MONASH University
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Development and Validation of a Naturalistic Driver Distraction Test

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Test Background

- Important to experimentally test the potential for in-vehicle systems to divert attention from driving and degrade performance and safety
- Common approach involves the evaluation of the effects on driving of performing secondary tasks
- Tests used for this purpose are the Peripheral Detection Task, the Visual Occlusion Technique and the Lane Change Test (LCT)

Limitations of Existing Tests

But, these tests have:

- Limited external validity
- Uni-dimensional
- Predictable

Thus…..

A need for a more ecologically valid, less predictable and multi-dimensional test that is also quick, simple and inexpensive to use

Guiding Principles

- **3 guiding principles used to develop test**
  - ease of application
  - versatility
  - application to real world driving

Test Overview

- 6.6km urban driving environment
- 4 speed zones
- Driver required to maintain speed and position on the road using standard vehicle controls
- Expected and unexpected events

Drive Events

Expected	Unexpected
• Three non-critical light changes • Car Following event • Speed zone changes	•Bus •Three critical light changes •Motorcycle •Roadwork merge •Gap acceptance •Pedestrian •Lead vehicle braking

Driving Measures

- **Speed**
- **Lane keeping and position**
- **Steering measures**
- **Braking/acceleration**
- **Following distance (time/distance headway)**
- **Reaction time to events**
- **Time to Collision**
- **Gap acceptance**

Pilot Validation Study

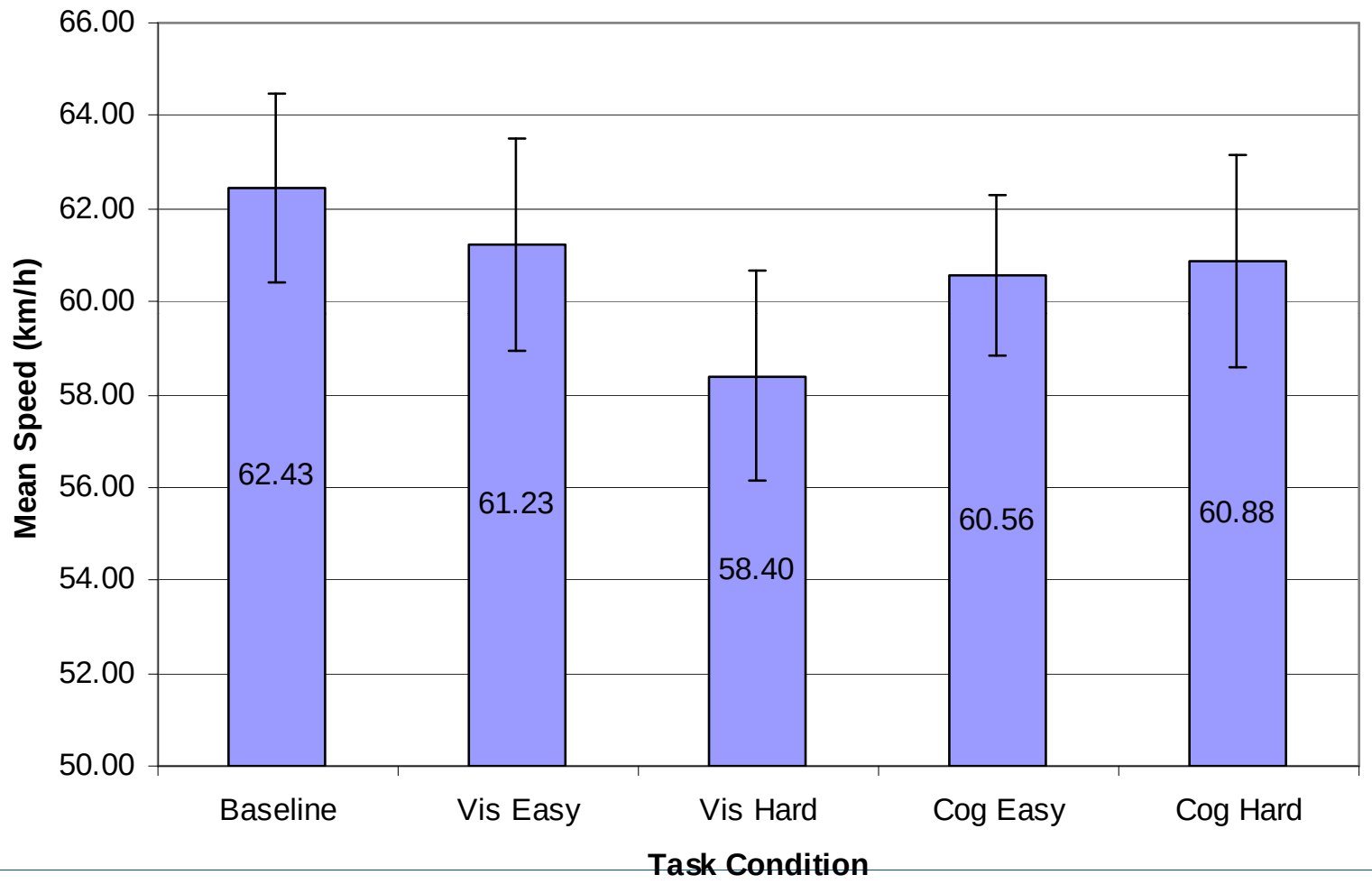
Aims of pilot validation:

- Establish face validity
- Qualitative comparison against LCT and previous research findings
- Establish sensitivity of test to different distraction types and complexity levels
- Examine technical operation of test

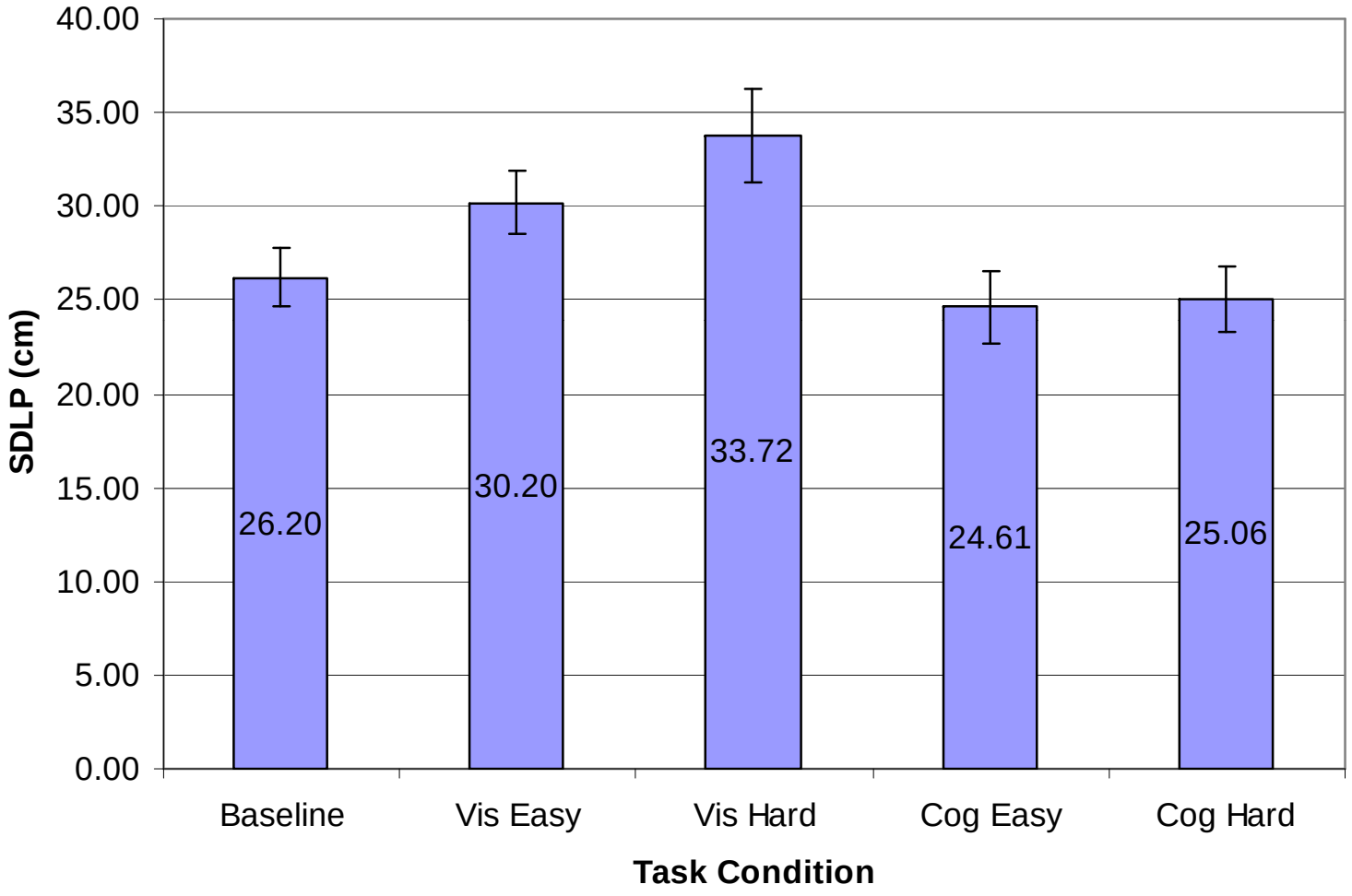
Pilot Validation - Method

- **27 participants; mean age = 24.4 yrs (SD=3)**
- **2 surrogate IVIS tasks, with two complexity levels (Easy & Hard):**
  - Visual-manual task (SuRT)
  - Cognitive task (addition task)
- **Within-subjects design**
  - Experienced both Distraction Test and LCT and both IVIS tasks
- **PC-based set up, single screen, Momo steering wheel and foot pedals**

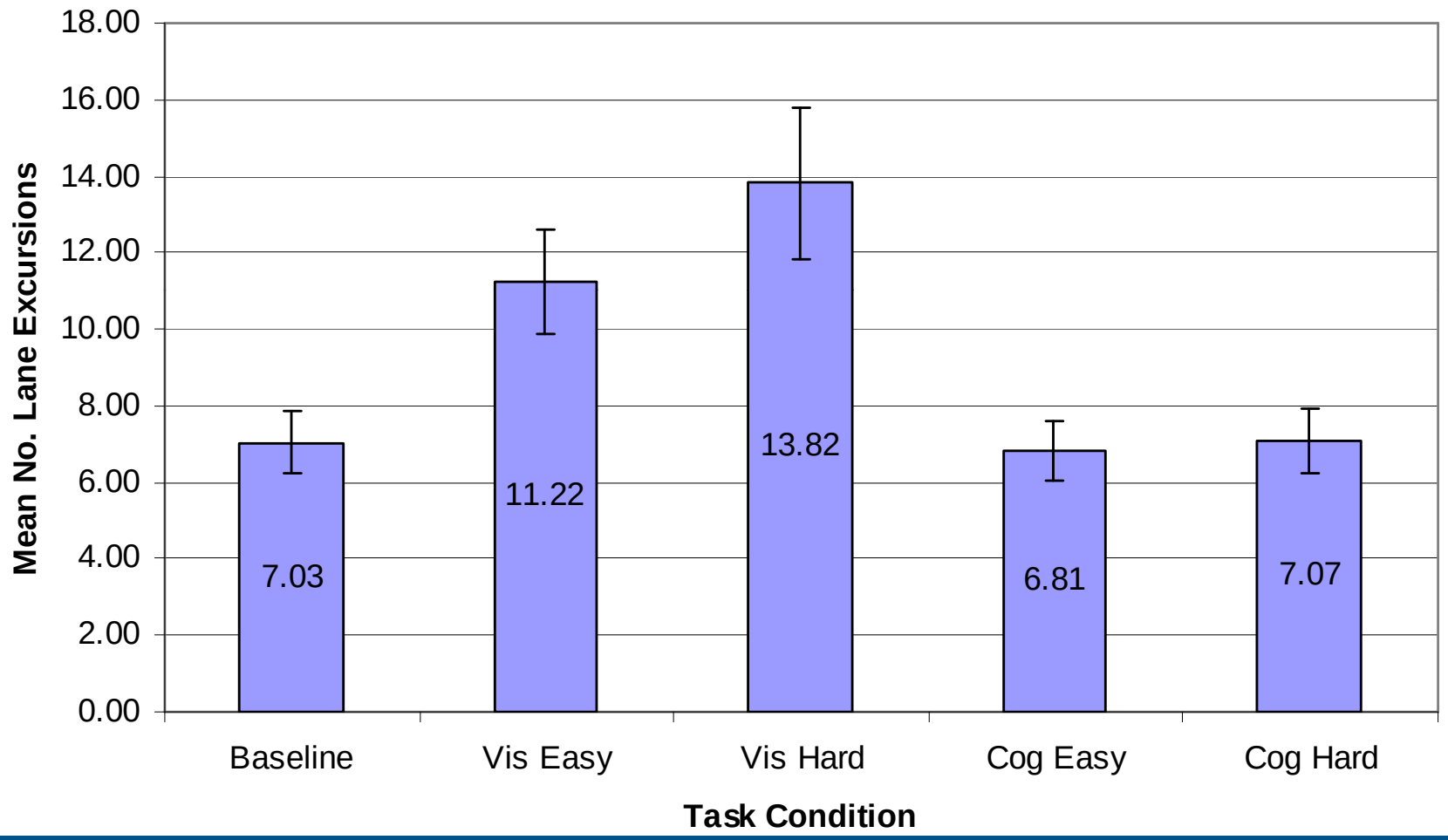
Results – Mean Speed



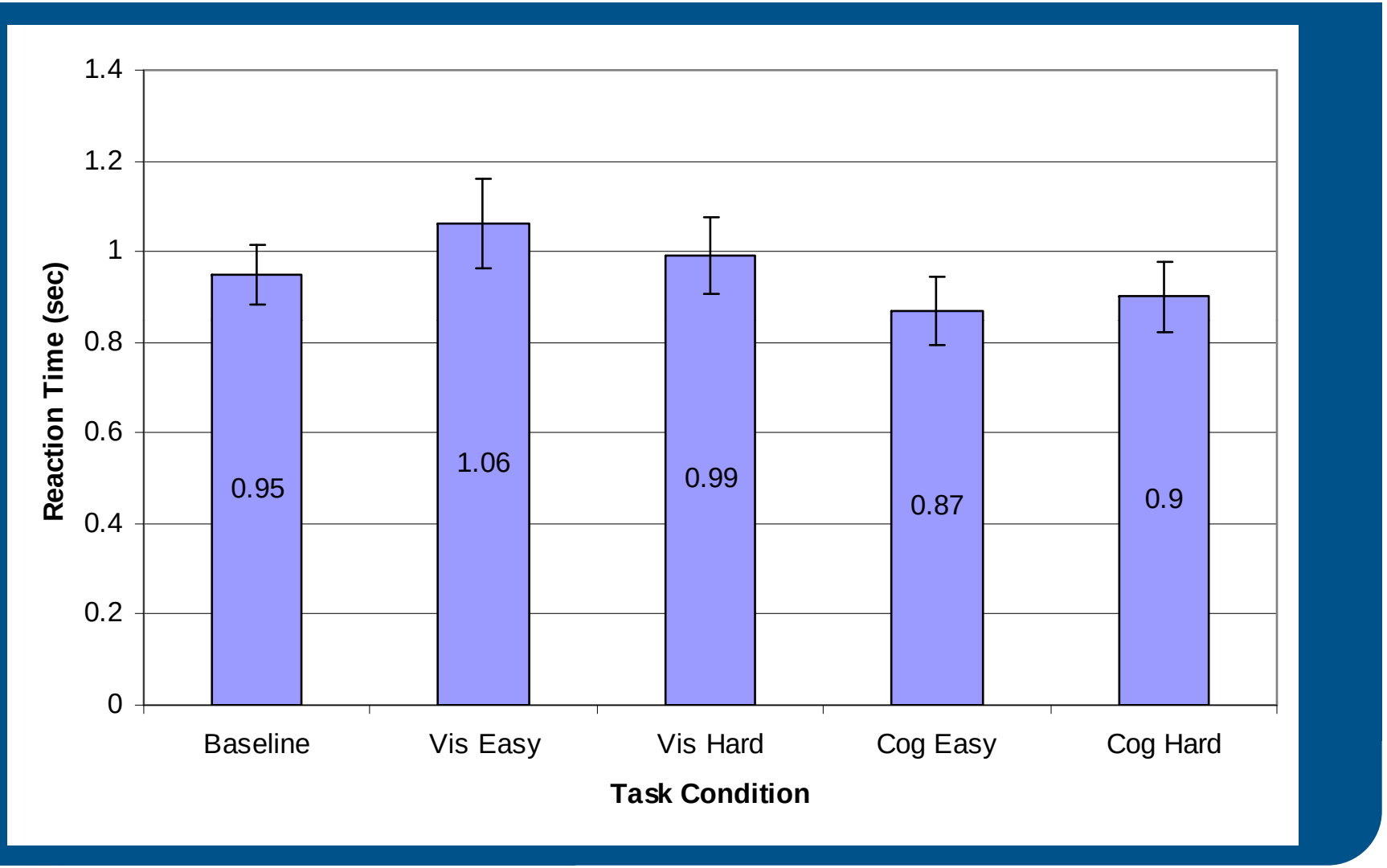
Results - SDLP



Results - Mean number of lane excursions



Results – RT to unexpected events



Conclusions

- **Promising findings overall**
- **Expected differences for number of driving measures between the two distraction types and complexity levels**
- **Qualitative comparison of DT and LCT revealed consistent results for lateral control measures**
- **Number of refinements identified**

Future Work

- **Refine test to improve validity**
- **Use test with real IVIS tasks**
- **Examine test's predictive validity by comparing to simulator and on-road data**
- **Distribute test to researchers for use and further validation**

Thank You!

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