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**

- Pedestrians manage social interpersonal distances.
- Encounter of two pedestrians is impossible.
- One has to step down and he is exposed to the road traffic.
- It can be seen as an URBAN JOUSTING.

**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?

**Impact of 3 personal factors were studied**

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

**Social Perception Model**

- Speed and attention influence the decision to step down.
- 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.

**2nd Experiment – Results**

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

**1st Experiment – Results**

- 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.

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**First Experiment – Questionnaire**

- 64 videos of pre-jousting, before any modification of trajectory.
- 62 counterbalanced videos.
- Participants told who was to step down.
- 64 videos of complete jousting with a Likert scale.
- Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales.
- 64 videos of complete jousting (opposite of the model result).
- Participants said if the jousting is credible.
- 8x8 counterbalanced videos.
- * One of 8 videos is a fake video.
- * 8x8 videos of complete jousting with Likert scales.

**Second Experiment – Questionnaire**

- 68 videos of complete jousting with the new model.
- 66 counterbalanced videos.
- One of 8 videos is a fake video.
- Participants said if the jousting is credible.
- 64 videos of complete jousting with the new model.
- * One of 8 videos is a fake video.

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**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.

**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.

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**Experiment – Questionnaire**

- Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales.
- Participants told who was to step down:
  - with a Likert scale.
- Pedestrian is expected to step down (speed, sex, distraction) with Likert scales.
- Participants said if the jousting is credible.
- 8x8 counterbalanced videos.
- * One of 8 videos is a fake video.
- * 8x8 videos of complete jousting with Likert scales.

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**Experiment – Results**

- Speed and attention influence the decision to step down from the narrow sidewalk.
- Assumption: speed and attention influence 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.

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- Assumption: speed and attention increase the detection time in the ORCA model. Detection time is then a score.
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- Participants told who was to step down:
  - with a Likert scale.
- Participants said why the virtual pedestrian stepped down (speed, sex, distraction) with Likert scales.
- 64 videos of complete jousting (opposite of the model result).
- Participants said if the jousting is credible:
  - 60 participants.