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

- To keep a safety zone
- To anticipate the collision

Goal: to simulate a social virtual pedestrian (non player character) in order to study this kind of situation in virtual environment

First Experiment – Results
- Impact of 3 personal factors were studied:
  - Speed (fast – slow)
  - Sex (Male – Female)
  - Distraction (texting – non texting)

We avoid the collision by modifying our trajectory

First Experiment – Questionnaire
- 64 videos of pre-jousting, before any modification of trajectory
  - 32 videos of complete jousting with the new model
  - 32 videos of complete jousting with the old model

Social Perception Model
- Speed and attention influence the decision to step down

Assumptions: speed and attention increase the detection time in the ORCA model.

Detection time is then a score

Participants said if the jousting is credible

64 videos of complete jousting with the model result

Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales

With Likert scales.

Participants told who was to step down:

- 6x8 counterbalanced videos
- One of 8 videos is a fake video

64 videos of complete jousting with the opposite of the model result

Experiment – Questionnaire
- Participants said why the virtual pedestrian stepped down when pedestrian at left or at right in the jousting
- Participants said if the jousting is credible

To anticipate the collision

We avoid the collision by modifying our trajectory

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

2nd Experiment – Results
- Credibility of model-based videos and fake videos according to the subjects’ answers

First Experiment – Results
- 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

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

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

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

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

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

Assumptions:
- 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.

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

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