Cyclist Safety – Reducing the Crash Risk

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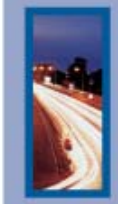
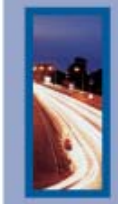
Beca



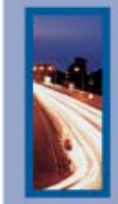
Objectives

- Determine the influence of road environment factors in cycle accidents
  - Traffic volumes
  - Traffic speeds
  - Traffic lane widths
  - Flush medians
  - Kerbside parking
  - Spacing of access points
  - Cycle lanes
  - Cycle facilities at intersections
  - Off road cycle paths



Methodology

- Collect data on road environment factors
  - Traffic signals
  - Mid-block
- Combine with existing flow only models
- Determine statistically significant variables
- Identify key factors for improving cyclist safety



Sample Size

- 44 Signalised Crossroad Intersections
  - 176 approaches
  - 54 with cycle facilities
- 97 Mid-Block Locations
  - 44 cycle lanes

Accident Prediction Models
(Cross Sectional Models)

- Generalised linear modelling

Base Model Form:

$$A = b_0 \times q_1^{b1} \times q_2^{b2}$$

A	Annual number of accidents
b_0, b_1, b_2	Model parameters
q_1, q_2	Traffic flows

Accident Prediction Models

- Add new variables
- Multiplicative factor only (discrete)
  - Cycle lane
  - Flush median
- Multiplicative factor ^ b_x (continuous)
  - Speed
  - Width
  - Spacing

Results

Signalised Crossroads

$$A = 6.16 \times 10^{-3} \times Q_e^{0.17} \times C_e^{0.03} \times CyLane$$

$$CyLane = 1.41$$

- Independent of cycle volume
- Safety in numbers effect (risk reduction)
- Cycle lane = 41% more accidents

Results

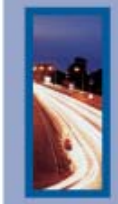
Mid-Block

- $A = 8.60 \times 10^{-3} \times Q^{0.25} \times C^{0.17} \times L^{0.37}$
- $A = 1.05 \times 10^{-2} \times Q^{0.25} \times C^{0.16} \times L^{0.45} \times Flush$

  $Flush = 0.63$
- $A = 7.11 \times 10^{-3} \times Q^{0.25} \times C^{0.19} \times L^{0.38} \times CyLane$

  $CyLane = 1.21$
- $A = 2.04 \times 10^{-3} \times Q^{0.23} \times C^{0.18} \times L^{0.37} \times S^{0.40}$

  4 – 7% accident reduction with every 10km/h reduction in traffic speed

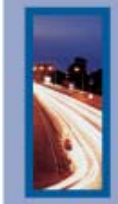


Before and After Studies

- All mid-block sections with cycle lanes
- Regression to the mean
- Estimated 46 crashes with no treatment
- Actual 42 crashes
- 10% reduction

Conclusions

- Accident Prediction Models Show:
  - Cycle Accidents **Increase** with:
    - Traffic volume
    - Cycle volume
    - Traffic speed
    - Presence of a Cycle Lane ??
  - Cycle Accidents **Decrease** with:
    - Lower vehicle speed
    - Longer mid-block sections
    - Presence of a Flush Median



Discussion

- APM = Cycle lane increases accidents 21%
- Before & After = Cycle lane decreases accidents 10%
- Influencing factors:
  - Treated high risk sites
  - Decreasing cycle volumes when no facilities
- Before & After Studies Most Reliable
- Larger sample to confirm findings