



Bicycling Crashes on Streetcar or Train Tracks Causes & Solutions

Kay Teschke¹, Jessica Dennis², Conor Reynolds¹
Meghan Winters³, Anne Harris^{2,4}

¹ University of British Columbia

² University of Toronto

³ Simon Fraser University

⁴ Ryerson University

Problem

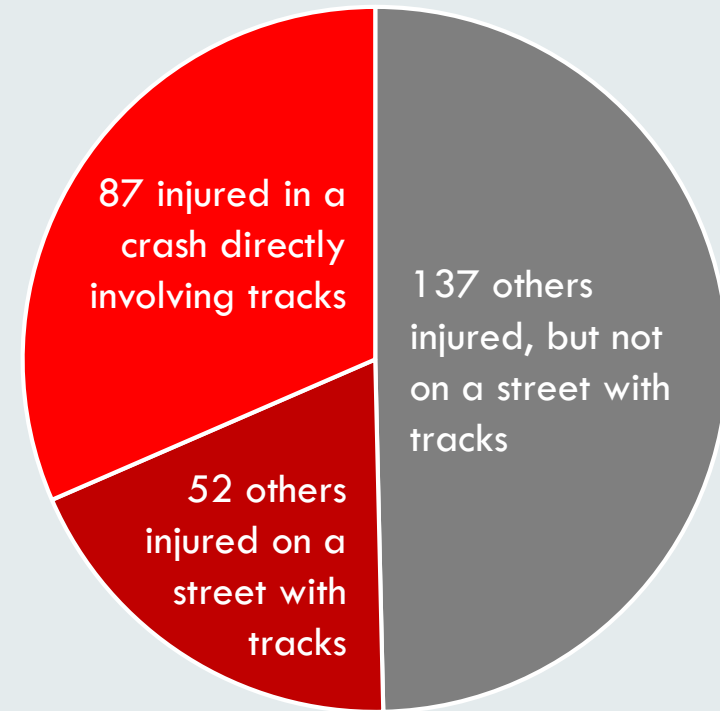


Vancouver & Toronto study
of 690 people injured while
biking, focus on
infrastructure ... told by ED
doctor that streetcar tracks
will be an issue

**On streets with streetcar or
train tracks, injury odds
ratio:
3.0 (95% CI: 1.8, 5.1)**

276 injured cyclists in Toronto
1/3 directly involve tracks

Toronto → largest streetcar system
in North America → 80 km 2-way





Further look at 276 Toronto crashes

- Examine circumstances
- Compare crashes involving streetcar tracks to those in other circumstances
- Ask TTC for data on system
- Visit bicycle shops
 - measure widths of commonly sold tires
 - ask about any advice given on avoiding streetcar track crashes

How & Where

Types of Crashes

15% → Bike tires slipped on rails

“The roads were very wet and slick. I was travelling south, turning left. I was getting ready to cross the next rail when my back tire slipped on the track.”



Types of Crashes

85% → Bike tires caught in rail flangeways

“As I approached an intersection, there was a car in front of me turning right. To go straight, I moved around the car into the left lane but as I did, my front tire got stuck in the streetcar track.”

“There was a car parallel parking in front of me. I moved across the tracks to avoid the car. When I attempted to move back into the right lane, my back wheel got caught in the streetcar track.”



Toronto cyclist dies after wheel gets trapped in unused streetcar track

Published August 7, 2012

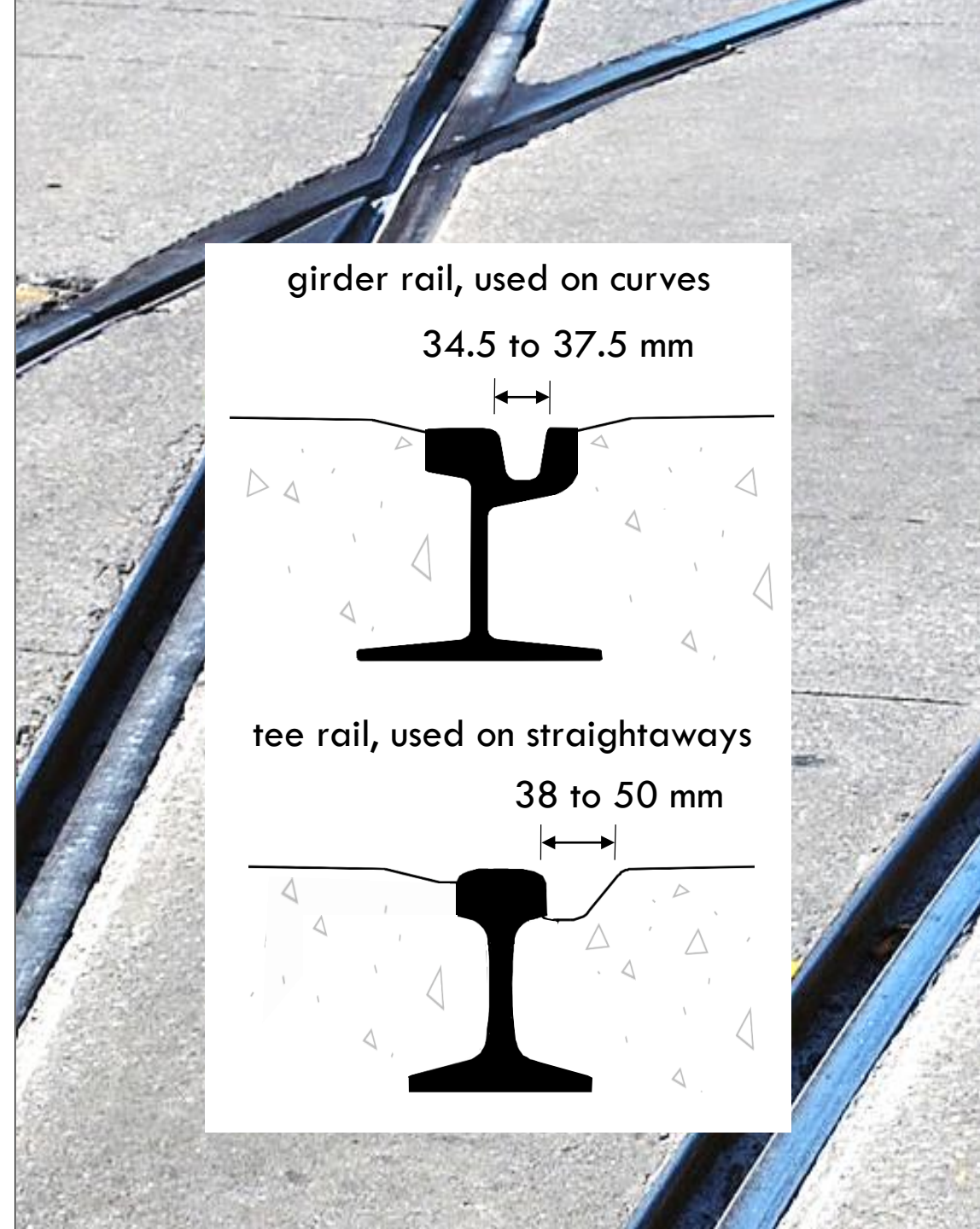


Photo: Fred Lum, Globe and Mail

Types of Crashes

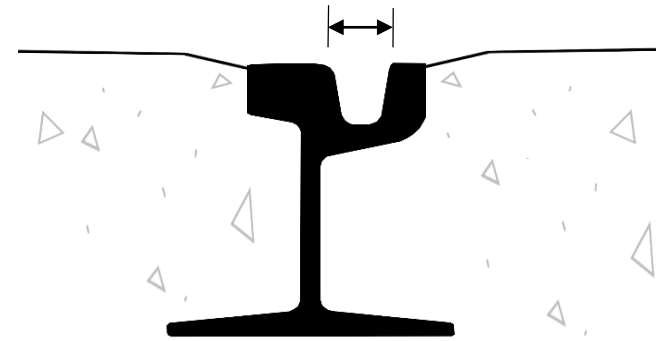
85% → Bike tires caught in rail flangeways

- Tires on commonly sold bikes
 - 54% - narrower than narrowest flangeways
 - 92% - narrower than widest flangeways
- Toronto bike share tire width: 49.5 mm



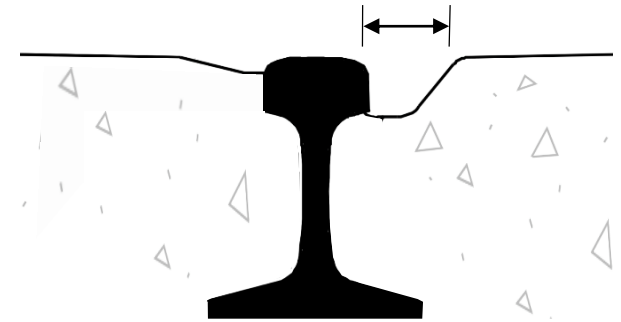
girder rail, used on curves

34.5 to 37.5 mm



tee rail, used on straightaways

38 to 50 mm



At intersections, often multiple sets of tracks
... difficult to cross all at a right angle



Photo: Hallgrimsson, Wikimedia Commons

Locations of Crashes

32% at intersections

“I wanted to make a left turn and while moving to the centre of the lane my bike wheels got caught in the tracks.”

Left turn had 40x higher injury odds
vs. going straight, right turn, or non-
intersection

No cycling infrastructure,
parked cars
→ highest track injury odds



No cycling infrastructure,
no parked cars
→ 1/2 odds of track injury



Painted bike lane
→ 1/6 odds of track injury



Dedicated streetcar right of way
→ no track injuries



Locations of Crashes

68% between intersections

Most involved sudden, unexpected manoeuvres

“I was cycling in the curb lane and a truck stopped in front of me. I went around him and my back wheel got caught in the track.”

Route type made a difference

Solutions

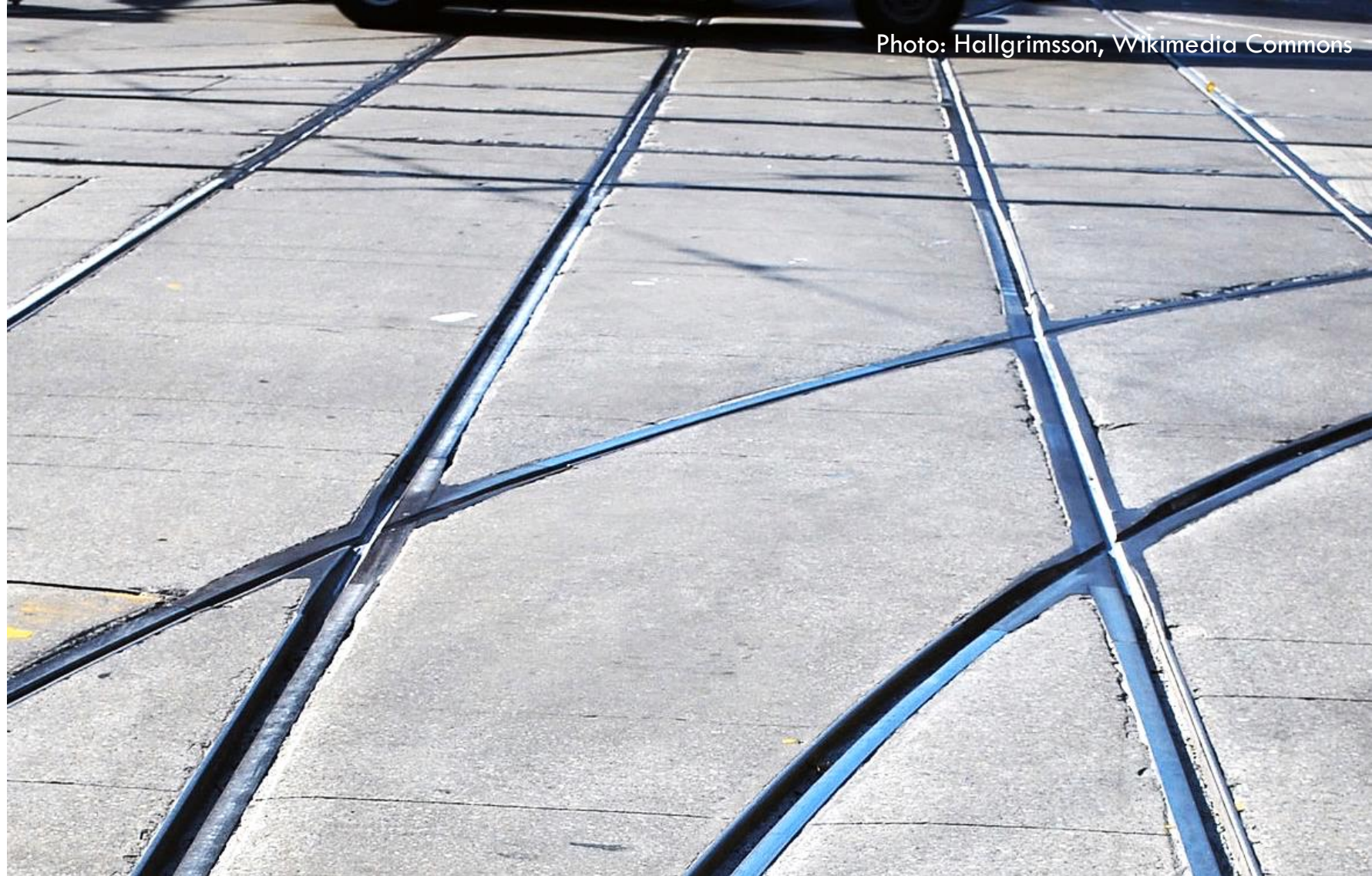
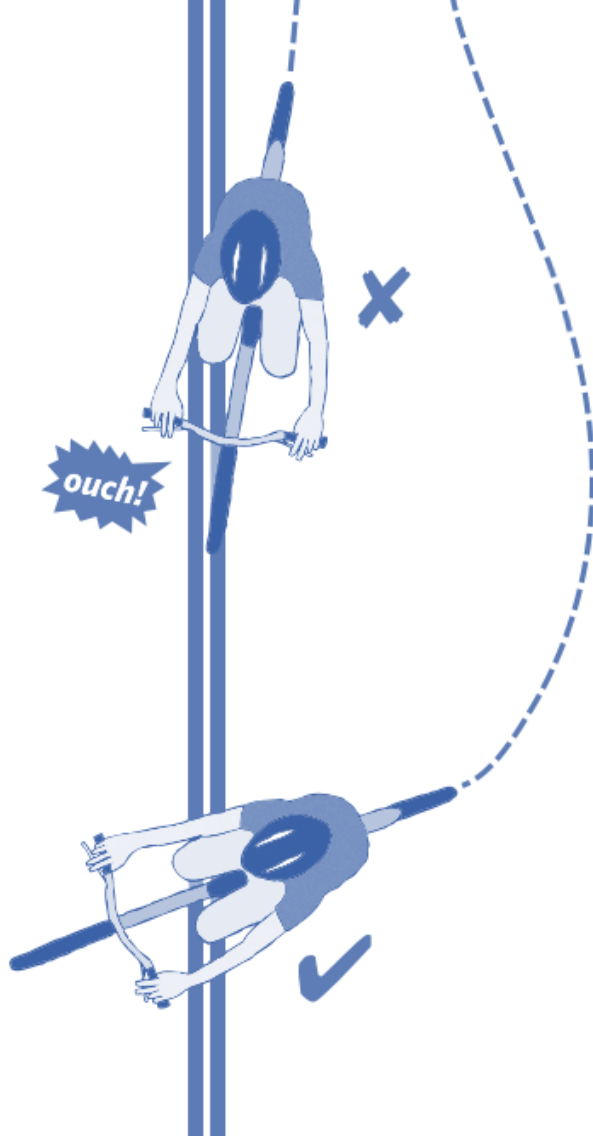


Photo: Hallgrimsson, Wikimedia Commons



Education as solution

Less experienced riders, slightly higher risk.
Left turn issue not well known. But ...



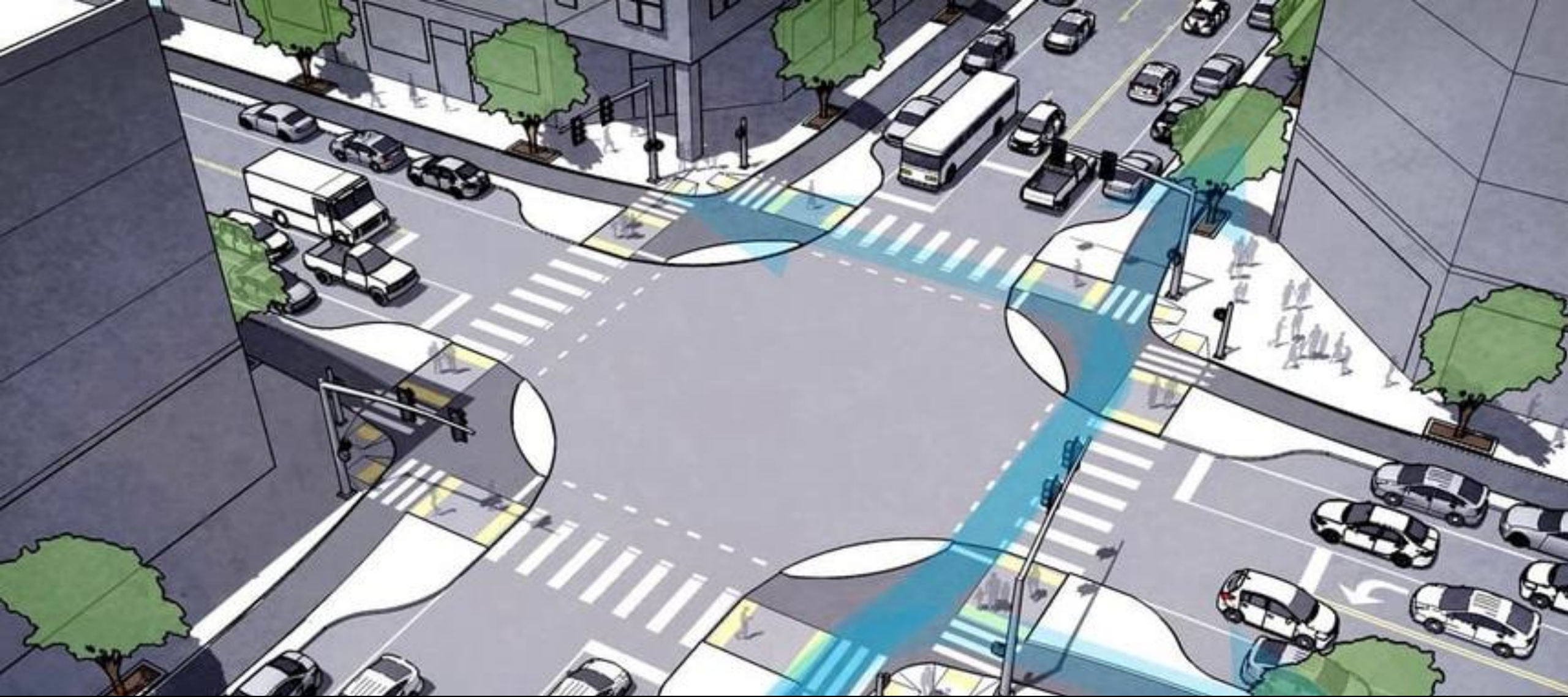
Education as solution ... but

Sudden nature of most events, unable to implement knowledge
85% of injured riders were experienced (rode > 100 days/year)



Infrastructure as solution

Dedicated streetcar right-of-way → dual benefits



Infrastructure as solution

Separated bike lanes (cycle tracks) → dual benefits
Protected intersection, 2-stage left turn



Thank you

Bike shops: Bateman's Bicycle Company, Broom Wagon Cyclery, Curbside Cycle, Cyclepath Danforth, Duke's Cycle, Sweet Pete's, Urbane Cyclist

TTC staff

Toronto Bike Share staff

BICE study personnel – especially Dr. Steve Friedman who originally alerted us to this problem

Heart and Stroke Foundation of Canada

Canadian Institutes of Health Research



Cycling in Cities Research Program
@kteschke