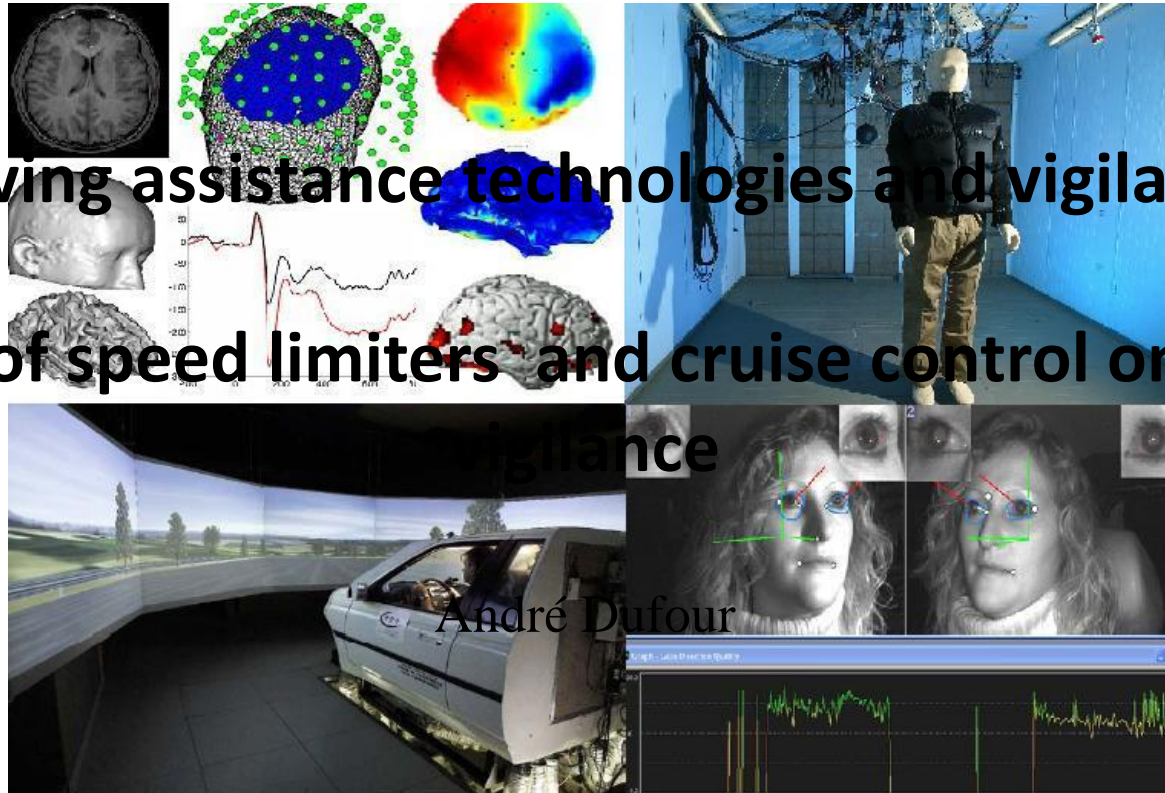




FONDATION

Driving assistance technologies and vigilance

Impact of speed limiters and cruise control on drivers



André Dufour



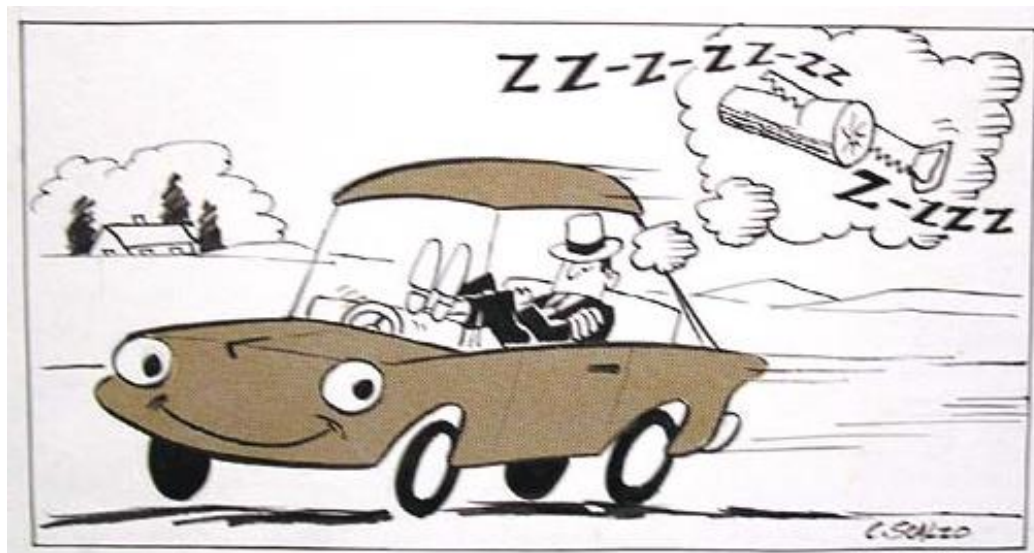
CI2N

Centre d'Investigations
Neurocognitives et Neurophysiologiques
UMS 3489 CNRS - UdS



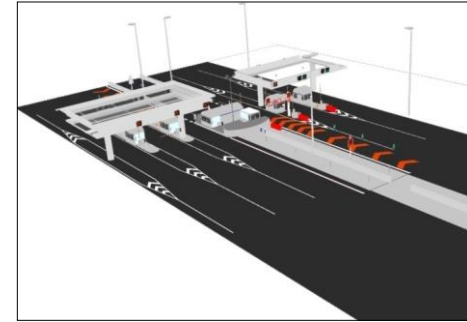
Question

Less activity while driving = Higher Drowsiness ?



Experiment on Driving Simulator

270 Participants



Accident

Speed Control

Tollage

Work zone

Highway : 120 Km

T_0

T_{15}

T_{30}

T_{45}

T_{60}

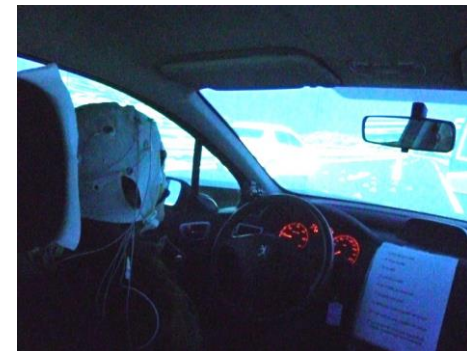
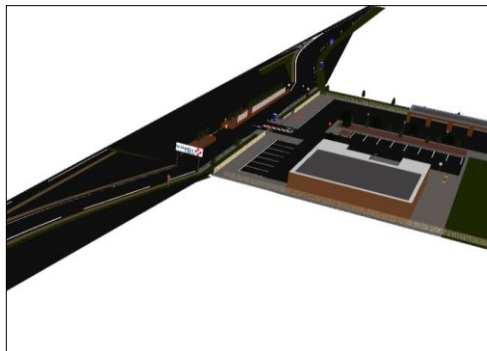
KSS

KSS

KSS

KSS

KSS



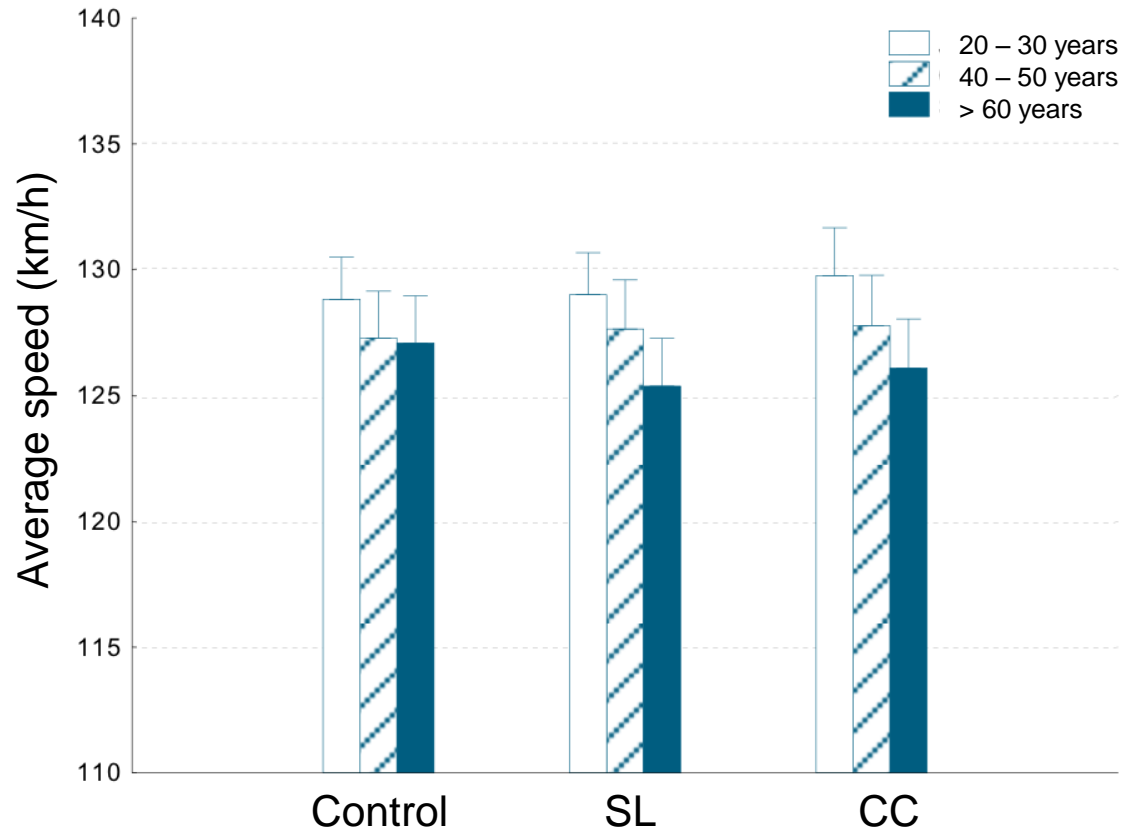
- Number of overtakings
- Distance before overtaking
- Inter-vehicle distance
- Braking delay
- Braking frequency
- Lateral position ajustement
- Speed regulation

Driving

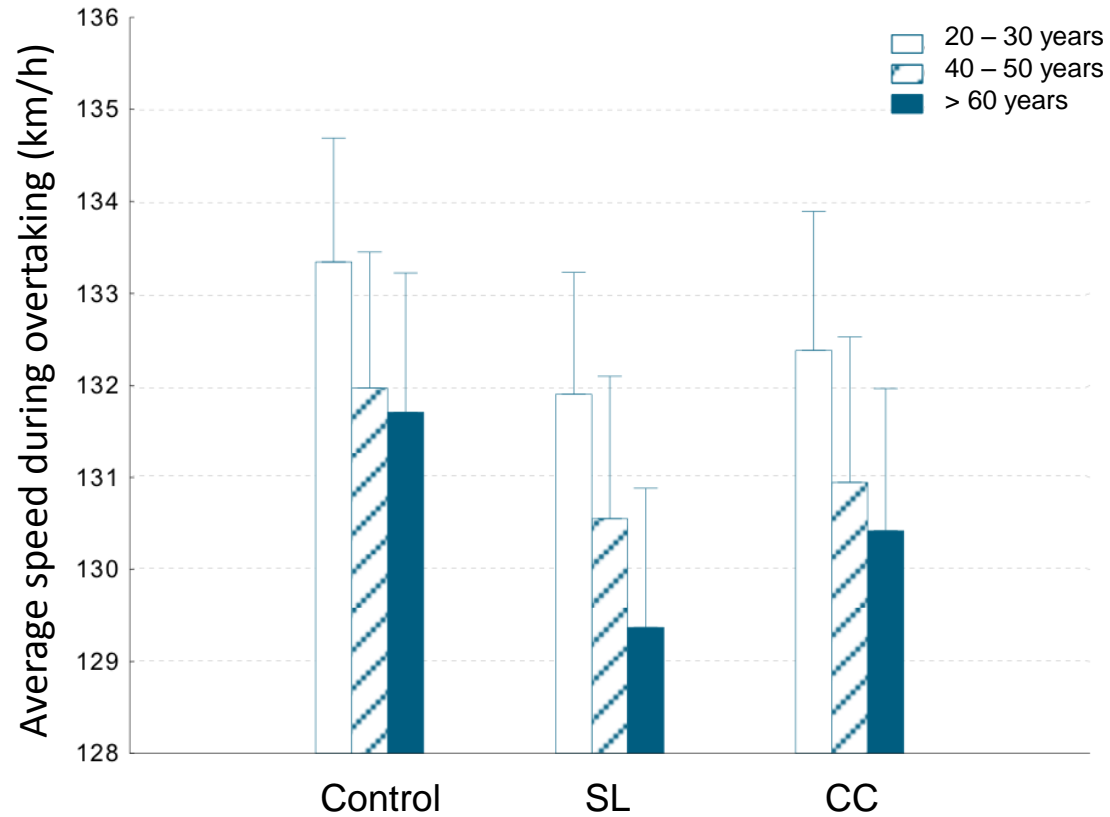
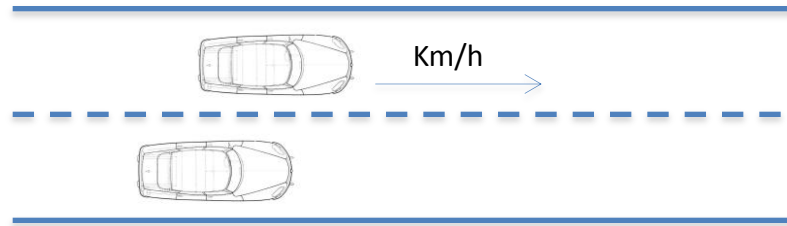
- KSS (Karolinska Sleepiness Scale)
- Alpha Rythm (EEG)
- Ocular movements (EOG)

Physiological/behavioral

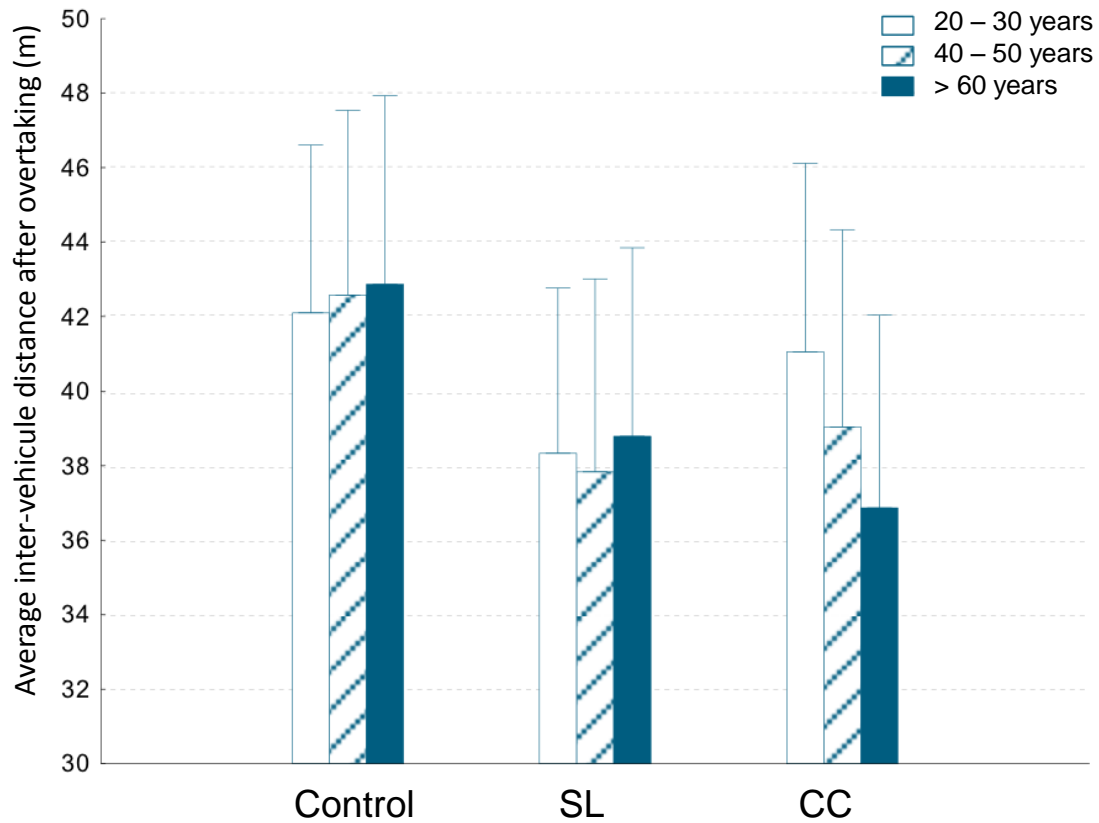
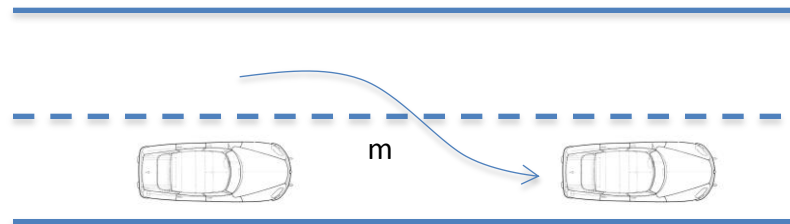
Modification of driving behaviors



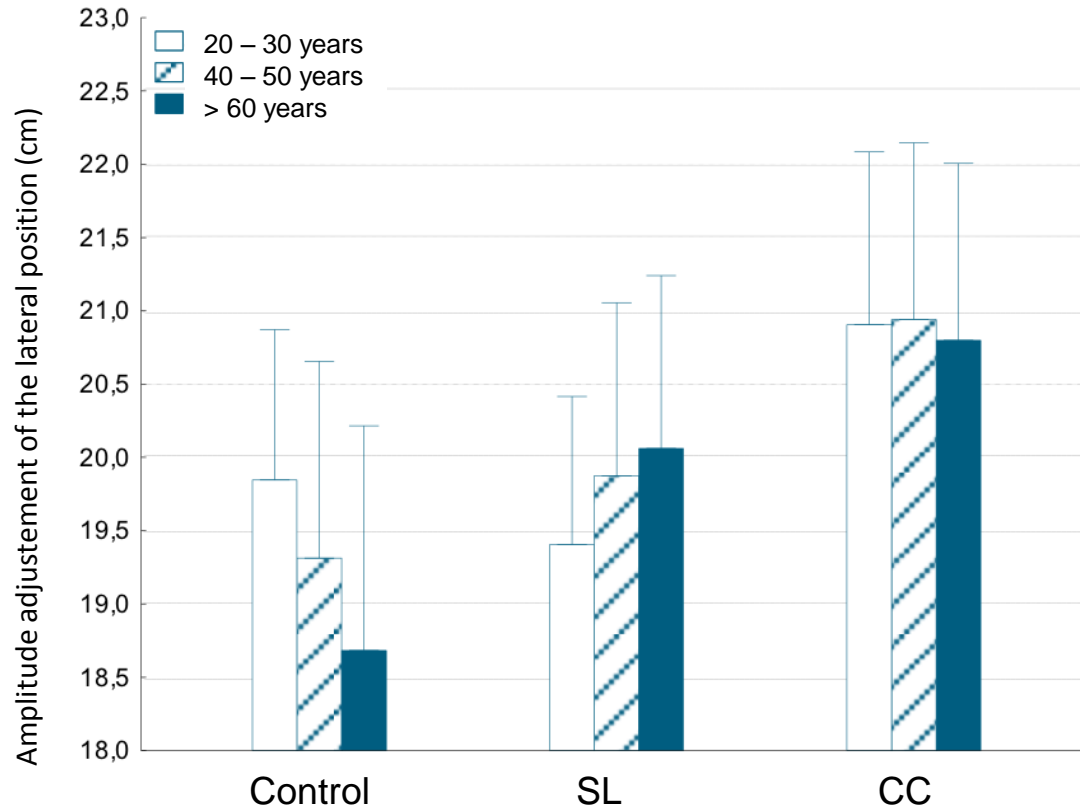
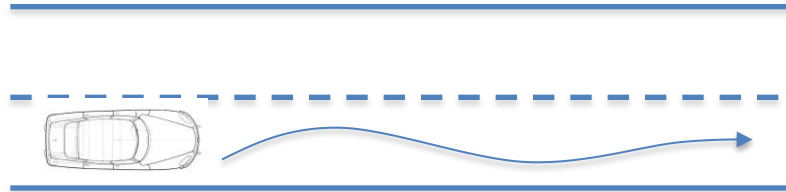
Average speed during overtaking



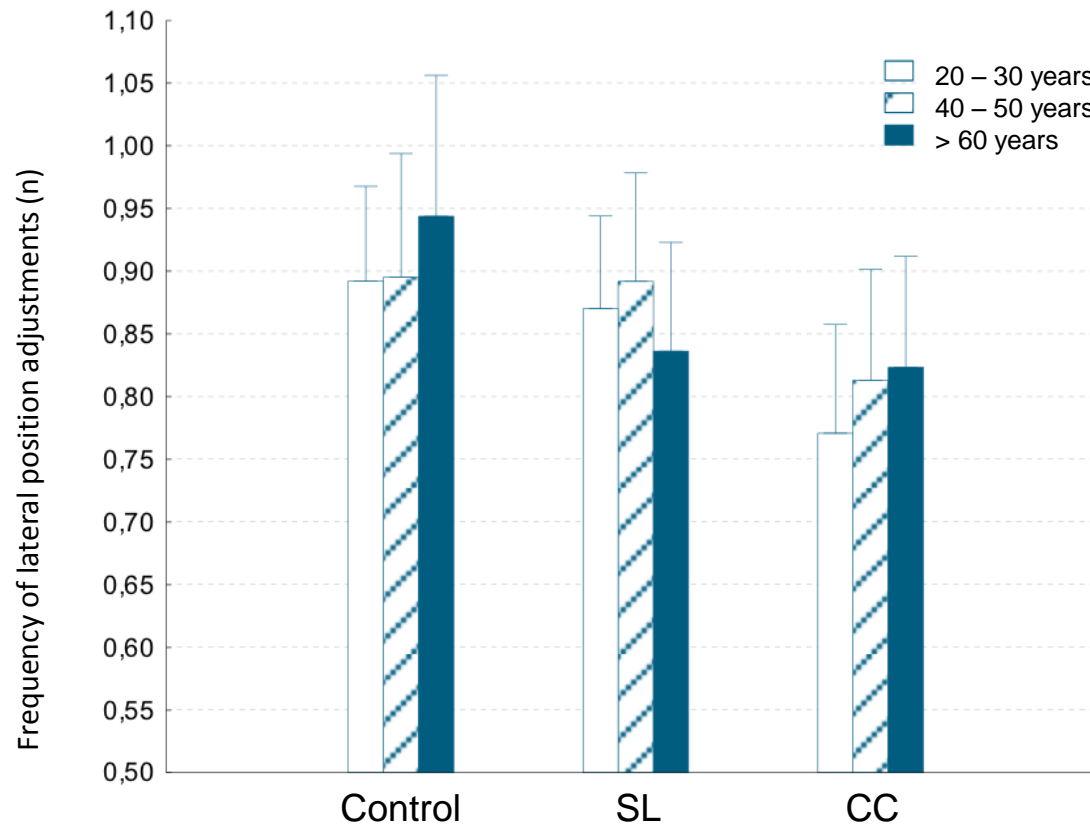
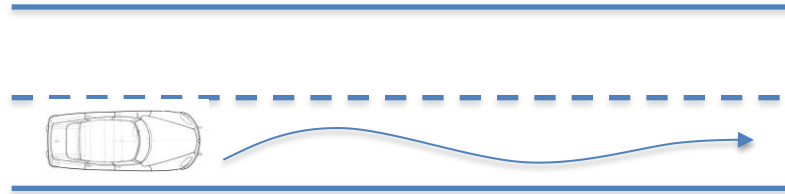
Average inter-vehicule distance after overtaking



Amplitude ajustement of the lateral position

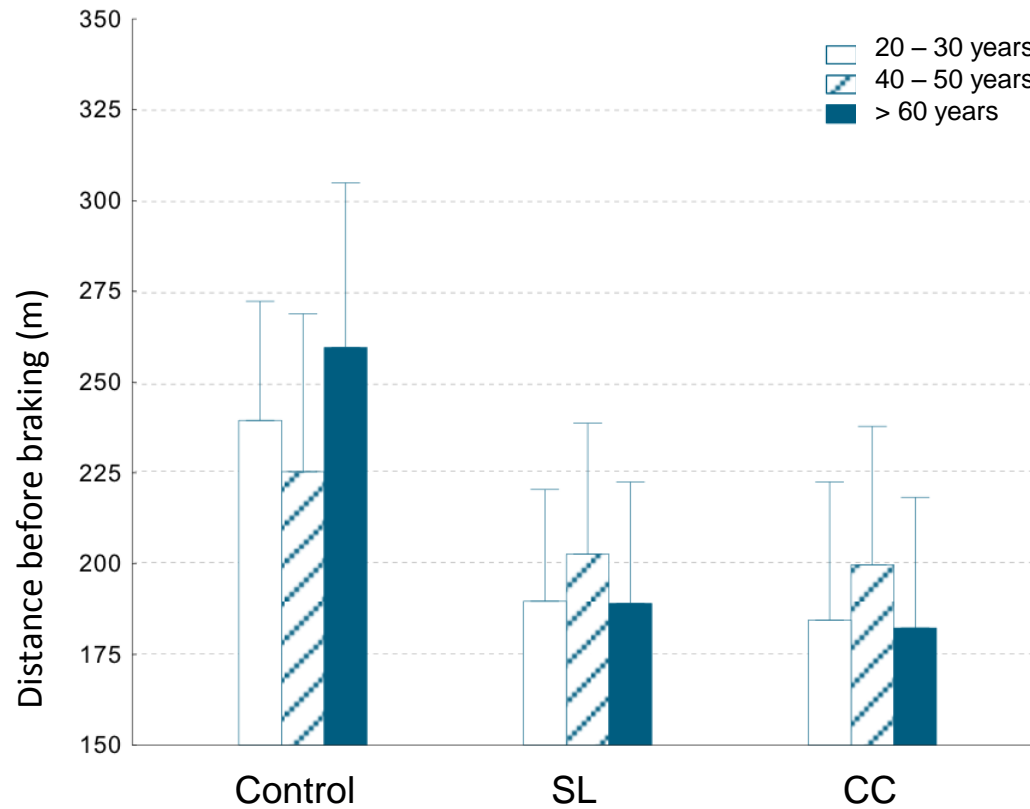
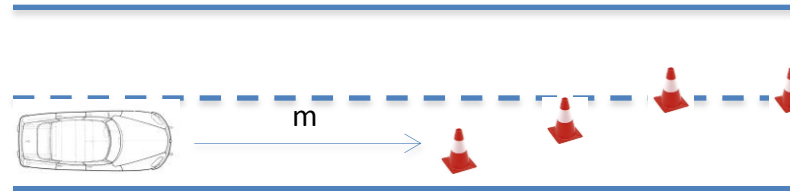


Frequency of lateral position adjustments



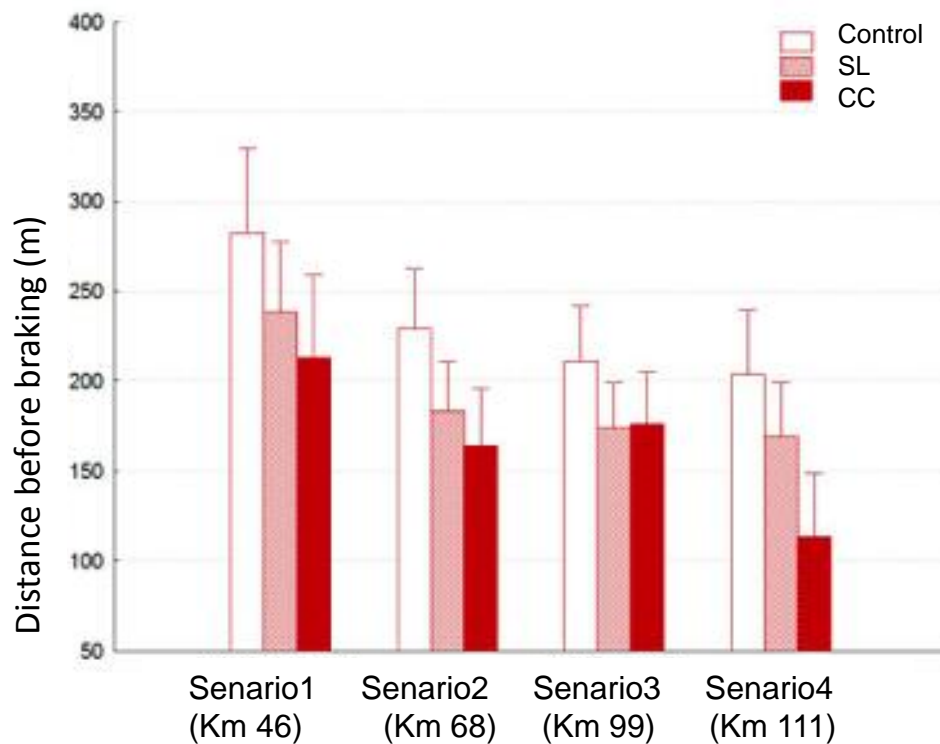
Reaction when approaching dangerous zones

Distance before braking



Reaction when approaching dangerous zones

Distance before braking

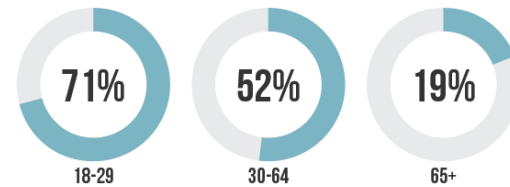


Fatigue and hypovigilance indicators

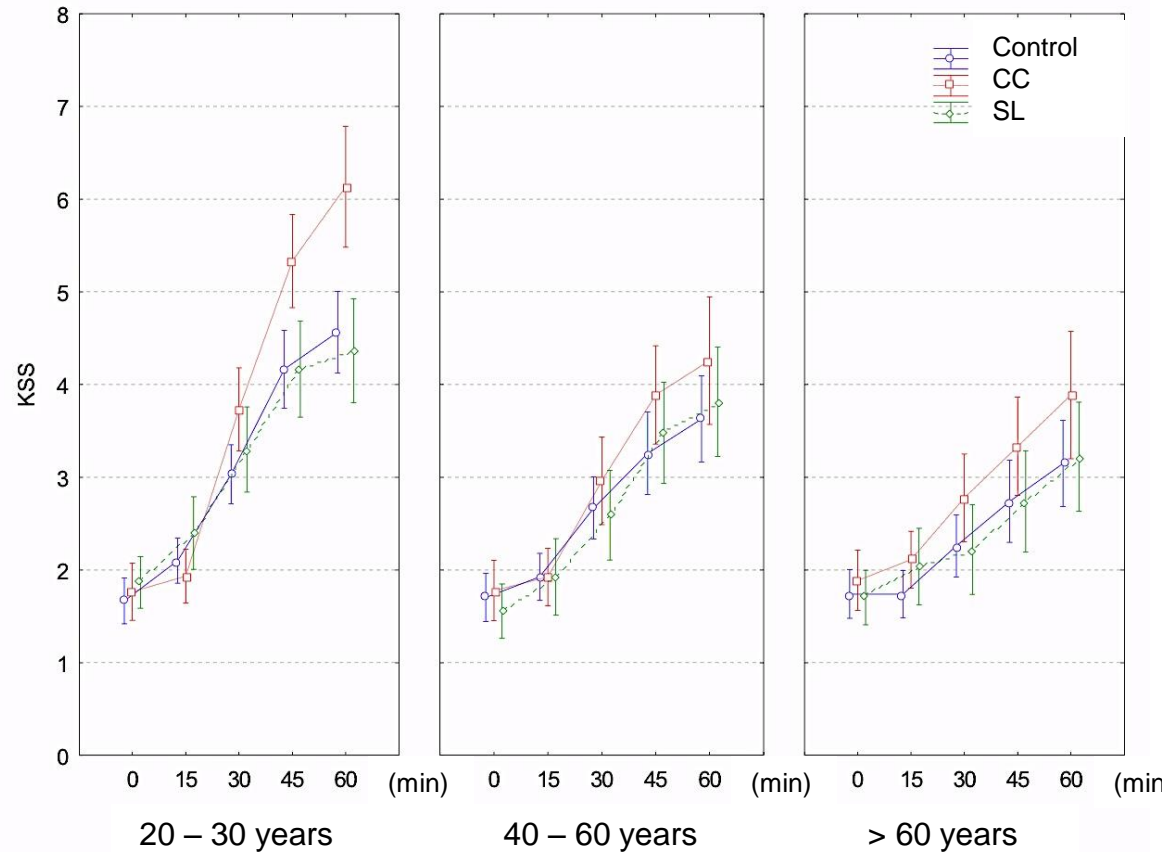
Karolinska Sleepiness Scale

- 1. Extremely alert
- 2. Very alert
- 3. Alert
- 4. Rather alert
- 5. Neither alert nor sleepy
- 6. Some signs of sleepiness
- 7. Sleepy, but no difficulty remaining awake
- 8. Sleepy, some effort to keep alert
- 9. Extremely sleepy, fighting sleep

LIKELIHOOD OF DRIVING DROWSY BY AGE

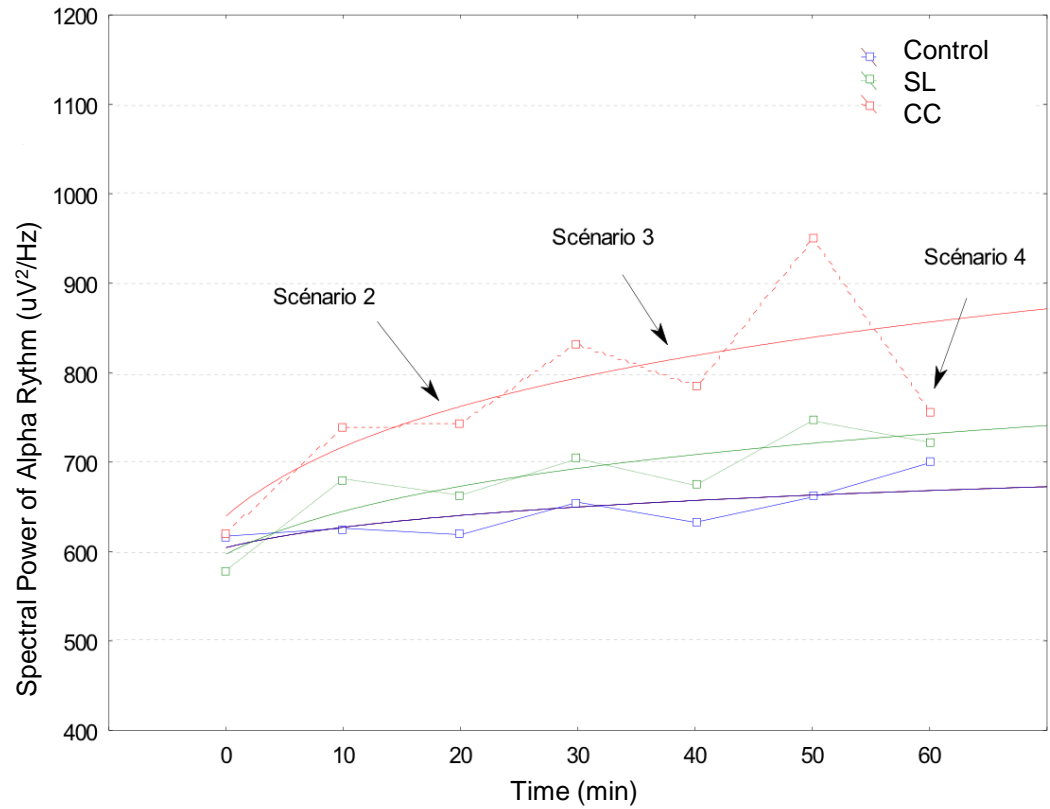
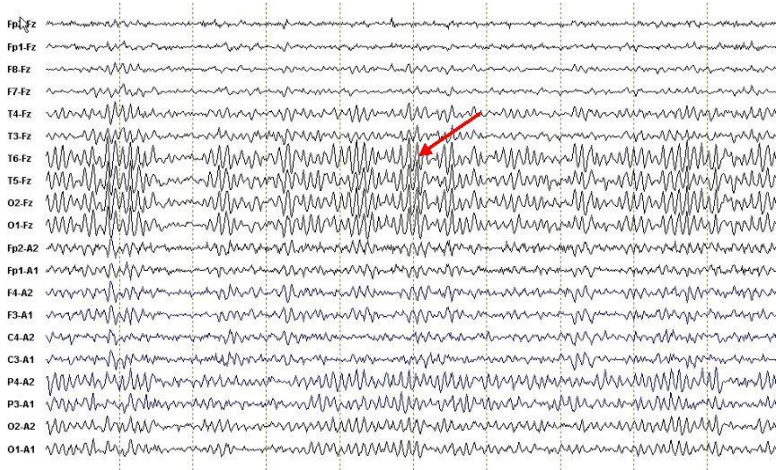


National Sleep Foundation



Fatigue and hypovigilance indicators

Alpha Rhythm (EEG)



Conclusion

Traffic high

Abnormal driving behaviour

Low traffic

Higher drowsiness

Should we banish Speed Limiter and/or Cruising Control ?

No

-> Efficient tools for speed limiting

Conclusion



FONDATION
Pour une conduite responsable

Recommendation

Traffic high

Do not use CC or SL

Low traffic

Drive shorter distances before rest