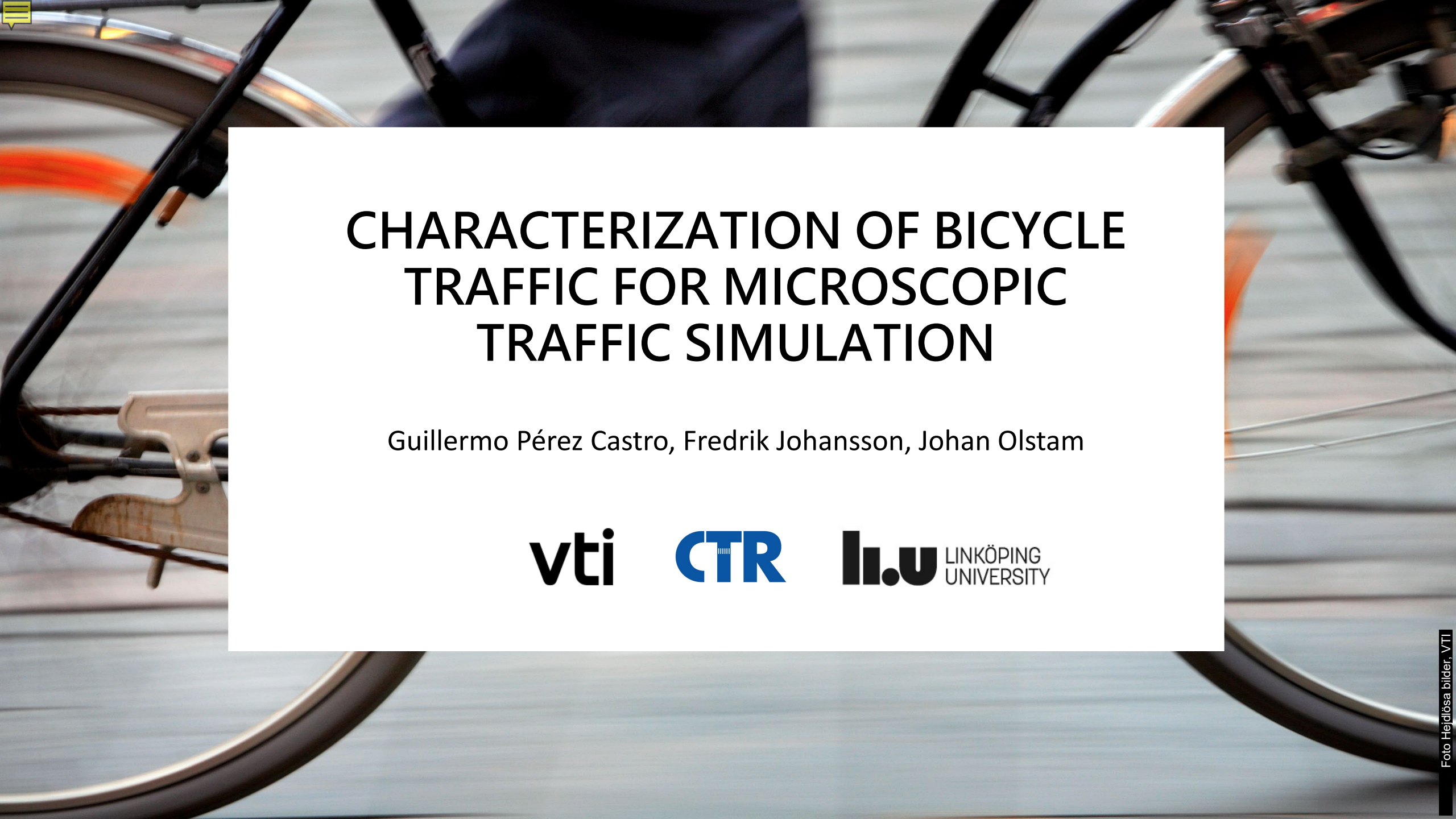

CHARACTERIZATION OF BICYCLE TRAFFIC FOR MICROSCOPIC TRAFFIC SIMULATION

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BACKGROUND

- PhD project:
  - To further develop and evaluate microscopic models for simulating bicycle traffic.
- Three types of interactions:
  - Interactions with the infrastructure and/or the environment.
  - Interactions between bicyclists.
  - Interactions with other road users.
- Characteristics of bicycle traffic.

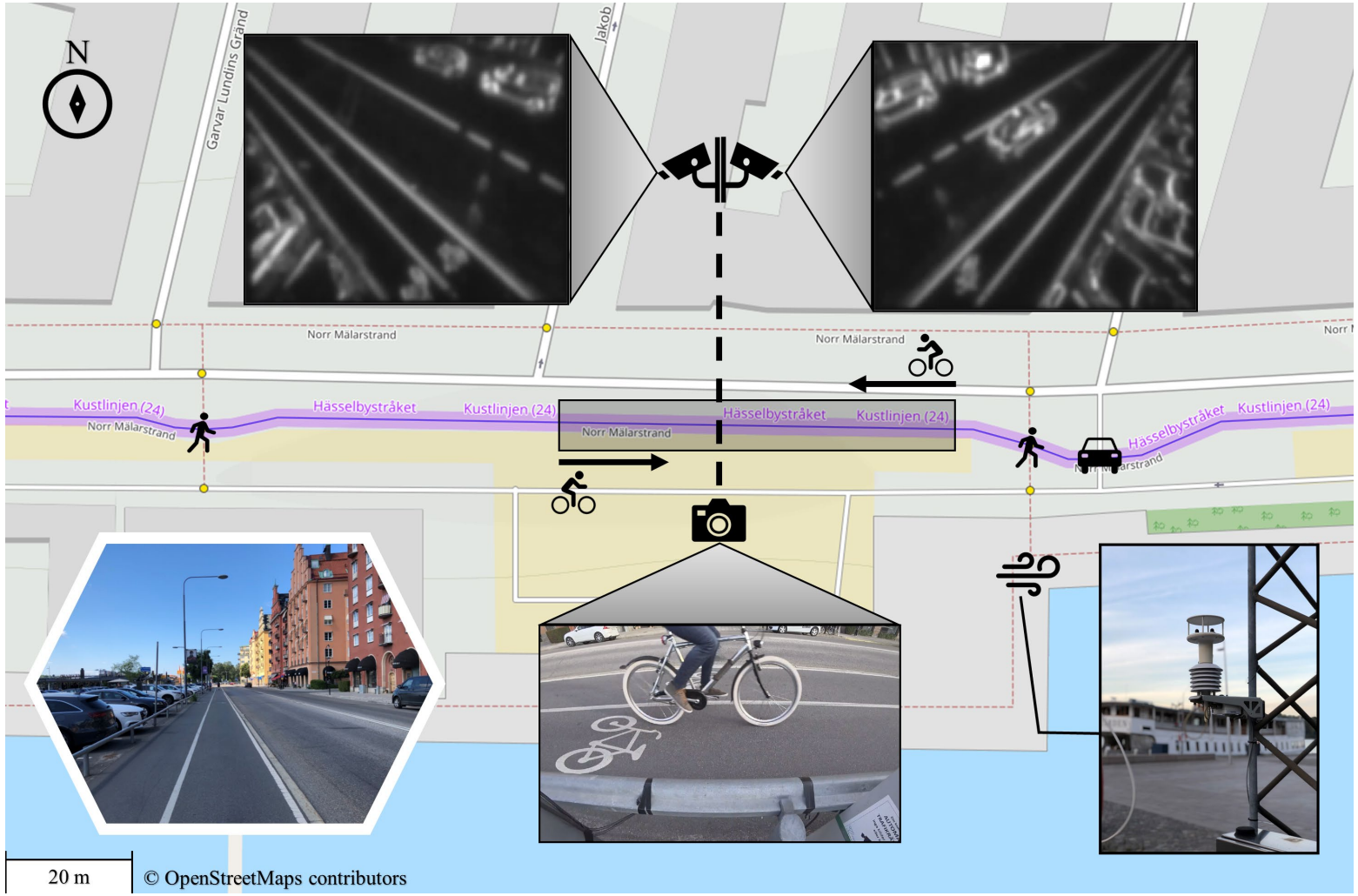
PURPOSE

To describe characteristics of bicycle traffic that are relevant for simulating bicycle traffic.

- Characteristics of free-riding, following, and overtaking.
- Bidirectional bicycle path (exclusive for bicyclists).

DATA

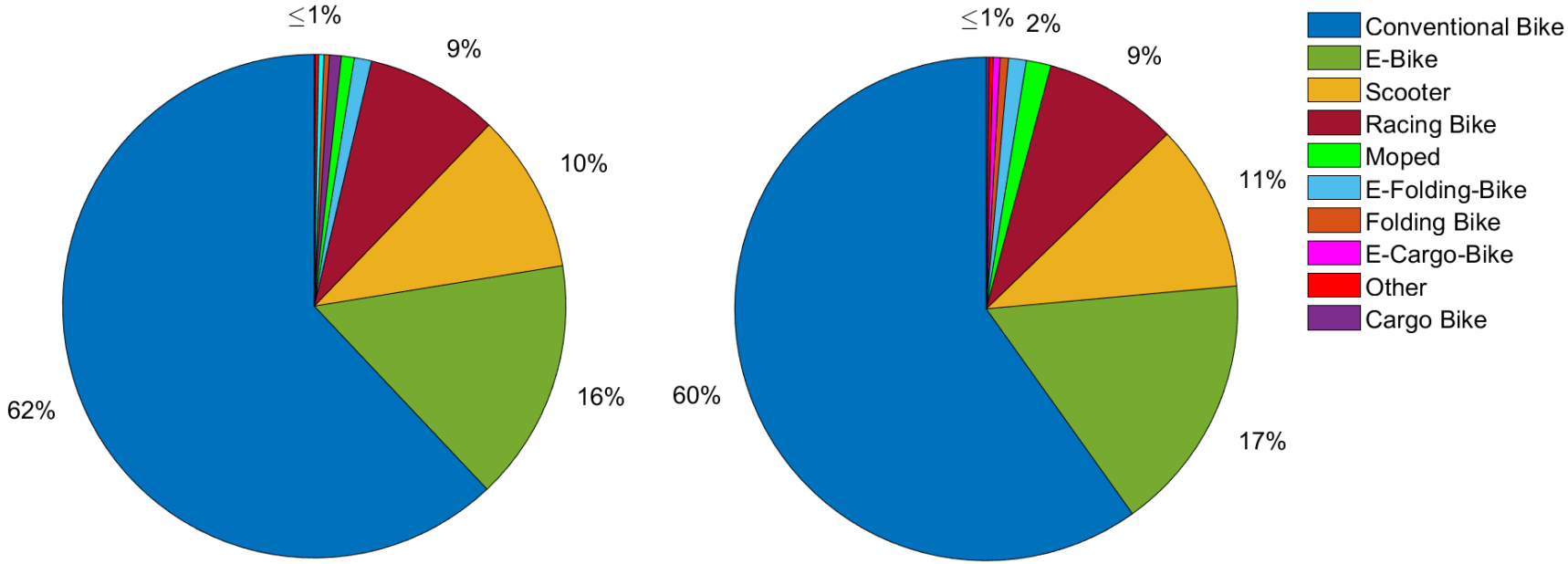
- Location: Norr Mälarstrand, Stockholm
- Date: 20-24th September 2021
- Two-camera Viscando OTUS3D System + Hand-held camera
- Total, 27 759 trajectories
  - 8.5 s long
- Wind measurements



DATA OVERVIEW

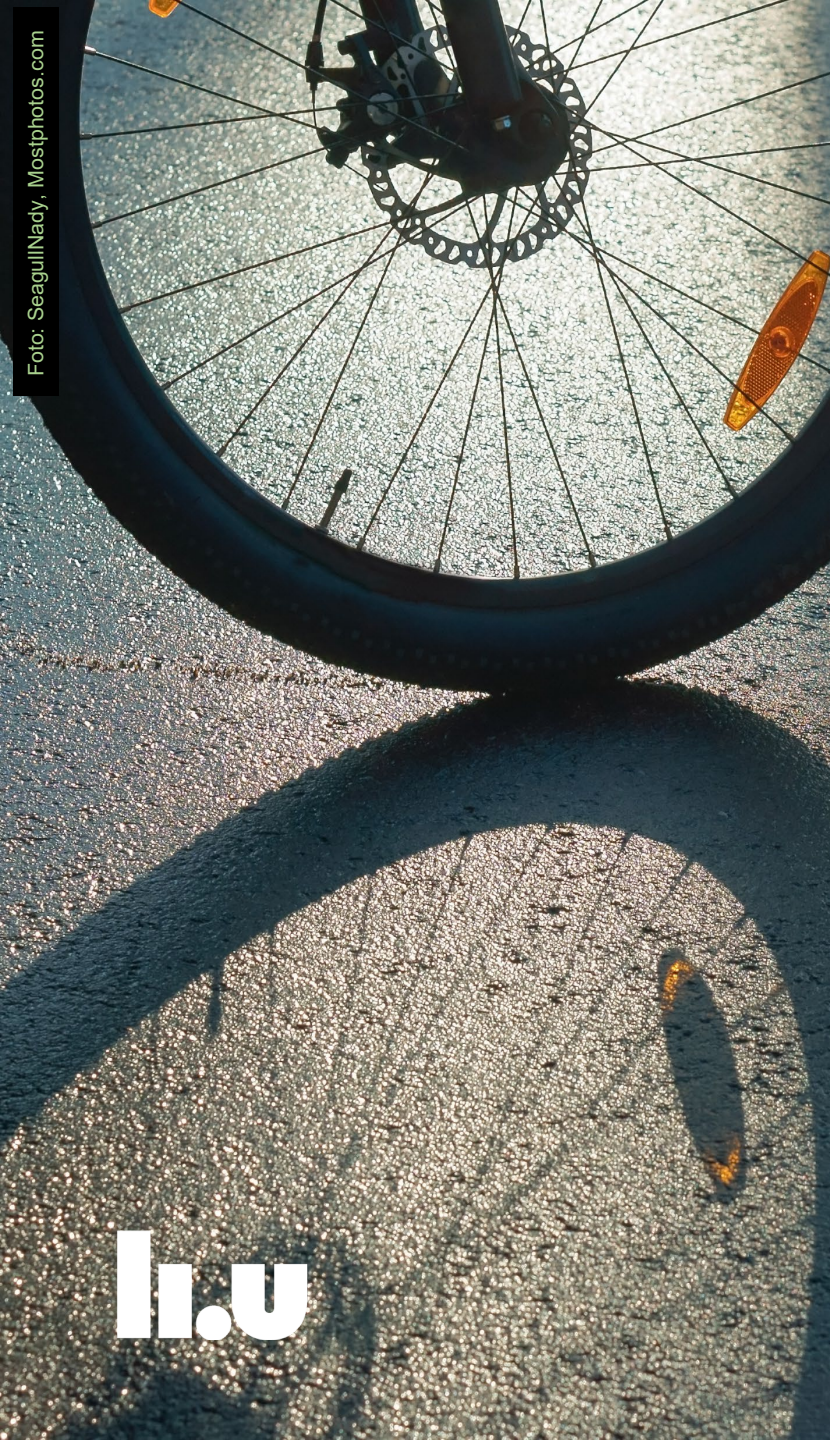
- Flow
  - Asymmetric between travel directions
    - Morning peak, towards city center [eastbound]: 600 bicycles/h
    - Evening peak, towards Rålambshovspark [westbound]: 300 bicycles/h

- Sample size with annotated type of bicycle = 2 580 bicycles



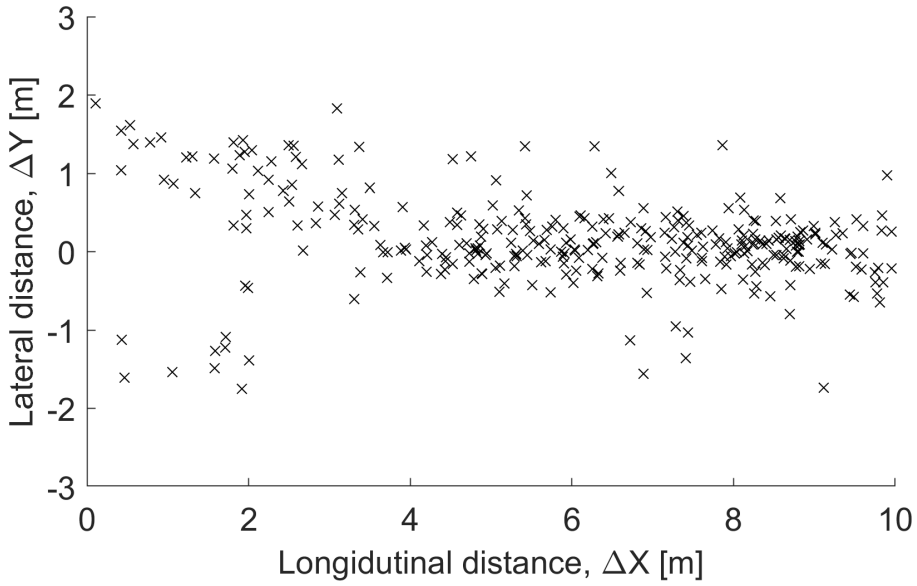
AM peak [n=1 444]

PM peak [n=1 136]

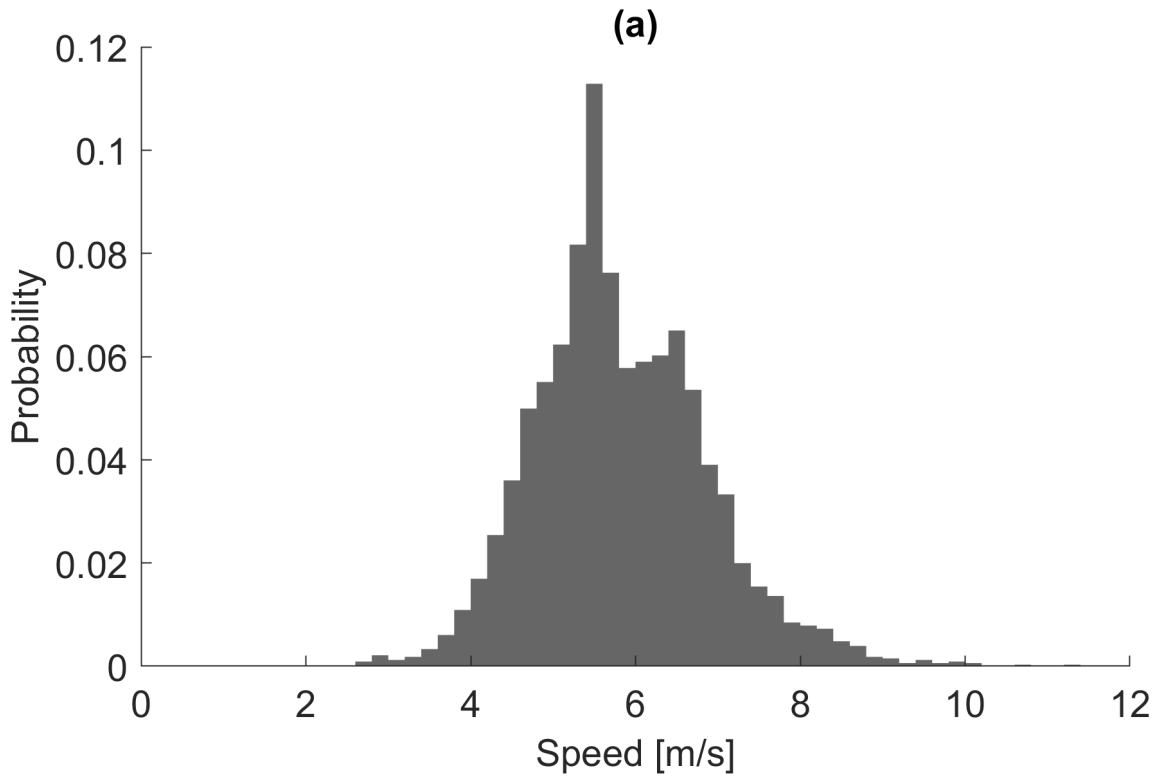


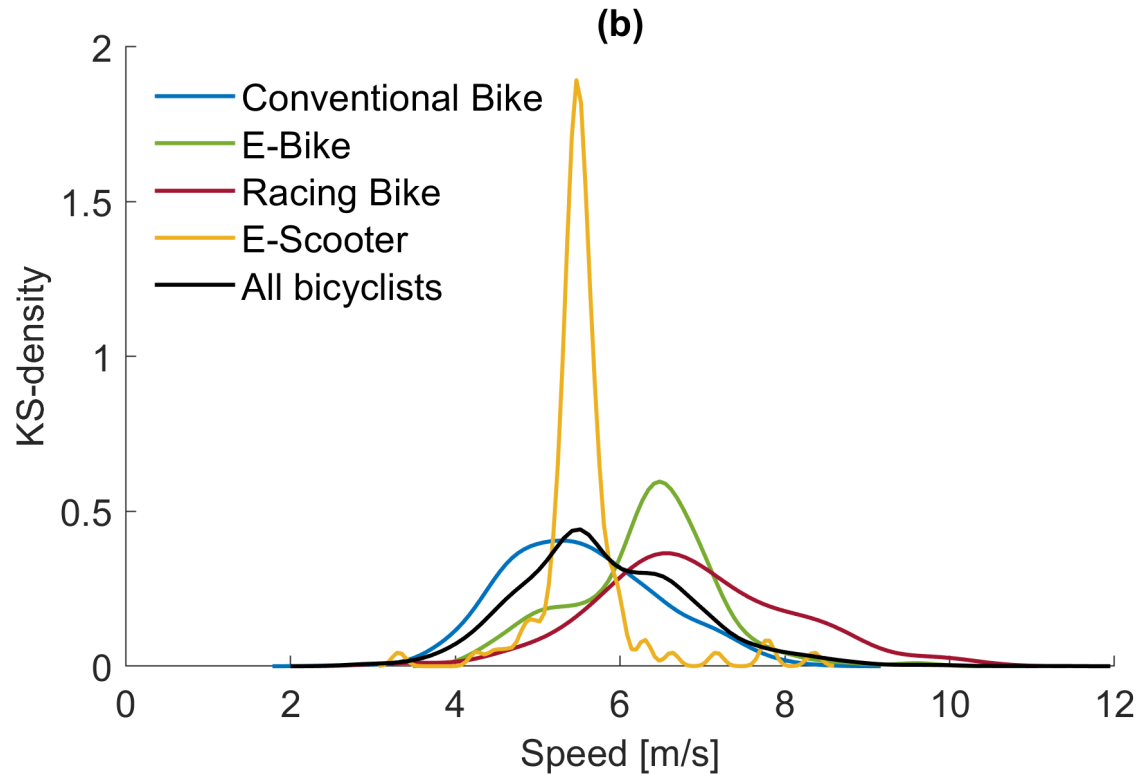
FREE & INTERACTING BICYCLISTS

- Free bicyclists.
  - No other bicyclists are present in direction of travel.
- Interacting bicyclists.
  - Following.
  - Overtaking.

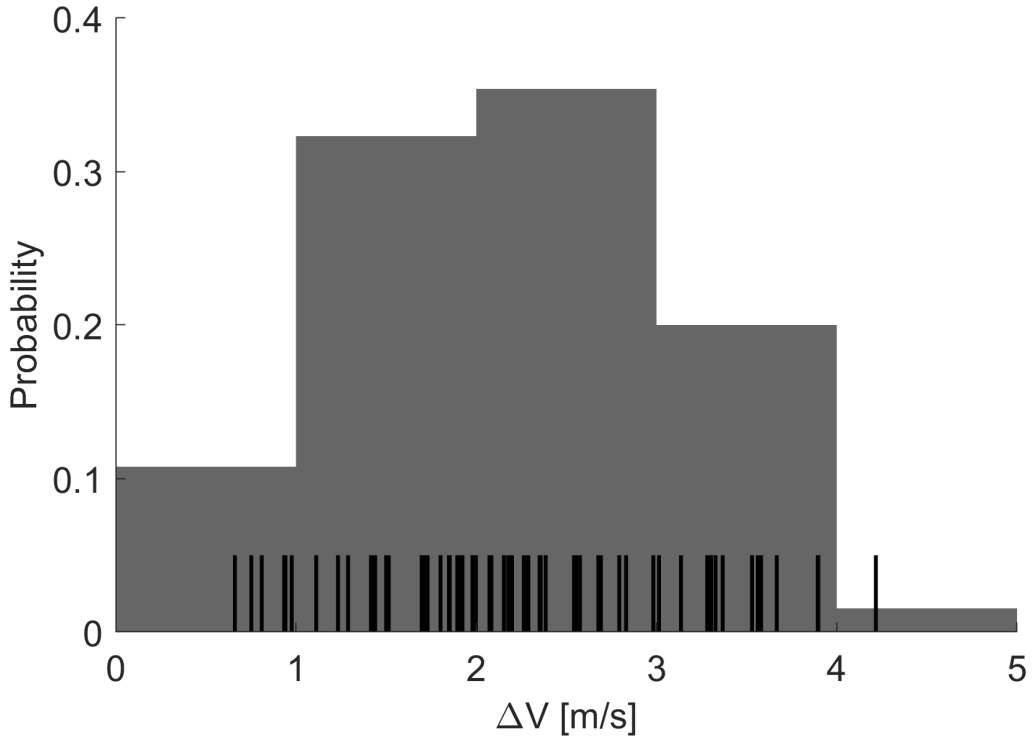


SPEED


(a)
Probability
0.12
0.1
0.08
0.06
0.04
0.02
0
0
2
4
6
8
10
12
Speed [m/s]

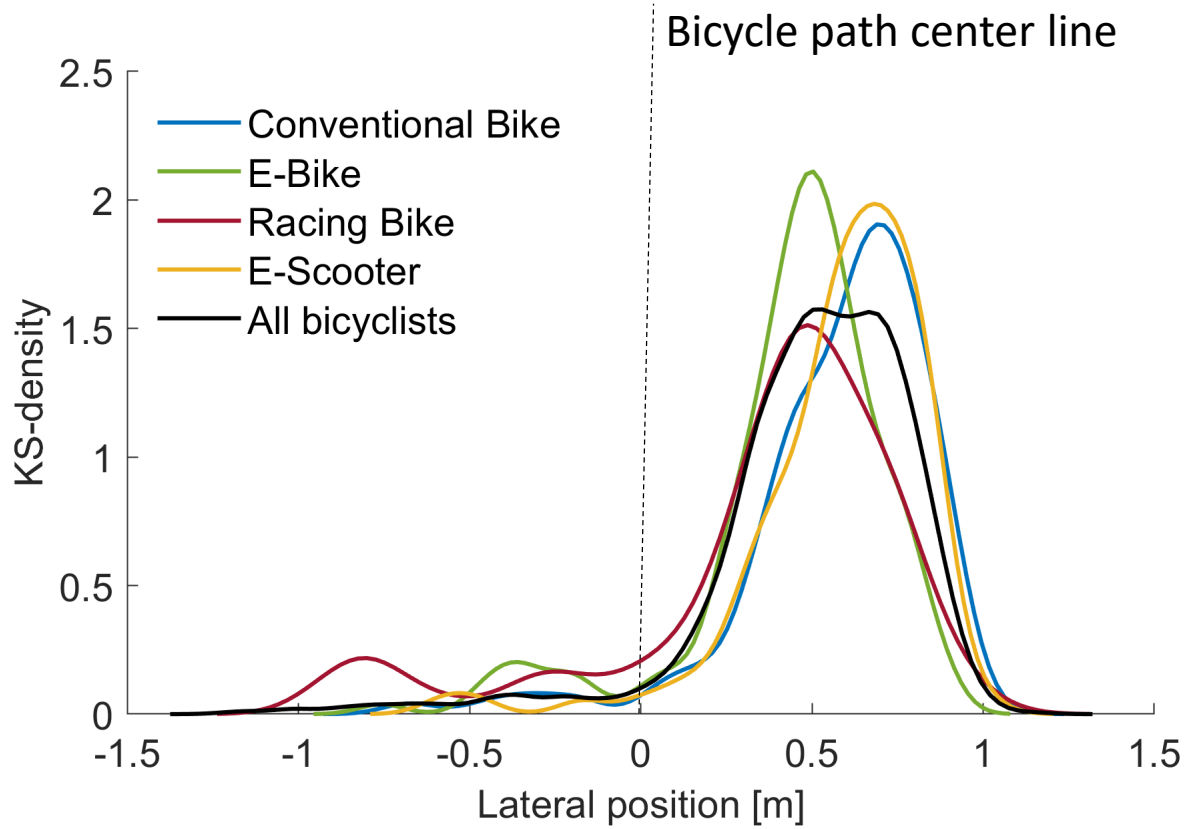

(b)
KS-density
2
1.5
1
0.5
0
Conventional Bike
E-Bike
Racing Bike
E-Scooter
All bicyclists
0
2
4
6
8
10
12
Speed [m/s]

SPEED AT OVERTAKINGS



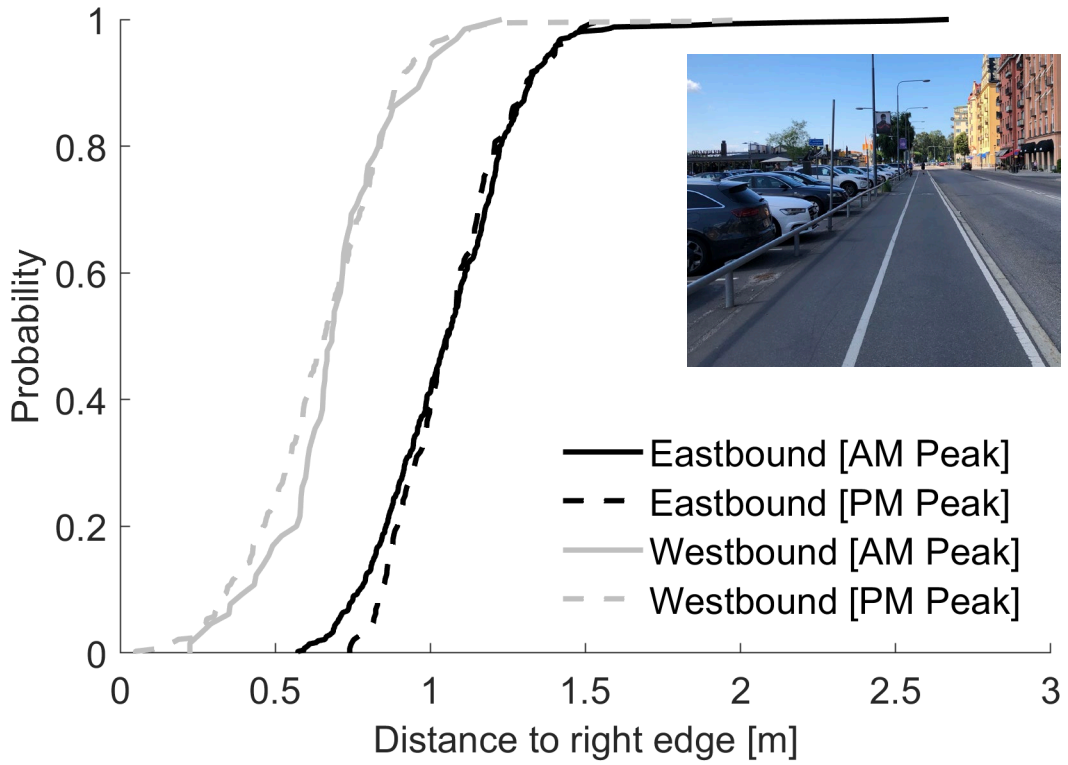
Speed difference (side by side)

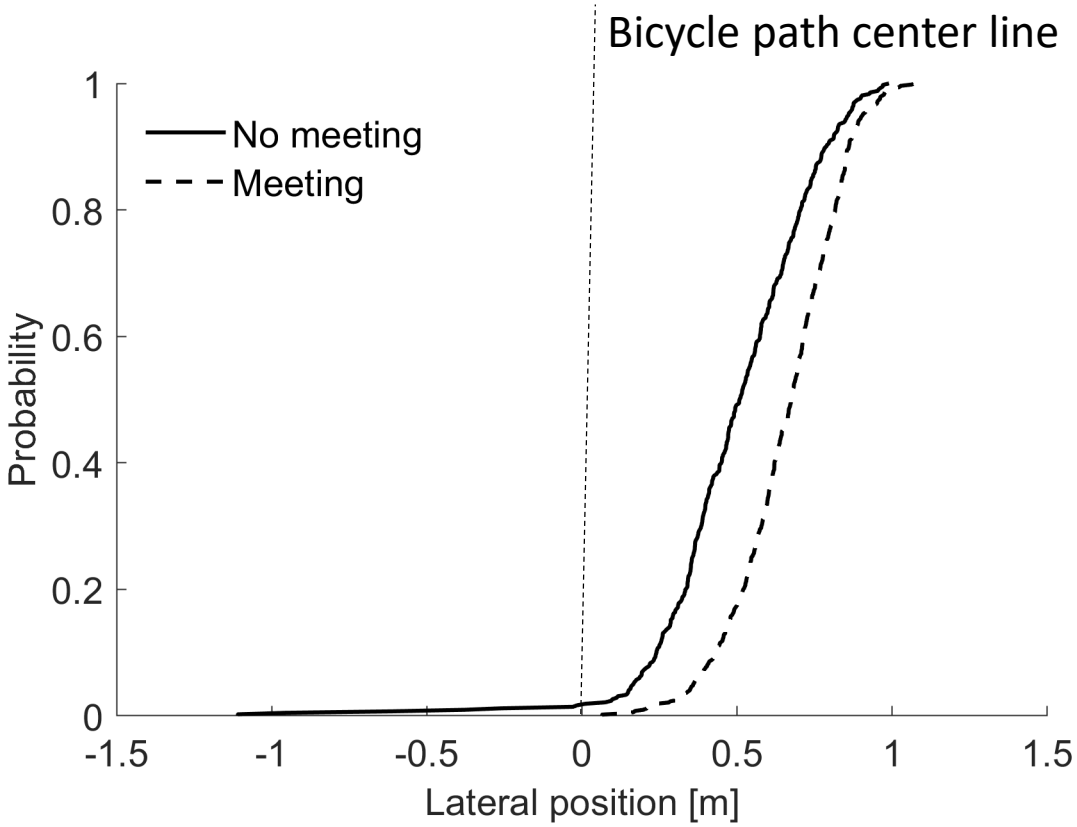
LATERAL POSITION



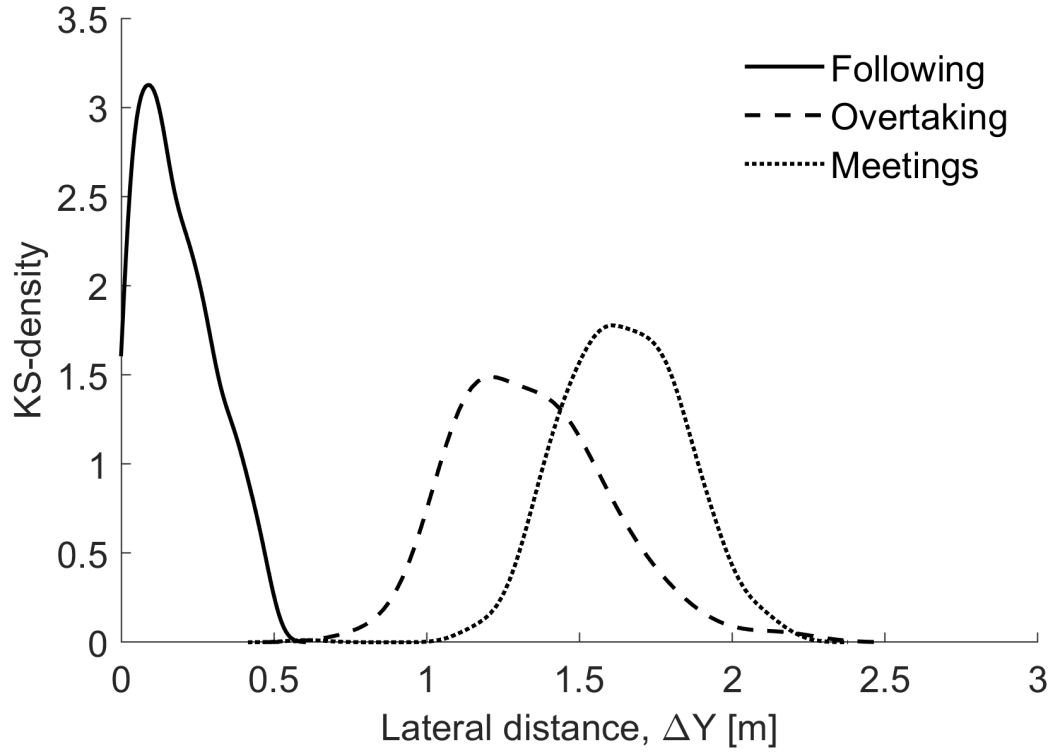
LATERAL POSITION

Free bicyclists





LATERAL DISTANCE BETWEEN BICYCLISTS



CONCLUSIONS

- Multimodal distributions of speed and lateral position.
  - High heterogeneity in preferences of bicyclists.
  - Identifying the bicycle type is important.
    - Need for efficient methods to identify type of bicycle.
- Different populations in morning/evening peak, and between travel directions.
- Insufficient evidence of a significant difference in the mean speed of bicyclists due to wind speeds [+/- 3 m/s].
- Risk of bias: strict filtering.
- Future research:
  - Investigate other time periods, and other locations.
  - Further develop microscopic models that incorporate characteristics of bicycle traffic intro traffic simulation.

Thanks

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