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.

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)

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

(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, ƞ²=.04, p<.005, ƞ²=.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

METHODS

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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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