Acceleration level and inability to predict vehicle path increase carsickness symptoms induced by very low frequency lateral movements in real driving conditions

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O’Hanlon & Mc Cauley, 1974
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Being unable to anticipate vehicle movements seems to increase motion sickness symptoms.

Kuiper et al., 2018

Wada et al., 2006

Rolnick & Lubow, 1991
Objectives

Evaluating the impact of the acceleration level and the inability to predict vehicle path on the occurrence of car sickness symptoms, induced by very low frequency lateral movements (0.2Hz) in real driving conditions.
Experimental protocol

**Acceleration level**

4 conditions:

- **Small** (3-5 m/s²)
- **Large** (8-10 m/s²)

**Speed**: 35 km/h

**n = 24 participants**  
(39.3 ± 9.1 yo)
Experimental protocol

**Acceleration level**

**Unpredictability**

4 conditions:

- **Small** (3-5m/s²)
- **Large** (5-10m/s²)
- **Unpredictable small**

**Speed**: 35 km/h
**Experimental protocol**

**Acceleration level**

**Unpredictability**

4 conditions:

- **Small** (3-5m/s²)
- **Large** (5-10m/s²)
- **Unpredictable small**
- **Unpredictable large**

**Speed : 35 km/h**
Everyone became sick to some extent in 20min >> 0.2Hz lateral movements are noxious in real driving conditions
Looking for relation between subjective score and Motion Sickness Dose Value (MSDV: indicator of the vehicle dynamics based on lateral acceleration only)
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In transportation, movements are not regular but include important sequences of acceleration/braking or unexpected turns.
Conclusion and perspectives

✓ Validated methodology to induce carsickness symptoms
  $\rightarrow$ Increase of carsickness ratings

✓ Acceleration level increases carsickness symptoms
  😞😊 $\rightarrow$ The higher, the worse

✓ Unpredictability of vehicle path increases carsickness symptoms without any visually induced sensory conflict
  $\rightarrow$ Participants were asked to look forward, without being engaged in any other task

Car manufacturers and suppliers should focus on the smoothness of path control and give ways to anticipate the upcoming path
Trolls won’t get sick anymore! Thank you for your attention!