

Rules versus risk: Why perceptions of pedestrian comfort and safety differ for interactions with self-driven versus human-driven vehicles

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RESEARCH QUESTION

Do pedestrian interactions with *self-driven vehicles* (SDV) evoke different topics than interactions with *human-driven vehicles* (HDV)?

DATA

Deception-based survey to measure the *intrinsic* effects of vehicle autonomy (all else equal) on perceptions of pedestrian comfort & safety

Video clips

Participants rated 8 video clips of pedestrian interactions with cars in uncontrolled crosswalks

Randomization

Participants were told that a random 4 of the clips showed SDV, and the others were HDV

Perception ratings

Open text box

545 participants wrote 2,129 comments about the interactions shown

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Regarding the interaction between the crossing pedestrian and the **self-driving vehicle** shown in the video, please indicate your level of agreement with the statements below:

| Strongly disagree | Neither disagree nor agree | Strongly agree | |
|---|----------------------------|----------------|---------------------------------------|
| -10 | 0 | 10 | |
| | | | <input type="checkbox"/> I don't know |
| The vehicle yielded to the pedestrian. | | | |
| The vehicle <i>should have</i> yielded to the pedestrian. | | | <input type="checkbox"/> I don't know |
| The pedestrian felt comfortable in this crossing. | | | <input type="checkbox"/> I don't know |
| The risk of injury for the pedestrian in this crossing was low. | | | <input type="checkbox"/> I don't know |

Please provide comments if you wish to clarify your rating, or describe any confusion/difficulty you had with rating this video

STRUCTURAL TOPIC MODELLING

A regression method to infer latent topics in open text data & examine covariates of the:

- **Topic Prevalence:** how likely it is to be discussed
- **Topic Content:** words used to express each topic

RESULTS

Topics significantly more likely to be discussed for SDV interactions (versus HDV)

1. Vehicle should make a complete (not rolling) stop
2. Pedestrian agency and individuality of risk in a given situation
3. Importance of awareness and communication for pedestrian safety
4. Car need not yield if pedestrian not in crossing
5. Pedestrian should be aware and cautious before crossing

“Can a self-driving car assess whether someone has a higher risk of falling or dropping something?”

“Eye contact helps drivers anticipate.”

“The pedestrian did not check the traffic (look all ways). Is this because they expected the self-driving vehicle to stop?”

“The pedestrians were defensive and cautious which reduced their risk of injury.”

FINDINGS

- Pedestrian interactions with self-driven vehicles (SDV) evoke comments on different topics than interactions with human-driven vehicles (HDV)
- Evaluators focus on **rule compliance** for SDV, but focus on **risk mitigation** for HDV
- Pedestrians are ascribed more responsibility to be **cautious, aware, and predictable** when interacting with SDV

TO IMPROVE WALKABILITY IN CITIES WITH SDV...

- Self-driven vehicles (SDV) should be programmed for strict rule compliance and conservative operation in city streets
- Limit uncontrolled space negotiation between SDV and pedestrians
- Enhance external communication from SDV