sup>th</sup> - 25<sup>th</sup> August 2011

## Overview

1. What is the NZAA Research Foundation?
2. What does it do?
3. What are its aims?
4. Current research programmes



## The NZAA RF:

- commissions research on road safety in New Zealand, in partnership with other research groups and government agencies
- supports increased awareness of international road safety research in New Zealand



## The NZAA RF:

- conducts membership surveys to represent members' views:
  - large membership
- disseminates road safety research findings to wide audience
  - can enhance understanding



## The NZAA RF aims to:

- influence national road safety policy by fostering evidence-based research
- counter misinformation in the media
- challenge popular public misperceptions about driving / road safety



## The NZAA RF aims to:

- increase the scope of research in NZ
  - > e.g., include inattention, distraction, fatigue as causes of crashes
- enhance understanding of causal factors in road crashes
  - > influence policy settings to increase focus on these factors



NZAA:

Good relationships with:

- Politicians and government agencies
- The media
- The public

Positive public image:

- Well-respected
- Trusted
- Credible



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The NZAA RF commissions research which is

- evidence-based
- integrated into long-term research programmes
- about issues of national concern
- of interest to motorists, especially AA members



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# Research: some issues of concern

## International research:

- implications for New Zealand not always clear or well-understood
- results not always considered in policy setting

## New Zealand research:

- competing bids for funding
- results not always widely publicised



# The NZAA Research Foundation

Based on partnership:

- Agreement with other research groups and / or government agencies on
  - > need for research on particular issues
  - > applications of the research results
- Pooled funding



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# Research programmes

- Stage 1: Steering group meets: experts, interested parties
  - > Literature review: background to issues
- Stage 2: Reference group meets: experts, interested parties
  - > Devise action plan for research
    - > Decide on research projects / funding



# Research programmes

- Stage 3:
  - > Commission research projects
  - > Publish results
  - > Review project outcomes / budget
- Stage 4: Reference group meets: experts, interested parties
  - > Decide how to disseminate results



## Current research programmes:

- Eco-driving
- Driver risk-awareness
- Driver inattention, distraction, and fatigue



Research Project 1

# Eco-driving



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- Explores the potential of eco-driving as a way to improve light vehicle fuel efficiency and safety in New Zealand
- Examines costs and benefits of eco-driving
- Reviews schemes and their effectiveness
- Considers how eco-driving could be encouraged in New Zealand



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## Government organisation

- promotes energy efficiency and conservation
- provides information and support to encourage people to change their energy use at work / home



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## Independent transport research organisation

- promotes improved transport safety, efficiency, and environmental sustainability
- provides independent information and analyses to government and private sector



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## Eco-driving



Dr. Rebecca Luther  
&  
Mr. Peter Baas



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Eco-driving

Mr. Peter King,  
AA Research Foundation



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## Outcomes to date:

- Literature review: international research and practice
- AA member survey: current level of knowledge and interest in NZ
- Report and research plan



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Research Project 2

# Drivers' risk-awareness



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## Drivers' risk-awareness

- Driving is influenced by how risky the driver thinks the road is
  - > however, drivers often misjudge the level of risk, and so may not drive appropriately
- Considers how
  - > the risk on specific roads can be made clearer to drivers
  - > road design features could be used to encourage safer driving on hazardous roads



## Drivers' risk-awareness

- Drivers are influenced by the design features of roads without being consciously aware of it
- The visual features of roads can be specially designed to encourage drivers to slow down
  - > e.g., low-cost features such as herringbone patterns and transverse lines painted on the road



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*Te Whare Wānanga o Waikato*



Associate Professor  
Samuel (Sam) Charlton



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## Drivers' risk-awareness

- Literature review:
  - > hazard and risk perception, self-explaining roads
    - > How do drivers perceive road risk?
      - > What road cues do they use to judge risk?
      - > Can these cues be manipulated to better relate perceived risk and KiwiRAP road risk ratings?
    - > How does road risk affect driver behavior?
      - > What road features are most effective in changing driver behavior?



# The KiwiRAP Assessment Tool (KAT)



This will be used to:

- identify hazardous roads
- provide risk scores to compare with drivers' ratings
- measure safety benefits of design features



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Research Project 3

# Driver inattention, distraction, and fatigue



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## Research Symposium, September 5-6

- Conference for New Zealand and overseas road safety experts
- Keynote speakers: Professor Tom Dingus, Virginia Tech Transportation Institute; Dr. Judith Charlton, Monash University (MUARC); Professor Richard Jones, Christchurch Neurotechnology Research Programme
- Many other eminent New Zealand speakers



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## The 100-Car Naturalistic Driving Study

Professor Thomas  
(Tom) Dingus



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## The 100 Car Naturalistic Driving Study

- Ground-breaking research on driver distraction and inattention
- Studied ordinary drivers with instruments in vehicles
  - > video, sensors, accelerometers, lane tracker, GPS
- Captured
  - > 82 crashes: both serious and minor
  - > 761 near-crashes, 8,295 other incidents



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## The 100 Car Naturalistic Driving Study

Large-scale study:

- 241 drivers (aged 17-83)
- drivers were observed over a year
- 2,000,000 vehicle miles of driving
- 42,300 hours of driving data



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## The 100 Car Naturalistic Driving Study: Findings

- > Driver inattention (distraction, fatigue, looking away)
  - > was involved in almost 80% of all crashes and 65% of all near-crashes
  - > usually occurred within 3 seconds before the incident
  - > contributed to 93% of rear-end crashes
- Young drivers (18-20) were more likely than older drivers to experience inattention-related crashes / near-crashes



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## The 100 Car Naturalistic Driving Study: Findings

- Drowsiness:
  - > contributed to 20% of all crashes, 16% of all near-crashes
  - > fatigue-related crashes previously thought to be less than 10% of total crashes
- Cellphones (and similar devices)
  - > associated with highest frequency of distraction-related incidents / near-crashes



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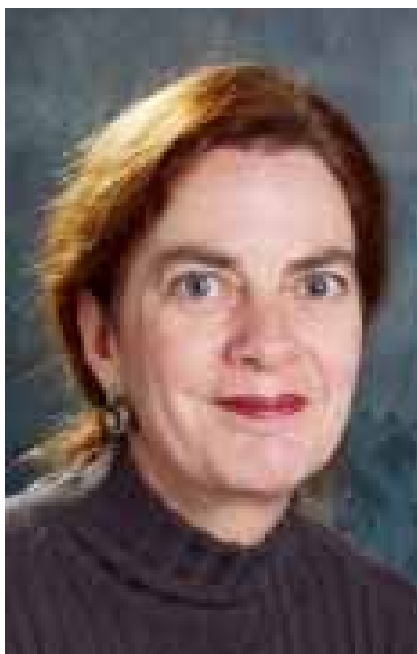
## Implications for New Zealand:

- The number of crashes involving inattention may have been underestimated in NZ:
  - > further research is needed
  - > TERNZ is setting up a naturalistic study here
- Symposium: provides an opportunity for New Zealand and overseas road safety researchers / policy-makers to collaborate





**MONASH** University  
Accident Research Centre



## The 1000-intersection Naturalistic Study: The Australian Experience

Dr. Judith (Jude)  
Charlton



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## Pilot study

- Intersections of varying complexity
- Older drivers (aged 65-83)
- Set route in Melbourne, Victoria
  - > 11 intersections X 2
- One instrumented vehicle
  - > 7-camera video system 12.5 f/s
- 3+ week period



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- 371 trips, 100 hours, 4493 km total
- 5 hard braking events
- 1 near-collision
- trip distance:
  - > < 10 km (75%)
  - > 1400 turns: 48% right turns



- mean approach speed 100m pre-intersection
  - > 22 km/h (SD 9.7)
- gap selection
  - > all waited for cross-traffic to clear
  - > not due to a lack of safe gaps (>9s)
- ongoing research into secondary factors
  - > e.g., distraction

# NeuroTechNZ



The Christchurch  
Neurotechnology  
Research Programme

Professor Richard  
Jones



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## Lapses (lapses of responsiveness)

- complete transient disruptions in performance
  - > can be surprisingly frequent in healthy people, even when not sleep-deprived
    - > especially when engaged in extended monotonous tasks
- particularly important in transport sector
  - > sustained attention required for extended periods
  - > lapses can lead to accidents



## Lapses: four main types

- Sleep events (> 15 s)
- Behavioural microsleeps (~0.5–15 s)
  - brief loss of consciousness, with drowsiness
- Lapses of sustained attention
  - can occur when alert, fatigued, or drowsy
- Lapses of task-orientated attention
  - i.e., diverted attention



# Microsleeps

## Examine:

- > behavioural and EEG-based detection and characterization
- > determination of underlying mechanisms in brain

## Conduct:

- > simultaneous fMRI, EEG, eye video, during continuous visuomotor tracking task



## Microsleeps

- improved knowledge of microsleeps may allow improved early detection, even prediction, of microsleeps
  - > this could lead to development of a non-invasive early-warning system
    - > potential to save lives





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Thank you!