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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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**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

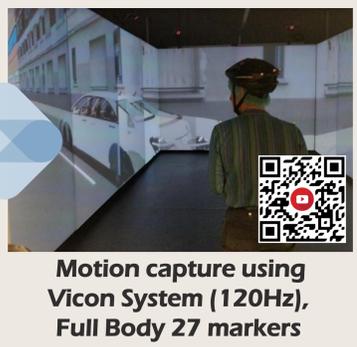
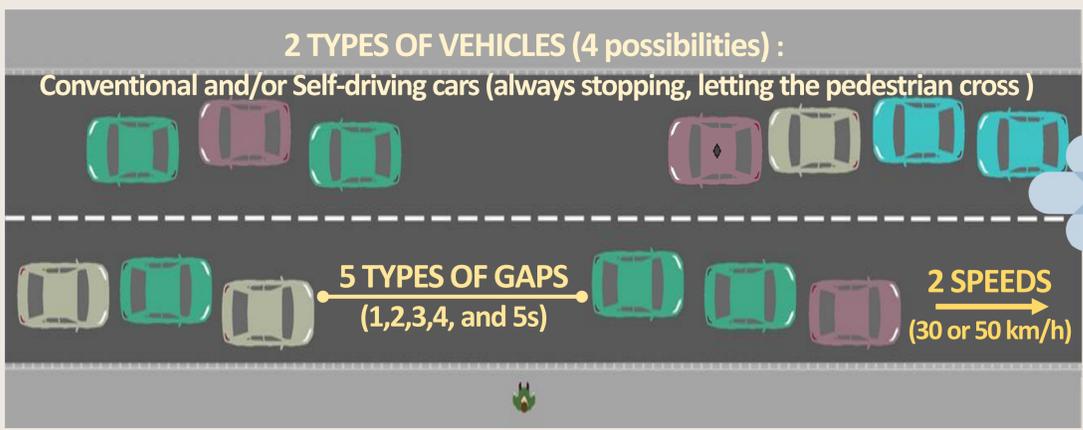
To investigate body movement strategies performed before crossing the street in OA wrt. YA in complex mixed traffic

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

## METHODS

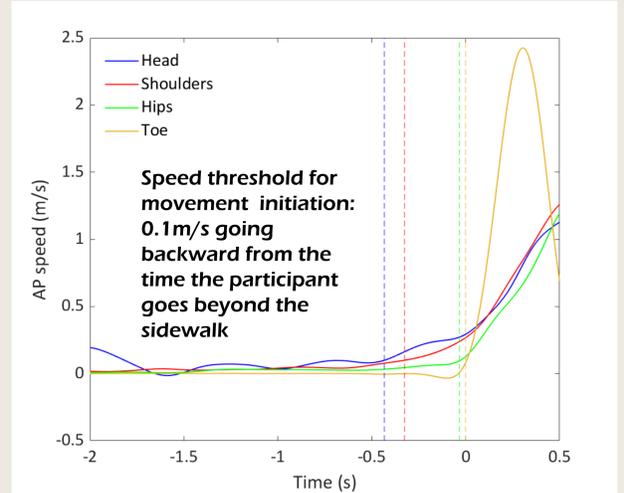
Between-group design

30 OA, 68-81yo



**Analyses:**

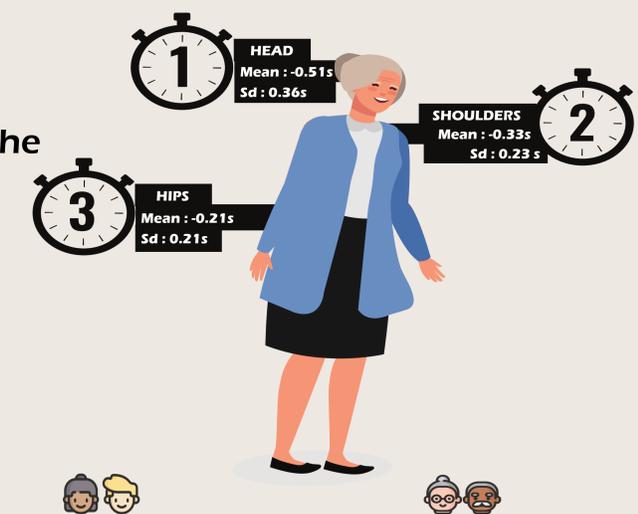
- **Comparison of the delays to initiate the crossing movement for head, shoulders and hips with respect to the feet**
- **Hierarchical clustering on body segments angles profile 2s before the initiation of crossing by the toe to identify specific groups of behavior.**



## PRELIMINARY RESULTS & DISCUSSION

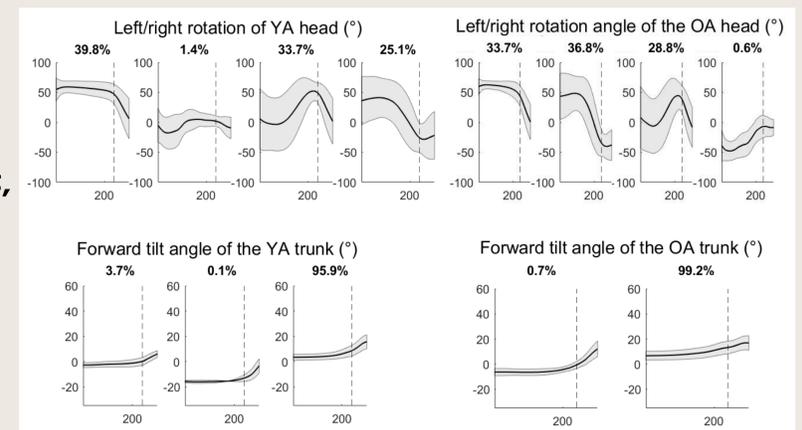
❖ **Delays in body movement initiation (12 YA-16 OA)**

- 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 (29 YA-20 OA)**

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



➡ **Forward head motion & trunk tilt angle promising predictors of street crossing**  
 ➡ **Consistent body behavior between YA and OA to initiate street crossing**