Improving Bicycle Responsiveness in Regional Models

Kristina Hill
City of Calgary

Kevin Stefan
HBA Specto
Here’s what we did:

• Performed a stated preference survey about bike route choice
• Developed a weighted assignment technique using SP results
• Estimated mode choice models with and without:
  • Weighted bike network
  • Other typical cycling/pedestrian model enhancements
Substantial recreation-focused network: 770 km (480 mi) of multi-use pathways
300 km (~190 mi) of pathways cleared of snow in winter; high priority
Limited on street facilities:
40 km bike lanes, 1 km cycle track
Bicycle usual commute share, largest Canadian metro areas

- Toronto
- Montréal
- Vancouver
- Calgary
- Ottawa
- Edmonton
- Québec
- Winnipeg
- Hamilton
Stated Preference Study

- 2001 survey
- Follow on from downtown intercept survey
- 547 surveys completed by e-mail
- Three scenarios, three options each:
  - Travel time along combination of different cycle facility types
  - Other amenities (showers, lockers, etc.)
Stated Preference Survey Results

- $1/trip for clothing change facility
- $10/month for clothing change facility
- Showers
- Change room
- Clothes lockers
- $1/trip for parking
- $10/month for parking
- Individual bike locker
- Bicycle enclosure
- Standard bike rack

Options:
- 10 min on residential road with bike route
- 10 min on pathway by arterial
- 10 min on pathway in park
- 10 min on residential road
- 10 min on arterial with Bike Lane
- 10 min on arterial with Wide Curb Lane
- 10 min on arterial
Pathway: 27 mins
9 km
-0.75 utility
-0.08 util/km

Road: 7.5 mins
2.5 km
-0.75 utility
-0.30 util/km
Arterial road: effective speed 20 km/hr

Arterial w/ wide curb or bike lane: effective speed 37 km/hr

Local or collector: effective speed 46.5 km/hr

Separated bicycle path: effective speed 71.5 km/hr

Disutility per minute by facility type
Bicycle network coding

Emme Modeller
Coded as auxiliary transit modes
Banned from reverse direction
Substantial pathway network
Assignment comparison

• Downtown commuter cordon intercept survey, 2006
• 1863 surveys (68% response)
• “Show us your route” with map of city enclosed
From west:

• Along river paths, not main roads
From south:

- Along river pathway / 2\textsuperscript{nd} street bike path
-Avoids major road
From east:
- Better on pathways
- Both assignments overestimate NE route (hills)
Test model estimations

- Current activity based model development
- Simplified work mode choice model
  - Travel time and cost components
  - Auto ownership and household size
  - Uses 2011 survey: 5724 observations (122 bike)
Test model estimations

• Modified bicycle alternative only
• Three types of typical enhancements:
  • Non-linear treatment of time
  • Land use/built form (density)
  • Slope
Test model estimations

• Three types of skims:
  • Road network
    • Shortest path
  • Walk network
    • Includes “shortcuts” due to pathways
    • Distance only
  • Weighted Bike
    • Includes pathway shortcuts
    • Incorporates SP results
Base model

• Road skims

• No enhancements
  • $\rho^2(0) = 0.5630$
  • $\rho^2(c) = 0.2717$
  • Log likelihood = -4434.34
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Substantial improvement from use of weighted bicycle skims
Major results

- Stated preference work can be applied
- Improved assignment results
- Weighted bicycle times valuable in mode choice model
- Adds key policy response

- Future: New route preference data (CycleTracks ?)
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- Dillan K
- Vik Approved
- Bike Calgary
Road network skims:
- Shortest path
- Most typical skim available
Road network path: 2.6 km

Road network skims:
- Shortest path
- Most typical skim available
Walk network skims:
• Includes pathways
• Provides “shortcuts”
• Distance alone

Road network path: 2.6 km
Walk network path: 1.9 km
Weighted Bike skims:
• Includes pathways
• Uses SP weighted cost

Road network path: 2.6 km
Walk network path: 1.9 km
Bike network path: 0.7 km on collector, 2.0 km on pathway