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**Body Movement Strategies to Initiate the Crossing of a Street in Front of Traditional and Self-Driving Cars in Young and Older Adults.**

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**Preliminary Results & Discussion**

To investigate body movement strategies performed before crossing the street in OA wrt YA in complex mixed traffic

48% of pedestrians fatalities involve people aged 65 or more \([1]\)

Deficits in street crossing behaviors in Older Adults (OA) [2, in a simulator]: walking speed, of risky decisions

Young adults’ (YA) strategies: the head initiates the crossing movement, followed by the shoulders, elbows, wrists, hips, knees and ankles [3, in front of a TV screen]

Head rotation is not a key factor to predict street crossing [4, using real street condition]

Self-driving vehicles - new challenges on the road [5]

Identifying pedestrians’ motion invariants could be a key to safety

**Method**

Between-group design

30 YA, 21-39yo

Task: cross (or not) a virtual two-way street by walking in a simulator

Conditions: 120 street crossings trials in the following conditions

- **2 Types of vehicles (4 possibilities):** Conventional and/or Self-driving cars (always stopping, letting the pedestrian cross)
- **5 Types of gaps:** (1, 2, 3, 4, and 5s)
- **2 speeds:** 30 or 50 km/h

Motion capture using Vicon System (120Hz), Full Body 27 markers

Analyses:

- **Comparison of the delays** to initiate the crossing movement for head, shoulders and hips with respect to the feet

- **Hierarchical clustering** on body segments angles profile 2s before the initiation of crossing by the toe to identify specific groups of behavior.

- **Delays in body movement initiation**
  - YA & OA: Top-down sequence to initiate the street crossing in accordance with [3]
    - Head → Shoulders → Hips → Toe
  - Very small effect of aging and traffic conditions (resp. p < .001, \(\eta^2 = .04\), p < .005, \(\eta^2 = .01\))

- **Body segment angles profiles**
  - Variability in left-right rotation angles profiles of the head, hips, shoulders
  - Forward tilt profile of the trunk more consistent

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