MONASH University
Accident Research Centre

Go Boldly.

Naturalistic Driving:
A snapshot of research in Australia

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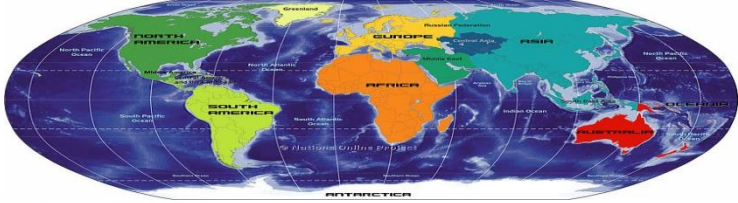
Overview
Naturalistic Driving at MUARC



- Naturalistic and ‘controlled’ on-road methods
- Instrumented vehicle fleet and 275 DAq Units
- PROJECTS
  - 1000 Intersection - older driver — AutoCRC/GM Holden
  - Ozcandrive-Candrive - older driver — ARC/VR/TAC/VicPol/NZRS Trust/E Hllth
  - On-road study driver errors (set route) — AutoCRC
  - Rail Level-Crossing study (set route) — Austroads
  - Europe: INTERACTION (EU-Aust) http://interaction-fp7.eu/ — EC
  - Children in cars — AutoCRC/GM Holden
  - Return to driving after TBI — VNI-ONF Australia-Canada Grant
  - View from a bike — Amy Gillett Fn/MUARF, NRMA ACT RS Trust

1000 Intersections *(pilot study)*

- Focus on intersections ~ different complexity
- Older drivers: 65-83yrs
- Sponsors: AutoCRC and GM Holden
- Melbourne, Victoria
  - Set route (11 intersections X 2)
  - Naturalistic
  - Pilot, n=10
- Participant assessments
  - Driver survey
  - UFOV, MMSE, MVPT, Visual acuity, contrast sensitivity

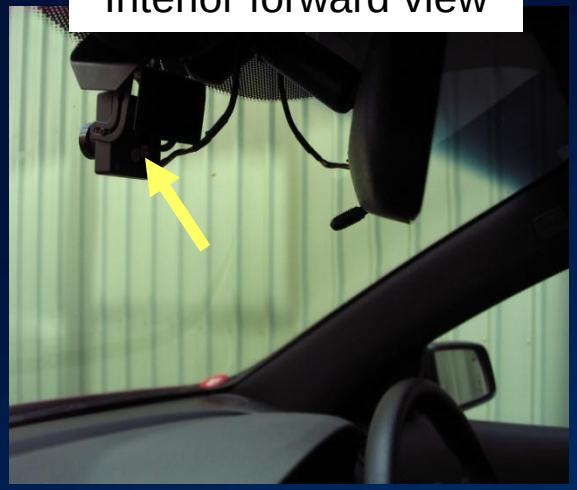
1000 Intersections (pilot study)

- One instrumented vehicle
  - DAQ (MOTEC ADL3 ®; 10Hz; 1GB)
  - 7-camera video system 12.5 f/s
  - Appro® DVR with 250 GB hard disk
- 3+ weeks drive period
- $80 reimbursement
- Monash Ethics/SCERH Issues:
  - ‘off button’
- Trip distance, speed, braking, pedal use, looking behaviour, gap selection, secondary behaviours

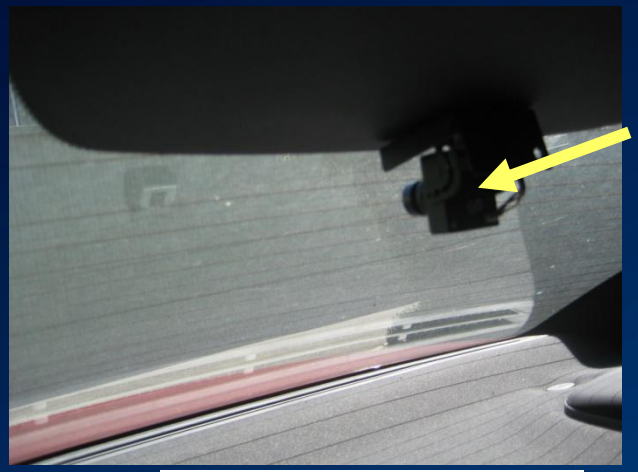
1000 Intersection Study - Location of 7 Cameras

Exterior L/R views x 2

Interior forward view



Driver face



Rear View

Brake Pedal

Instrument Panel

Video Camera Views: road, driver

"Driver's view" of road/traffic (240 deg)

Driver "looking behaviour" (frequency; direction of gaze L/R/C)

Preliminary findings

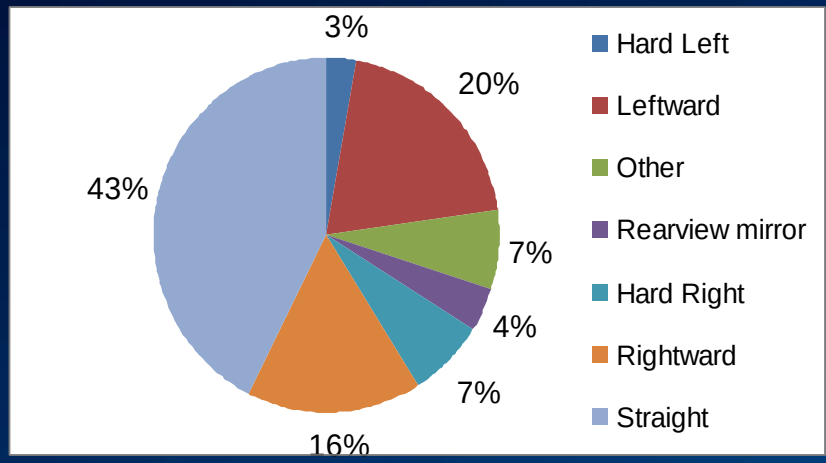
T-intersection Right-Turn (Set Route 20 trials):

- Gap selection
  - all waited for cross-traffic to clear
  - not due to a lack of safe gaps (>9s)

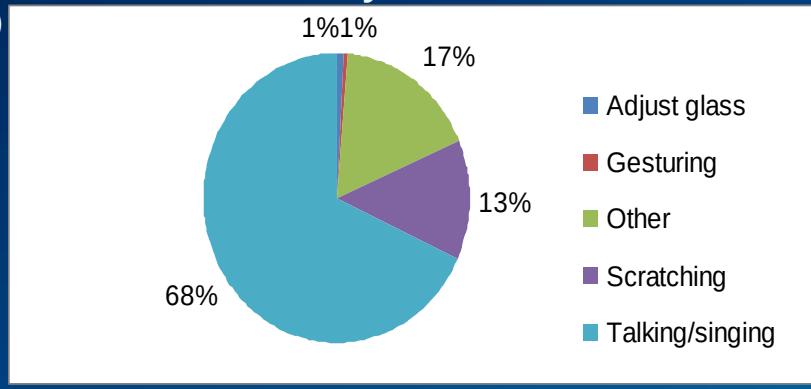
Naturalistic driving

- 371 trips, 100 hours, 4493 km total
- Trip dist: < 10 km (75%)
- ~1400 turns: 48% right turns
  - Mean Sp Approach (100m pre-X'n): 22 km/h (SD 9.7)
  - 5 Hard Braking events (brake pedal pos'n ≥50%)
  - 1 Near-Collision (acceleration > - 0.5g)
- Next: secondary behav./distract'n) @ X'n
- More data collection
- Comparative data sets

Looking behaviour



Secondary behaviour

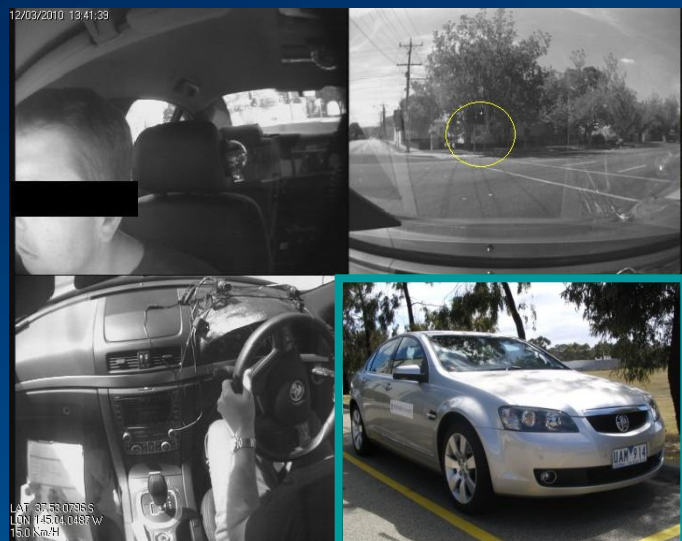


Ozcandrive - Candrive

- 5 year cohort study of older drivers:
  - n =1250; 70/75yrs+
- Main aim: develop a ‘decision rule’ to identify safe/unsafe drivers
- 9 sites: Canada-Australia/NZ
- Naturalistic: DAq GPS; 1Hz; key fob driver ID
  - Focus on driving exposure, speed, driving habits self-regulatory patterns
- Comprehensive annual cog/vision tests
- Driver surveys
- Crash/infringements: retrospective/prospective
- Sub-study: Driver Observation Schedule
  - Set route, 30min annual observation on familiar route; observer/DAQ/quick-install video

Driver Behaviour at Highway-Rail Grade Crossings

- On-road study of road user behaviour and decision making processes at highway-rail grade crossings
- Multi-method approach: instrumented vehicle (ORTeV), FaceLAB, Verbal Protocol Analysis and Critical Decision Method
- 25 drivers (18-60yrs)
- Set route: 21 km drive, with 4 fully signalised highway-rail crossings
- Identification of key factors influencing decision making at rail level crossings
- Identification of driver errors at level crossings

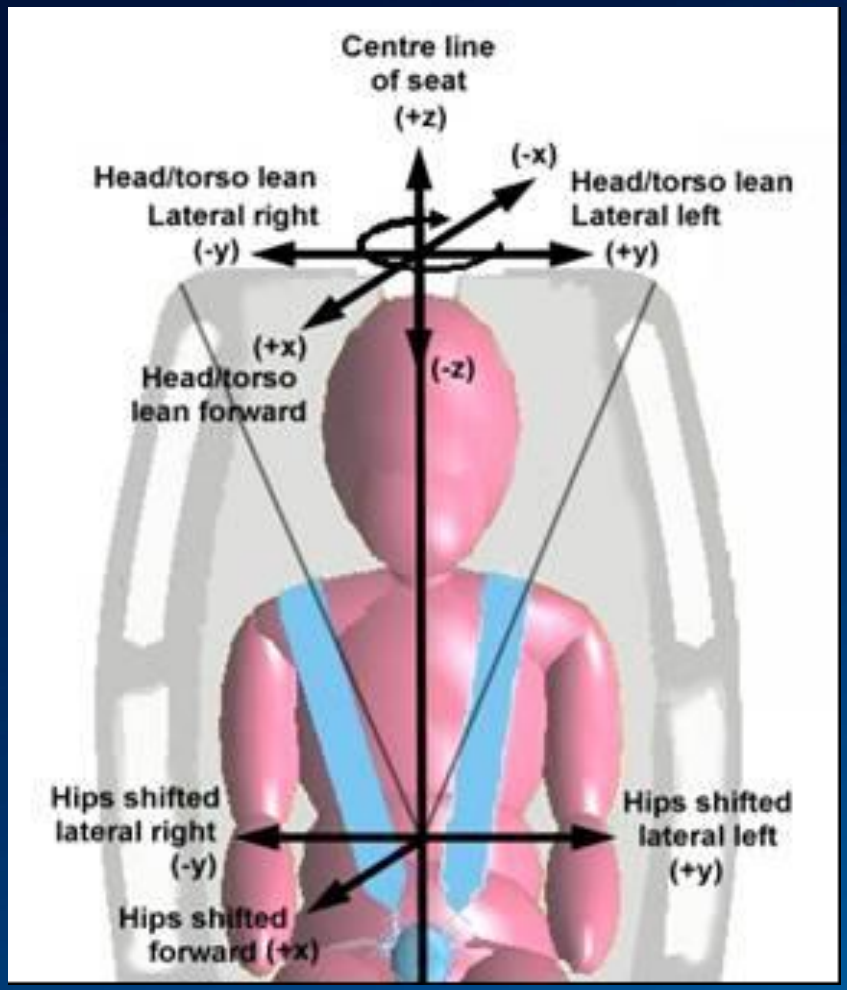


Children in Cars

- Focus of study:
  - Inappropriate use of CRS out-of-position (OOP)
  - driver distraction
- 12 families: 19 drivers: 25 children
- “Study vehicle” fitted with discrete camera/recording system
- 4 video cameras: 25 f/s
- Observation of all trips with children for 1 month
- Questionnaire: demographics, driving experience

Analysis on video recorded data

- Child seating arrangements
- Out-of-position status (OOP)
- Driver distraction: 2^{ndry} behav
- Children's activity
- Interactions: Driver/FSP/Child
- Road/traffic conditions



Schematic of out-of-position classification scheme.

Results Snapshot

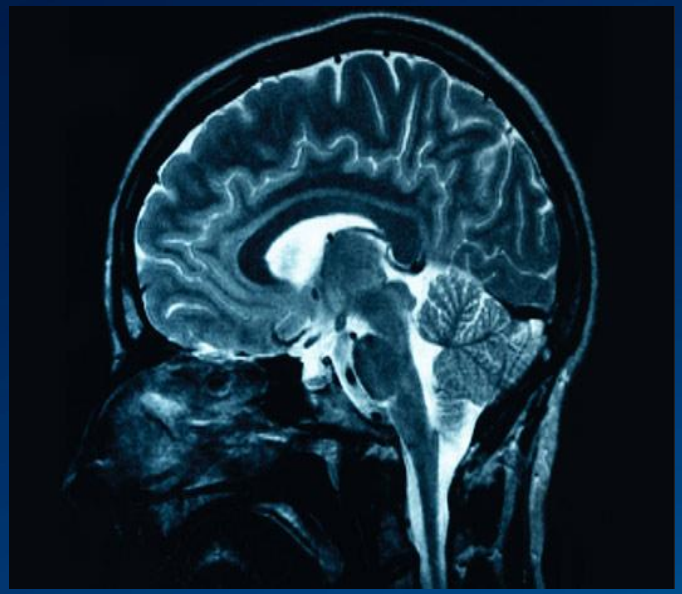
- Children were out of position ~ 70% of time during trips
- Children accounted for ~ 12% of all ‘distracting events’
- Highlights a need for solutions
  - to improve child occupant protection for 100% of trips
  - minimise children’s role in driver distraction

Sleeping child: torso slumped to the right, head lolling forward, and seatbelt sitting too high on shoulder.

Driver attempting to start up in-car entertainment system, while driving in ‘complex’ traffic

Return to driving following TBI

- Aim: to identify predictors of readiness to drive after traumatic brain injury (TBI)
- Partners:
  - Monash University: MUARC; Department of Psychology
  - Monash Epworth Rehabilitation Research Centre
  - Ottawa Hospital Research Institute
  - Ottawa Hospital Rehabilitation Centre
  - U Ottawa: Psychology; Dept Medicine
  - Lakehead U; St Joseph's Care Group, Thunder Bay
- Sponsors: VNI-ONF
- Sample:
  - 100 drivers with TBI
  - 100 controls
- Sites: Melbourne, Ottawa, Thunder Bay
- Participant Assessments
  - compréhensive neurocognitive and vision tests; simulator drive
- DAS Components and Sampling Frequencies – TBD
- Study period – 6 months post re-licensure



PhD research: Marilyn Johnson

Aim: To identify ways to improve safety for on-road cyclists

- types of unsafe/at risk behaviours of cyclists/drivers
- subgroups of roads users with unsafe/at risk behaviours

Amy Gillett FOUNDATION
Safe together

Method:

1. Observational study – fixed cameras at intersections
2. Naturalistic cycling study – helmet-mounted cameras
3. Online survey

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Observational study

- 10 signalised intersections, metro Melbourne
- 288 hours recorded (multiple recordings at 4 sites)
- 3 hours over 6 days (7-10am or 4-7pm)
- key findings: red-light running behaviour

Naturalistic cycling study

- helmet mounted camera
- recorded 12 hours over 4 weeks
- n = 35, 420 hours of footage
- key findings: L turn drivers fail/late indicate

Online survey

- attitudes and knowledge
- n = 2590 cyclists and drivers

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