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 (texting – non-texting)

Personal characteristics (psychological and physical)

We avoid the collision by modifying our trajectory
- Collaborative effort (Y/N)
- Direction
- Speed

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

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

We avoid the collision by modificating our trajectory

To keep a safety zone

To anticipate the collision

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

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

Collision avoidance behaviors simulation (Orca model)

Social Perception Model

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

Metrics
- Overall ranking of the model-based videos and fake videos according to the subjects' answers
- Percentage of correct answer (model-based videos vs fake videos)

2nd Experiment – Results

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

64 videos of pre-jousting, before any modification of trajectory
- Bell 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
- 64 videos of complete jousting with the new model.
- Bell counterbalanced videos
- One of 8 videos is a fake video (opposite of the model result)
- Participants said if the jousting is credible

Participants said if the jousting is credible

- 8x8 counterbalanced videos
- Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales
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