Pedestrian collision avoidance on narrow sidewalk: a meeting between psychology and virtual reality

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PEDESTRIAN COLLISION AVOIDANCE ON NARROW SIDEWALK: A MEETING BETWEEN PSYCHOLOGY AND VIRTUAL REALITY

Context: NARROW SIDEWALKS

Impact of 3 personal factors were studied

- Speed (fast – slow)
- Sex (Male – Female)
- Distraction (testing – non-testing)

Problem: why do we choose to step down or stay on the narrow sidewalk when we encounter a pedestrian walking in the opposite way?

Go to a safer place

Social Perception Model

- Speed and attention influence the decision to step down from the narrow sidewalk

Assumption: speed and attention increase the detection time in the ORCA model. Detection time is then a score.

- Virtual pedestrian decides to step down if his detection time is greater than the other pedestrian involving in the jousting

N.B.: the virtual pedestrian sees pedestrian in the public space, and detects him in the social space

Perception model for the virtual pedestrian

- ORCA Model used.
- Different types of collision avoidance (anticipative, reactive)
- Collision avoidance behaviors are a function of the walking speed, the detection time

Proxemics (Hall, 1966) @JL Grall, Wiki-commons

Pedestrians manage social interpersonal distances

First Experiment – Results

- Influence of speed and attention

Pedestrian is expected to step down when:
- he walks fast;
- he is attentive

For the participants, no gender effects

Overall ranking of the model-based videos, Median = 4

Second Experiment – Results

- Credibility of model-based videos and fake videos according to the subjects’ answers

First Experiment – Questionnaire

- 64 videos of pre-jousting, before any modification of trajectory
- 50 counterbalanced videos
- Participants told who was to step down: pedestrian at left or at right in the jousting with a Likert scale.
- Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales.
- 60 participants

Second Experiment – Questionnaire

- 64 videos of complete jousting with the new model.
- 50 counterbalanced videos
- One of 8 videos is a fake video (opposite of the model result)
- Participants said if the jousting is credible
- All participants

Discussion

- To use Social Pedestrian Non Player Characters in VR environment is feasible
- Needs to take into account the empowerment/authority

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