

# Traffic dynamics

## Multi-area, multi-lane, multi-class

Victor L. Knoop

20-10-16

# Background

- Physicist (MSc), interest in flows
- PhD in traffic dynamics (effect of incidents)
- International work:



Universiteit  
Leiden

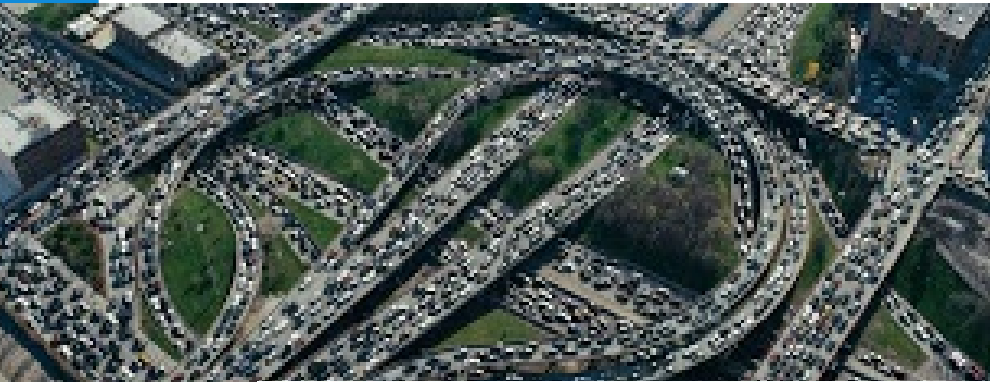


Imperial College  
London

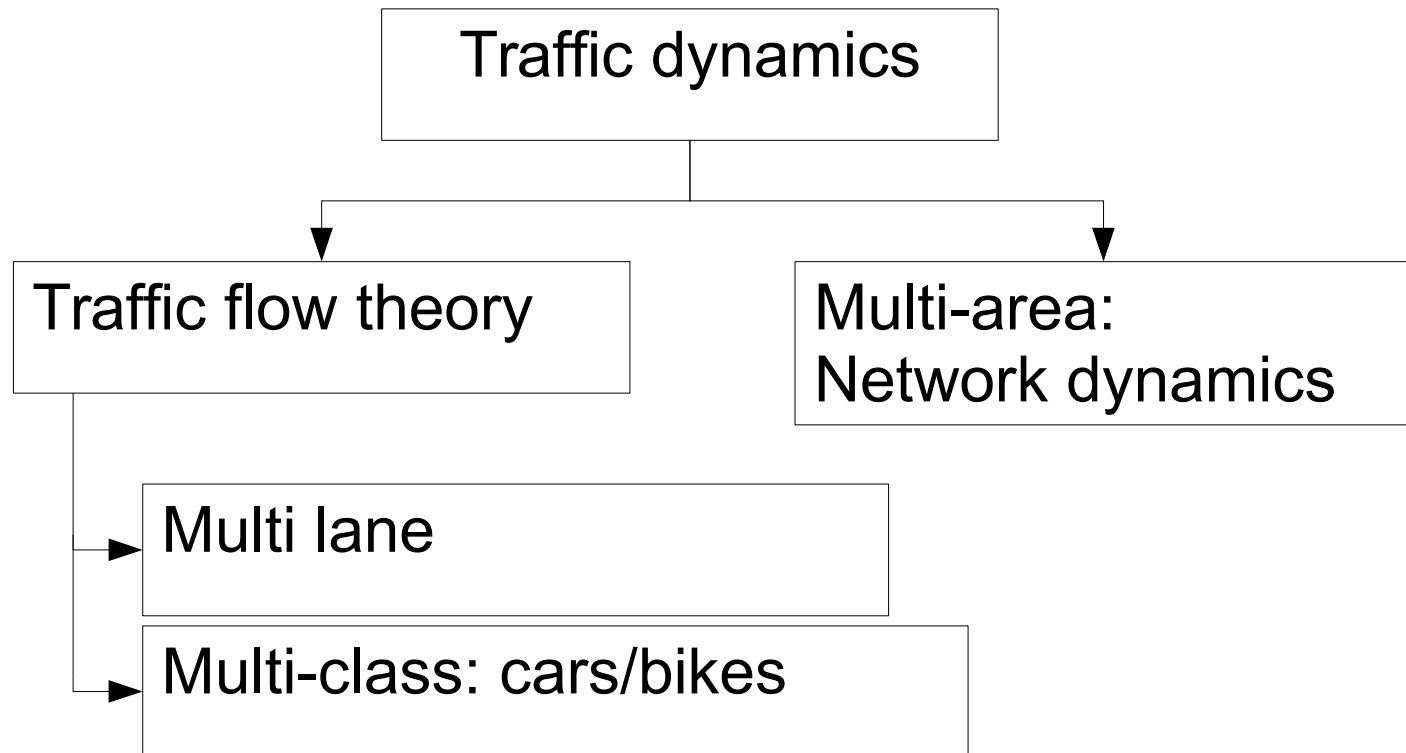


- Flows are wider applicable:  
use methods from other disciplines

# Traffic dynamics



# Traffic dynamics



# Multi-area traffic reseach

# Traffic flow description per zone

Traffic can be modelled on the level of:

cars



roads,



and now: zones!

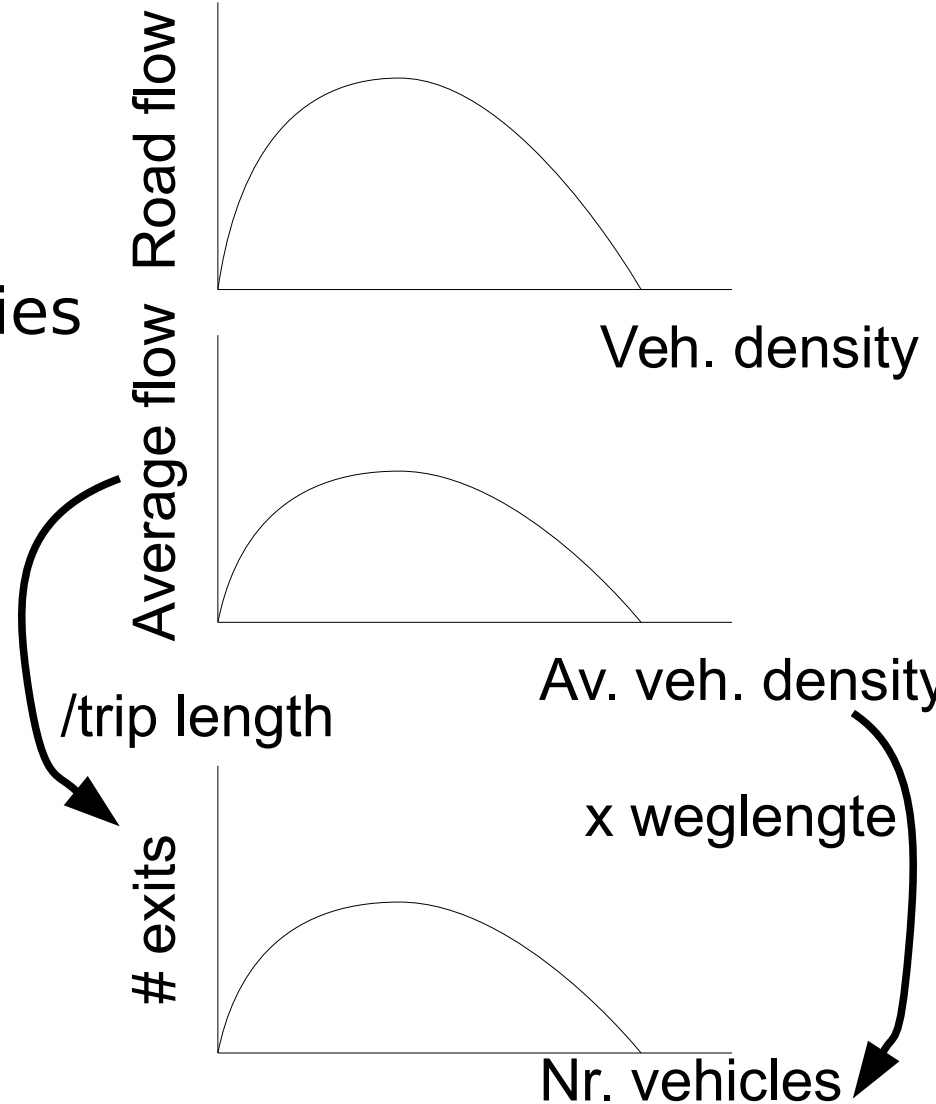


# Large scale description



# Dynamics rules:

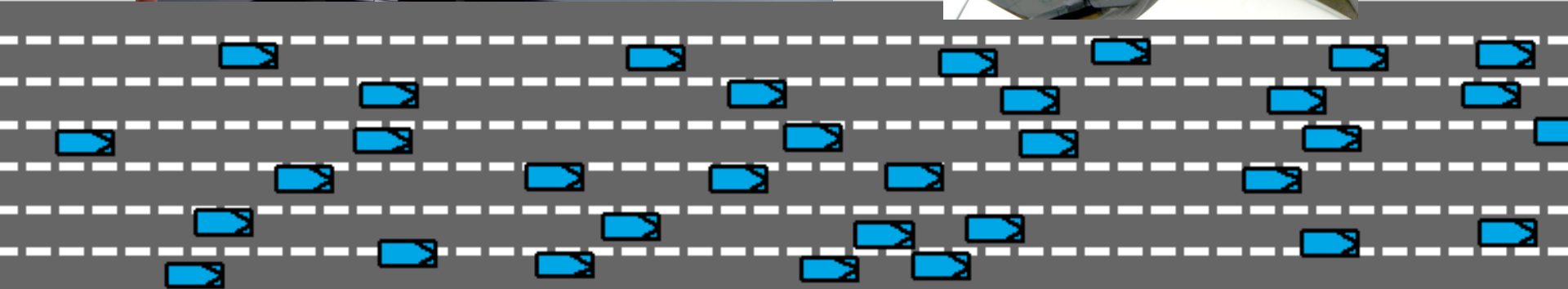
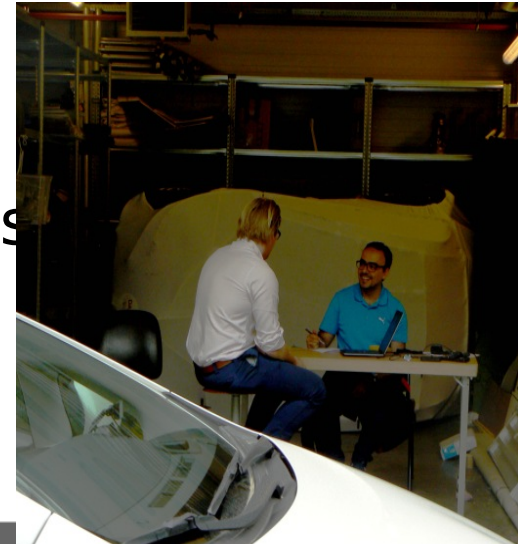
- Estimate bin dynamics from speeds and capacities
- Correct for traffic lights and non homogeneity
- Also adjust boundary capacity (from road caps)





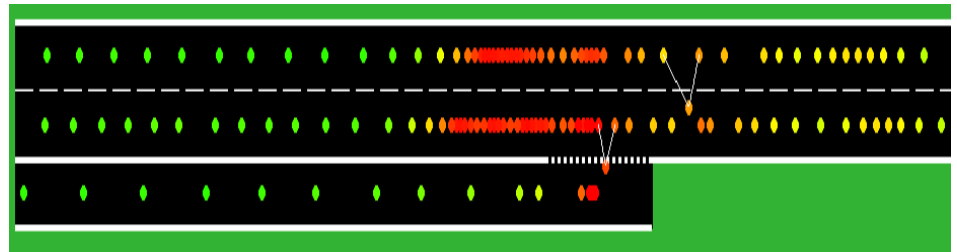
# Multi-lane traffic reseach

# Observing driver behaviour



# Multi-lane research

- Everyone considers himself a “normal” driver
- Major differences!
- 4 main strategies:
  - Speed leading
  - Speed leading with overtaking
  - Lane leading
  - Traffic leading
- **Others?**
  - => Simulate effect on flow



# Multi-modal traffic reseach

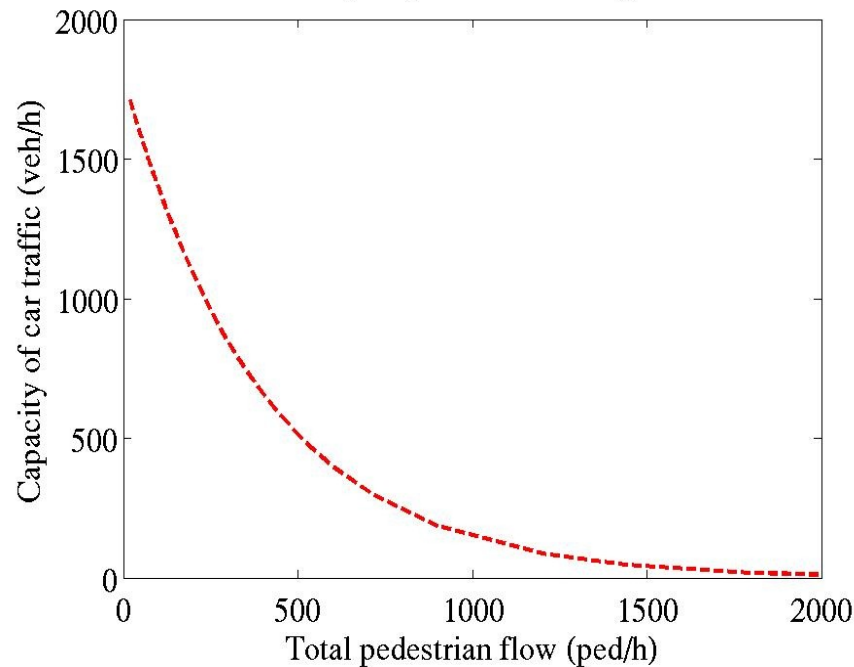
# Effect of pedestrian crossings

- Known: capacity of the road under one single (fixed timing) pedestrian crossing  
=> which time the flow is blocked?
- Non controlled: analytically solvable
- Spreading pedestrian load over more pedestrian crossings benefits drivers and pedestrians

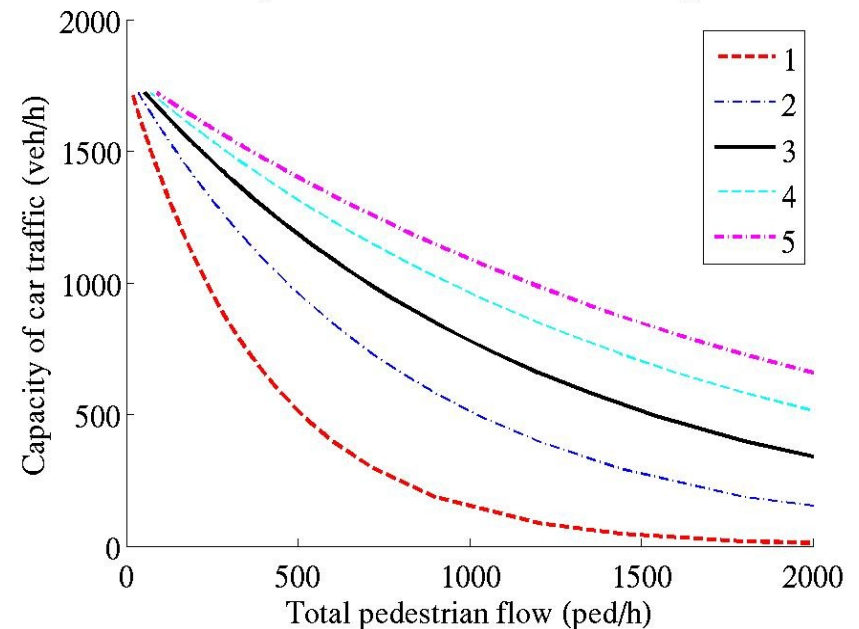


# Vehicular capacity of pedcrossings

Capacity for one crossing



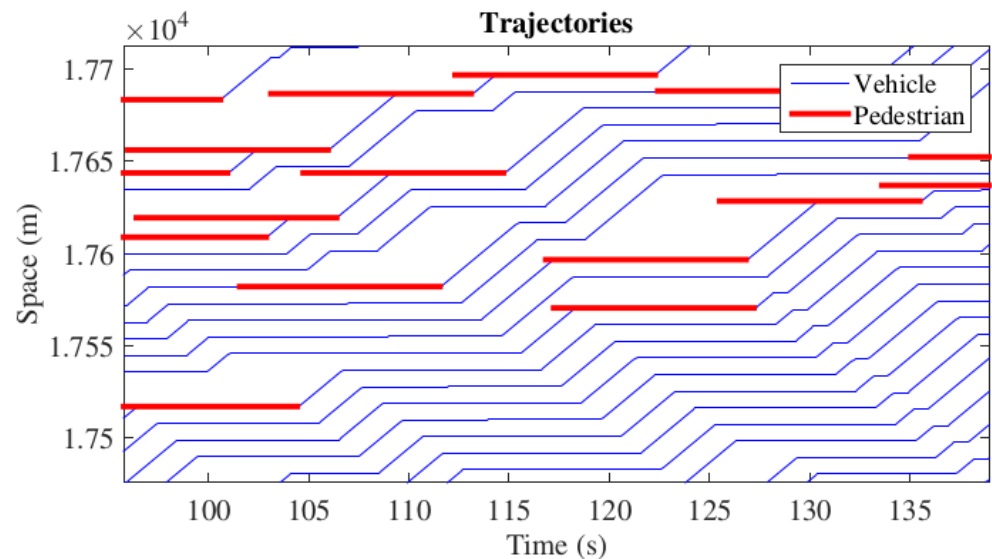
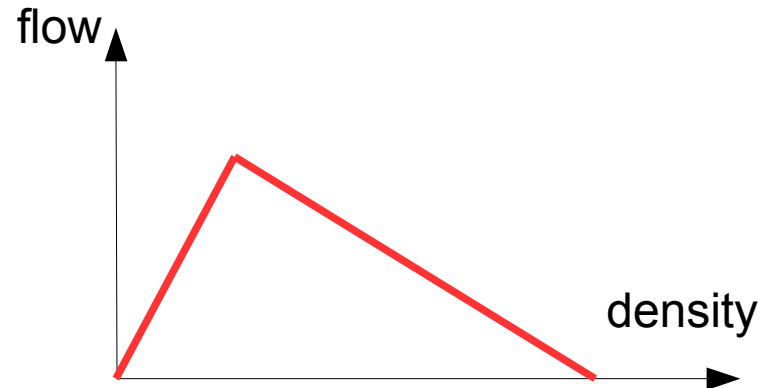
Capacities for different nr of crossings



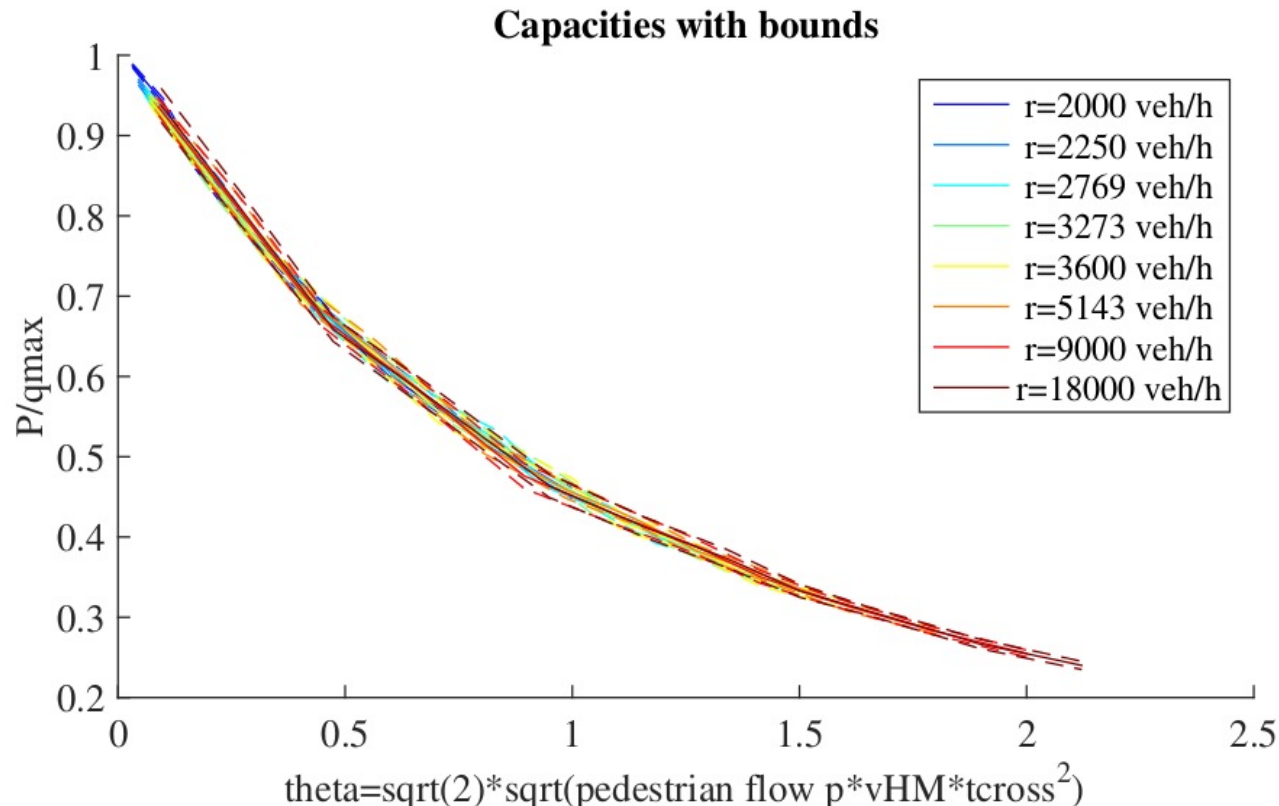
- More crossings help
- No interaction effects taken into account

# Introducing pedestrians

- Theory: capacity cannot depend on shape of triangular fundamental diagram
- Dimensional analysis  
 $\text{cap}(v_H * p * t^2)$
- Simulation (circular road)
- Theoretical bounds



# Road capacity with pedestrians





# Future works

- Include cyclists (and other modes) in the road-based and area-based descriptions
- Include the effect of traffic control
  - traffic lights?
  - Demands?
- All other flow problems...

