Speed calming measures and how they affect speed violations and driving pattern

Agenda

- Background
- Speed calming measures
- Research Question
- Method and data
- Results
- Summary
Background

Road safety and speed are close connected
• Too high speed increase the risk substantial
• Braking distance increase by the square of the speed increase
• The energy in a collision increases similar
• The reaction time is unchanged
• Speed variation increases a lot

But are we speeding?

Yes!

• 72% of the Danish drivers are speeding outside built-up areas
• 61% do it in built-up areas (2008)
  (The amount might be slightly lower today (higher fines, more automatic traffic control))
• Special challenge regarding thoroughfares
  • Significant speeding outside the small towns/villages
  • The speed is insufficient reduced in the thoroughfares (studies from 1996 & 2004)
Traffic calming measures

- Speed bump
  - 50 km/h limit or below
  - Drivers of cars at speed limit and trucks etc. at speed limit-15 km/h: 0.65-0.75 vertical G
  - Most are *modified sinus bump*
  - Significant part of bumps are deform!

- Traffic calming measures
  - Speed bump are widely used
  - 2,300 in North Denmark
Traffic calming measures

• Narrowing
  • 40 km/h limit or below
  • <300 cars in peak hour

• Elevated surface
  • 50 km/h limit or below
  • Longer than vehicles (from 10m)
  • Full distance in an intersection
  • Elevated in the full distance
Traffic calming measures

• Of more solutions…

Limitations of traditional speed measurements

• Based on one spot only
• The speed in the next spot is not known
• On roads with various driving conditions (speed-calming) the speed is virtually unknown
Research question

• Which effects have narrowing, elevated surfaces, and bumps on driving behaviour?

• These two hypotheses guided the analyses presented in the current paper:
  • Mean speeding is affected almost identically from narrowing, elevated surfaces, and bumps
  • Speed variation is substantial bigger near narrowing than near bumps

The Method briefly

• GPS data from driving vehicles (Floating Car Data (FCD))
• A change from point to section speed measurements:
  • Big knowledge about a share of the drivers speed on most parts of the road network
  Vs.
  • Exact knowledge about the speed in one spot – the speed elsewhere is unknown.
FCD from ITS Platform

- North Jutland
- Floating Car Data project
- Field trial April 2012 -
  - 425 vehicles
  - Almost 20 million km driven

Speed-calming measures in the study

- North Jutland only
- Minor towns/villages (to avoid congestion problems)
- Road segments divided into pieces of 12.5m
- Missing/redundant FCD are replaced/removed systematically
Data

- Xx narrowing
- Xx bumps
- Xx elevated surfaces
- Villages/minor towns:
  - Bergum
  - Gelstrup
  - Harken
  - Hundelev
  - Nørager
  - Tornby
  - Vittrup
  - Skørping

Results

- With/without study
- Effects on driving behaviour
Traffic calming measures established autumn 2013

Background:
• Minor town – 3,000 inhabitants
• One road connects two parts of the town and the hinterland
• Many commuters
• Many home-school trips (cars and bikes)
• Partly bicycle paths
• High speed problems
• 50 km/h speed limit

Skørping

Data

• 1,363 trips in total
• Removal of short trips
• Removal of erroneous data
• Most trips in the southern part
• 1,277 trips included
Effects on speeding

Mean speed towards south

- Mean without
- 95% without
- Mean with
- 95% with
Effects on speed variation

Mean speed and speed variation towards north

Summary with/without speed calming

• All types reduces speeding significantly
• a bump seems to have higher effect than narrowing
• Effects decreases soon
• Narrowing increases speed variation

Results are preliminary!
Effects with bumps at short intervals

Background:
• Minor town – 1,050 inhabitants
• Local connection road
• Holiday traffic
• High speed
• **50 km/h** speed limit
• 8 speed-calming bumps
• 1,365 trips

![Graph showing mean speed towards north and south](image-url)

**Mean speed towards north**
- **Mean**
- **Median**
- **SD**
- **Min)**

**Mean speed towards south**
- **Mean**
- **Median**
- **SD**
- **Min**
Effects with elevated surfaces

Background:
• Minor town – 1,100 inhabitants
  (was main town in the local municipality)
• Central highway
• High share of trucks
• High speed problems
• 50 km/h speed limit
• 4 elevated surfaces
• 175-215m intervals
• 3,087 trips in total
Elevated surfaces: effects on speeding

Mean speed towards west

Traffic calming island 4 elevated surfaces Traffic calming
Summary

- Speeding is significantly reduced by narrowing, elevated surfaces, and bumps.
- The best effect can be found regarding bumps.
- It seems that elevated surfaces are less uncomfortable to drive across.
- Speed variation increases due to narrowing.

*Results are preliminary!*