The situation awareness of young drivers, middle-aged drivers, and older drivers: Same but different?

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Situation awareness

• What is it?

*Knowing what is going on around you*

1. Perception
2. Comprehension
3. Projection
Situation awareness

• What is it?

  Knowing what is going on around you

  1. Perception
  2. Comprehension
  3. Projection

• Situation awareness skills are directly related to road safety
Situation Awareness Skills
Decade of Action for Road Safety

• 2011-2020, five pillars of action
  – Enhancing behaviour of road users
Decade of Action for Road Safety

• 2011-2020, five pillars of action
  – Enhancing behaviour of road users

• Road safety risks
  – Young drivers
  – Middle-aged drivers
  – Older drivers
Young driver road safety
Number of casualty crashes by licence type

- Learner licence phase
- Provisional licence phase
- Open licence phase

No. of drivers in casualty crashes

Years after licensing

Your learner is here

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Your learner is here
Young driver road safety

• Road risks are related to driving inexperience-related (and age-related) factors
Young driver road safety

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• Situation awareness skills?
  – Related to driving exposure
    • Time spent driving
    • Distance driven
    • Driving contexts
    • Personal circumstances
Middle-aged driver road safety

• Situation awareness skills?
Middle-aged driver road safety

• Situation awareness skills?
  – We know they have better situation awareness skills than young drivers
Middle-aged driver road safety

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Middle-aged driver road safety

Fatality rate: traffic fatalities per billion kilometres travelled by age, Netherlands (2001-2005). Source: SWOV/Transport Research Centre, CBS.

Injury rate: non-fatal traffic injuries per billion kilometres travelled, by age, Netherlands (2001-2005). Source: SWOV/Transport Research Centre, CBS.

http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Content/07_old/high_fatality_rate_more_crashes_or_more_severe_injuries_.htm
Middle-aged driver road safety

![Graph showing fatality and injury rate by age group](http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Content/07_old/high_fatality_rate_more_crashes_or_more_severe_injuries_.htm)
Older driver road safety

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Older driver road safety

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Older driver road safety

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  – Related to driving exposure
    • Time spent driving
    • Distance driven
    • Driving contexts
    • Personal circumstances
  – But what about ageing-related factors…..
Older driver road safety

• Ageing-related factors
  – Normal declines and deficits
    • Slower reaction times
    • Increased frailty
Older driver road safety

- Ageing-related factors
  - Normal declines and deficits
    - Slower reaction times
    - Increased frailty
  - Abnormal declines and deficits
    - Disease (e.g., dementia)
    - Disability (e.g., brain injury)
Older driver road safety

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[Graphs showing fatality and injury rates by age group]
Older driver road safety

Ageing-related factors
- Normal declines and deficits
  - Slower reaction times?
  - Increased frailty
- Abnormal declines and deficits
  - Disease (e.g., dementia)
  - Disability (e.g., brain injury)

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Study aim

• Explore situation awareness skills of three driver age-groups
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  2. Middle-aged drivers
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  2. Middle-aged drivers
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• Compare similarities and differences in situation awareness skills
Method

• 36 participants
  – 12 young drivers
    • 16-23 years, Learner licence, 0-100 hours in logbook
  – 12 middle-aged drivers
    • 44-62 years, Parents of learner drivers, 27-44 years driving experience
  – 12 older drivers
    • 66-84 years, 42-62 years driving experience
Method

• Projected Go-Pro recorded driving footage in Cave simulation environment
Method
Analyses

• Verbal commentary transcribed verbatim
Analyses

- Verbal commentary transcribed verbatim
  - NVivo for word counts
  - Leximancer for situation awareness networks and network mapping
Results: Words

• Average word counts
  • Young drivers: 1,187*
  • Middle-aged drivers: 1,702*
  • Older drivers: 1,570
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- Situation awareness the same?
Results: Concept maps

• Shared concepts
  • Young/Middle/Old: 21 concepts (e.g., overtaking)
  • Young/Middle: 2 concepts (e.g., merging)
  • Young/Old: 2 concepts (e.g., driving)
  • Middle/Old: 3 concepts (e.g., behind)

• Unique concepts
  • Young: 5 concepts (e.g., school); Middle: 4 concepts (e.g., vehicle); Old: 6 concepts (e.g., fast)

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• Situation awareness the same?
Results: Concept maps

- Road
- Crossing
- Pedestrian
- Zone
- Coming
- Traffic
- Roadwork
- Sign
- Highway
- Doing
- Speed
- Read
- School
- Kids
- Green
- Clear
- Left
- Driving
- Ahead
- Sign
- Highway
- Merging
- Vehicle
- Lane
- Hand
- Truck
- Overtaking
- Continuing
- Car
- Turning
- Indicating
- Fast
- Moving
- Distance
- Need
- Aware
- Look
- Front
- Behind
- Red
- Ute
- Lights
- People
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- Distance
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• Similarities
  – All three maps emerge from 3 central concepts (left, lane, car)
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• Shared connections
  • Young/Middle/Old: 2 connections (e.g., roadworks-sign)
  • Young/Middle: 7 connections (e.g., merging-lane)
  • Young/Old: 3 connections (e.g., pedestrians-crossing)
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- Good news
  - Concepts capture important sources of risk (for and to the driver)
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• Good news
  – Concepts capture important sources of risk (for and to the driver)
    • Infrastructure
    • Other road users
    • Actions of themselves and other road users
    • Direction from which threat is posed
Results:
Concept maps *(basic structure)*

**Roadworks** (infrastructure)
**Coming** (actions)
**Left**
**Ahead** (direction)
**Traffic** (surrounding road users)
Results: Concept maps

• Less good news
  – Important differences in concept map structure, e.g., turning – where is their focus?
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    • Young drivers: behaviour of themselves, behaviour of other road users, changing features of road environment
    • Middle-aged drivers: behaviour of other road users, relationship to other road users
    • Older drivers: behaviour of themselves, structure of roadway
What does this mean?

• Driver training implications
  
  – Driving trainers need to know
  
  • They have situation awareness skills
  
  • They need to teach young drivers situation awareness skills
  
  • It takes time (and exposure) to build situation awareness skills
  
  • Parents need to be aware that their learner driver is not seeing the same road through the same windscreen (safety implications)
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  – Can this be assisted by targeted training?
What does this mean?

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• Continued driving privileges

• Older drivers need to know

• They lose some situation awareness skills

• This may be related to normal ageing and may be exacerbated by disease and disability

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Questions?

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