

# Filtering and flashing through cycleways

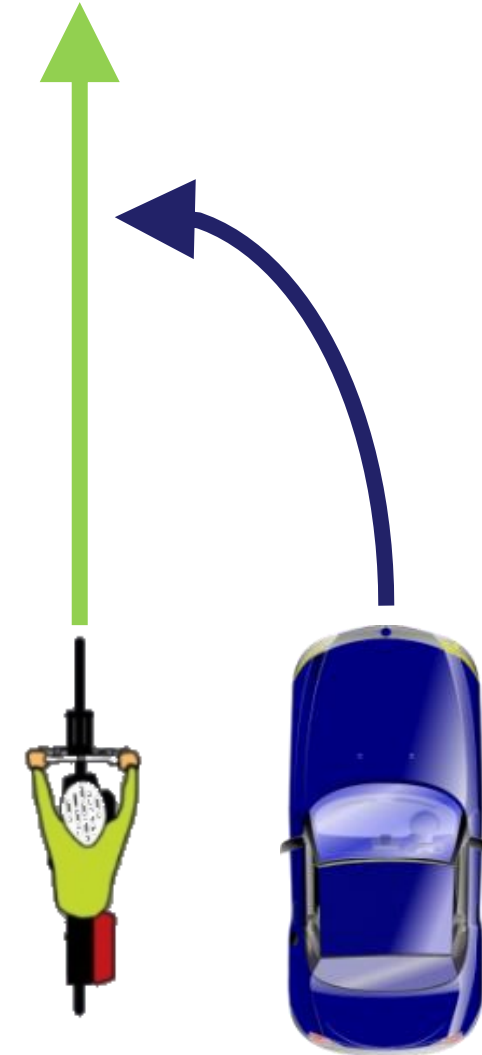
Presentation to  
SNUG 2018 Workshop

**ViaStrada Ltd**

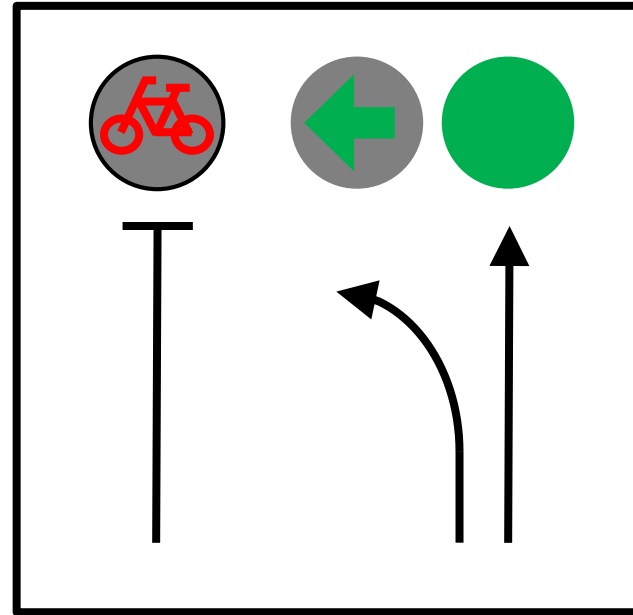
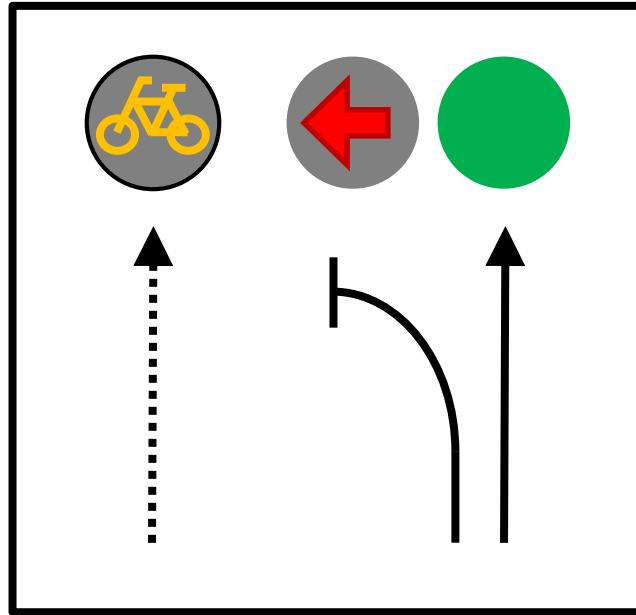
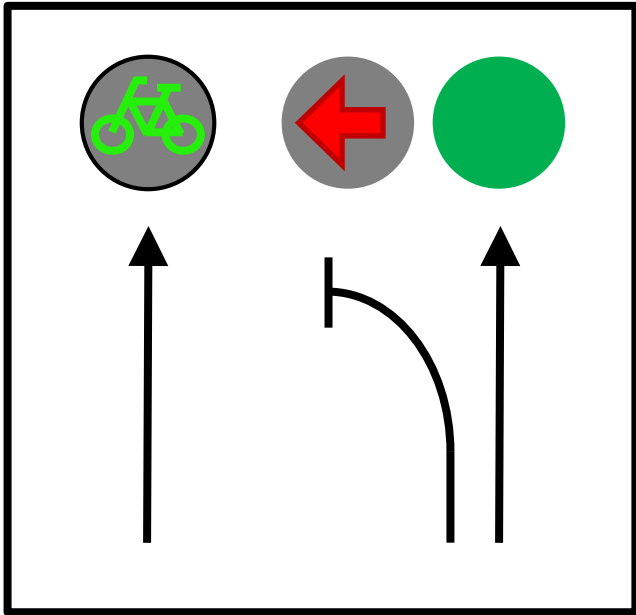
Axel Wilke & Megan Gregory

# Setting the scene

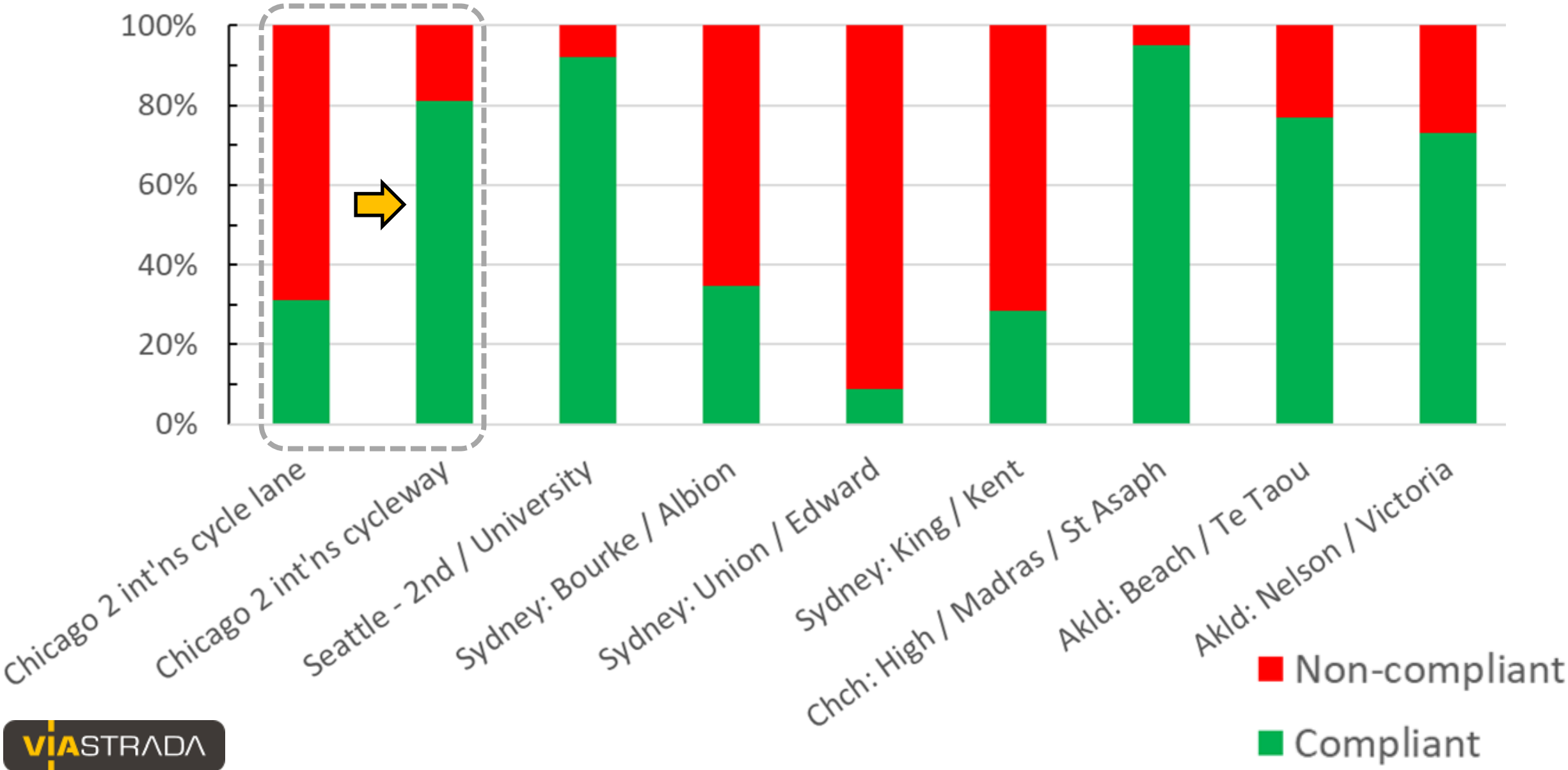
- Separated cycleways at signalised intersections
  - left turning motorists vs through cyclists
- Typical treatment = full protection
  - Is this *really* the most safe and efficient way?
  - Are there other options?
- Let's talk...



# Fully protected cycleway at intersection



# Cycle compliance studies – full protection



# Factors in cyclist compliance at full protection

- Opportunity to infringe
  - Depends on cycle signal state on arrival



# Factors in cyclist compliance at full protection

- Opportunity to infringe
  - Depends on cycle signal state on arrival
  - Timing of cycle movement within phase is important
  - Relates to coordination along corridor



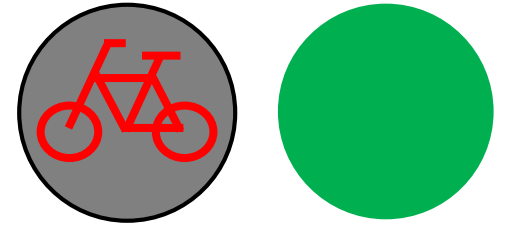
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  - Depends on cycle signal state on arrival
  - Timing of cycle movement within phase is important
  - Relates to coordination along corridor
- Risk of conflict



# Factors in cyclist compliance at full protection

- Opportunity to infringe
  - Depends on cycle signal state on arrival
  - Timing of cycle movement within phase is important
  - Relates to coordination along corridor
- Risk of conflict
- Comparison with parallel through traffic



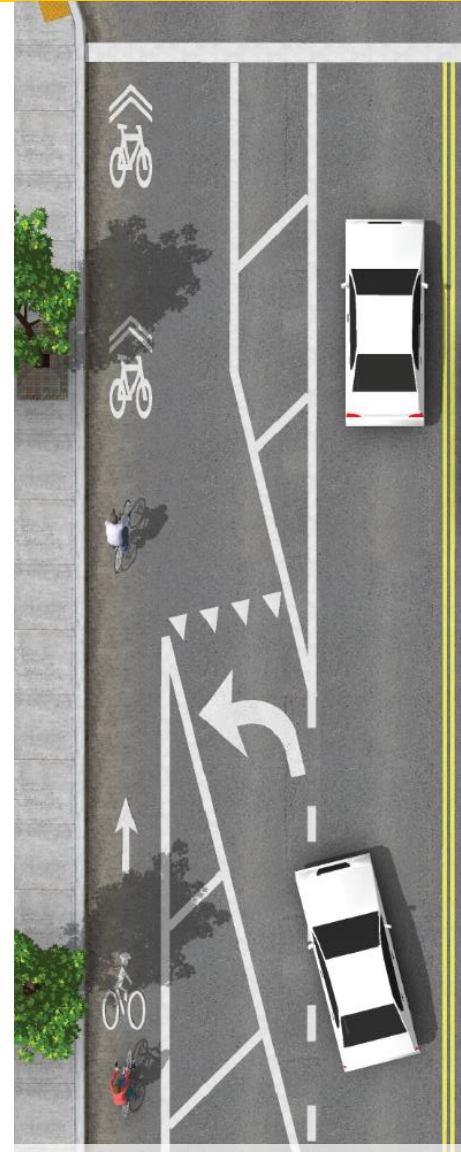
$$\text{Cyclist compliance} \sim \frac{\text{cyclist green time}}{\text{parallel traffic green time}}$$



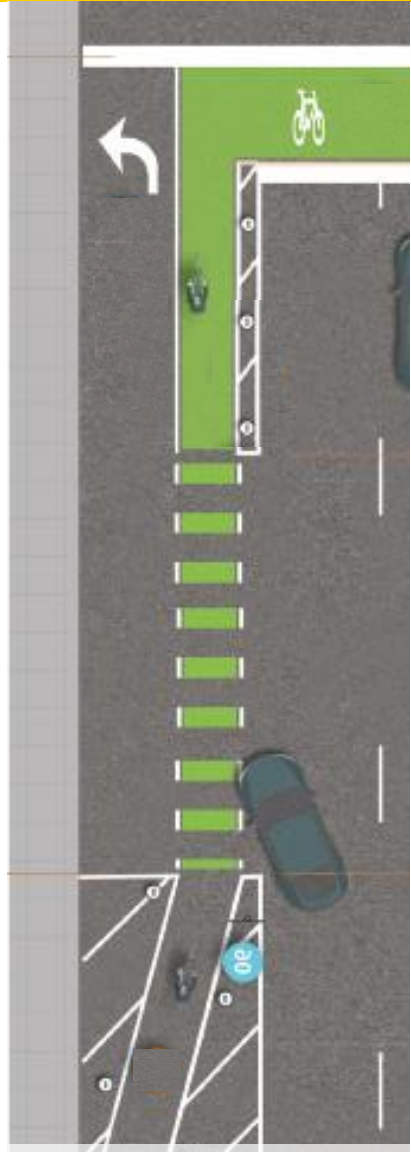
# Other ways to tackle the problem?



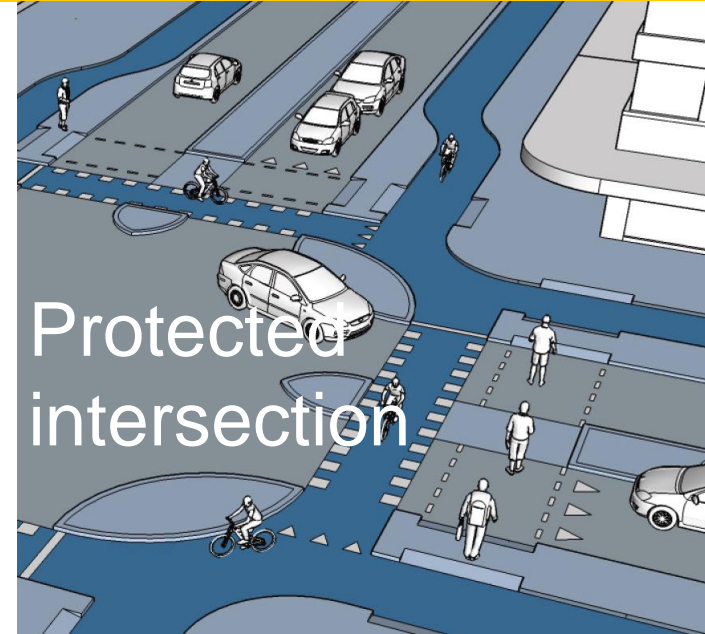
Filter turning



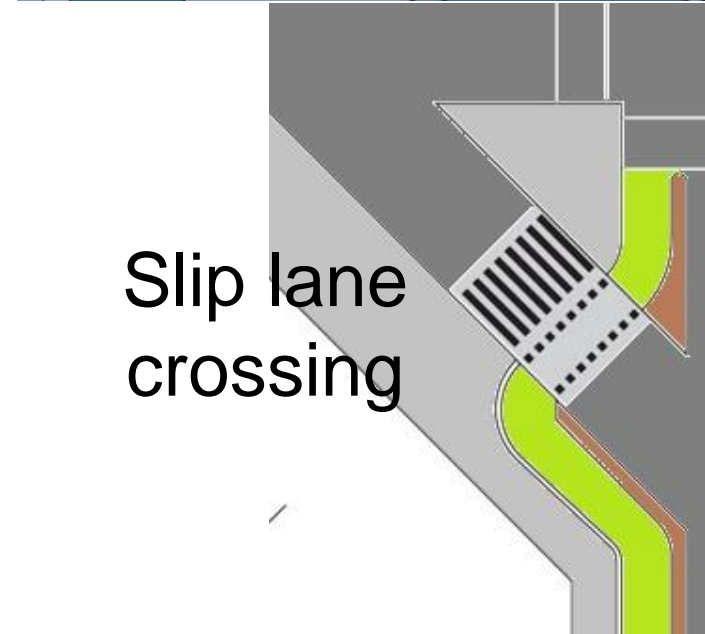
Mixing zone



Transition



Protected intersection



Slip lane crossing

# Filter turning – New York example



New York City

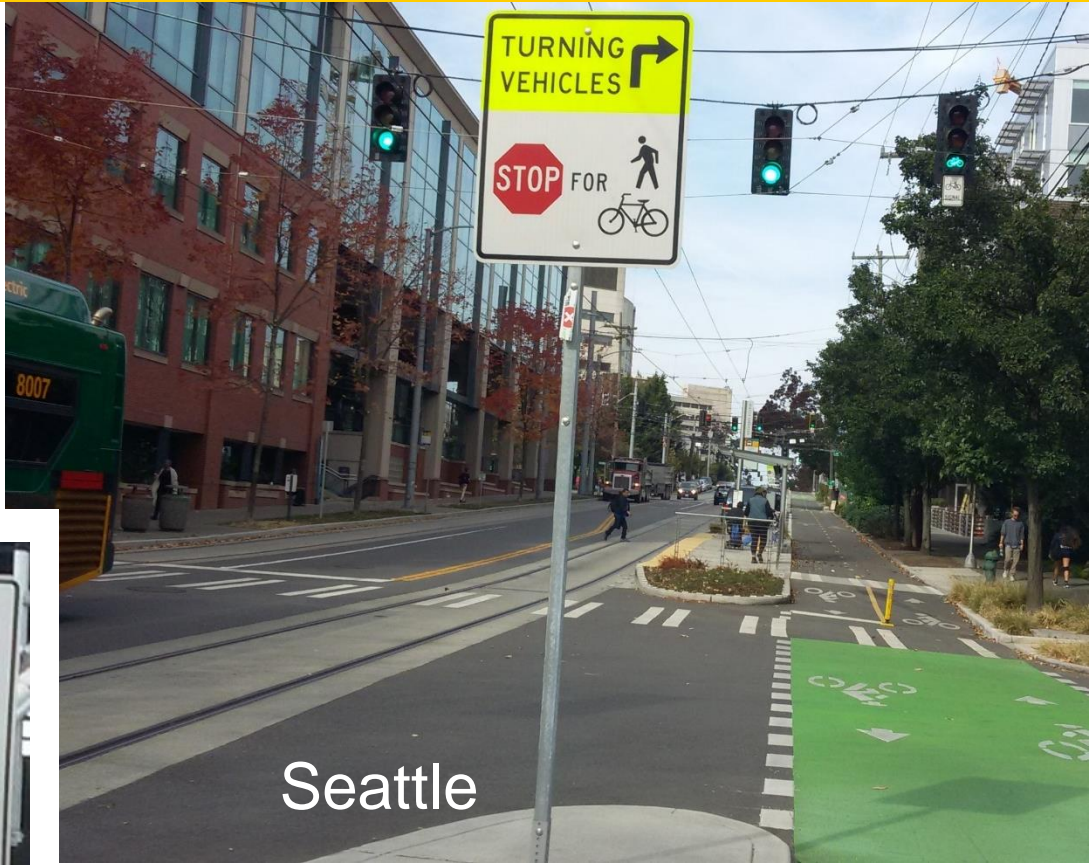
# Filter turning aids – signs & markings



Cambridge

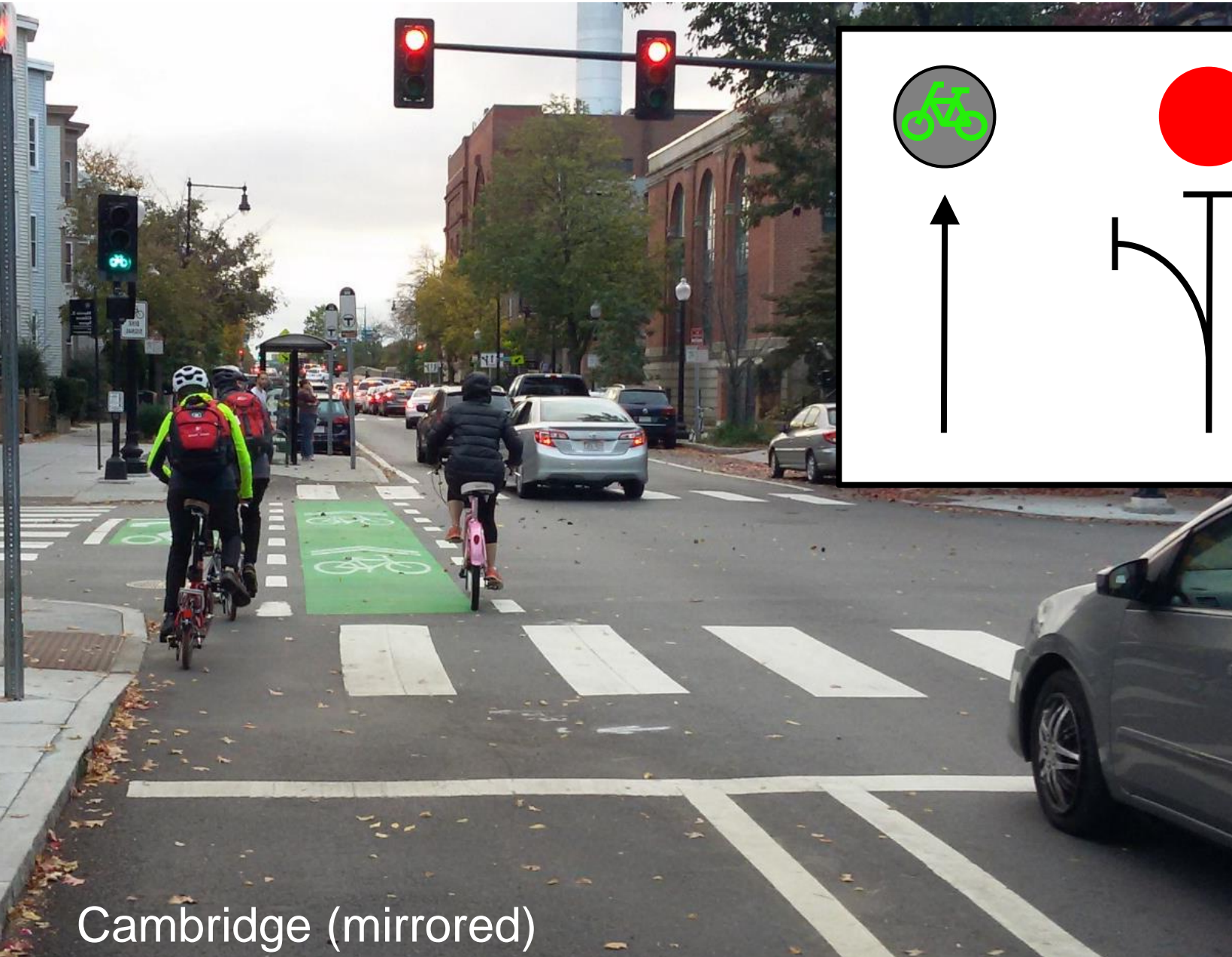


Toronto

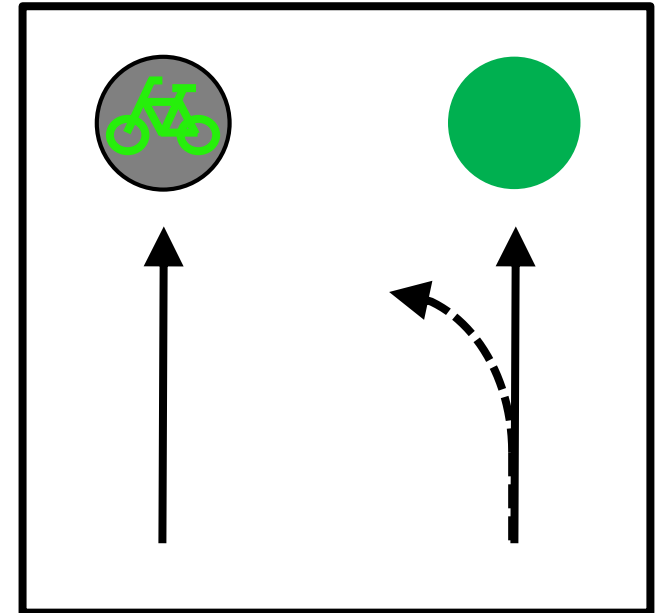
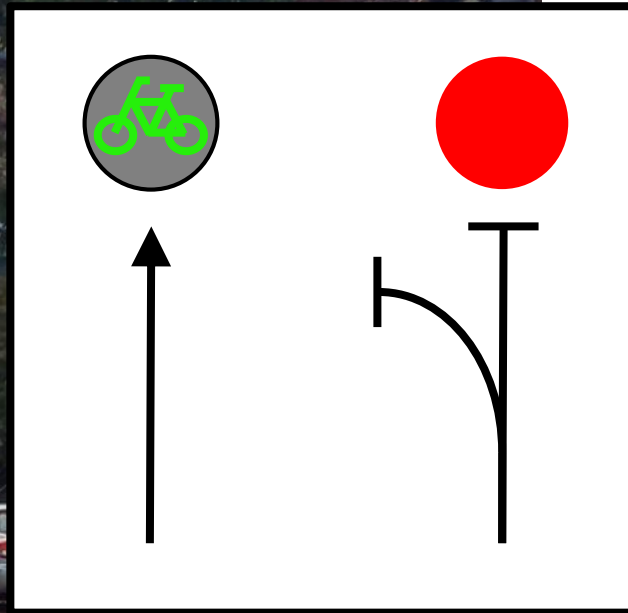


Seattle

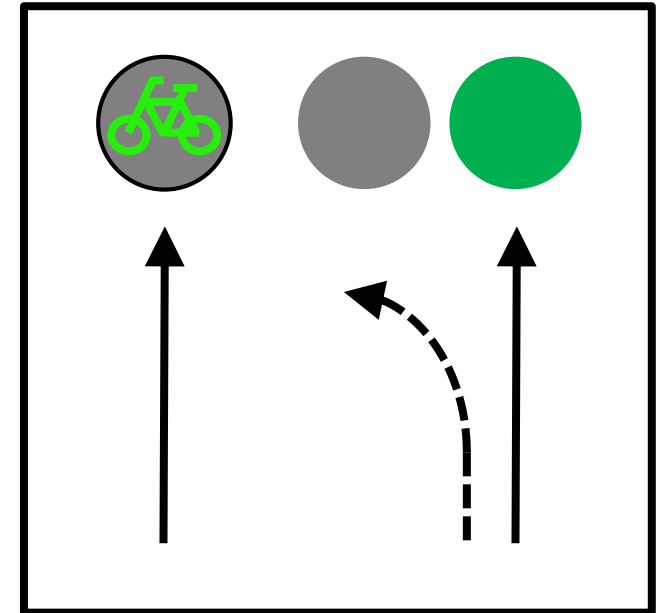
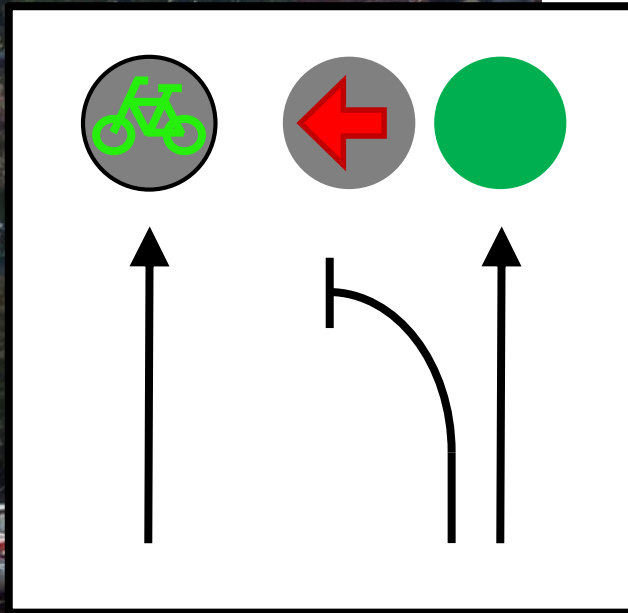
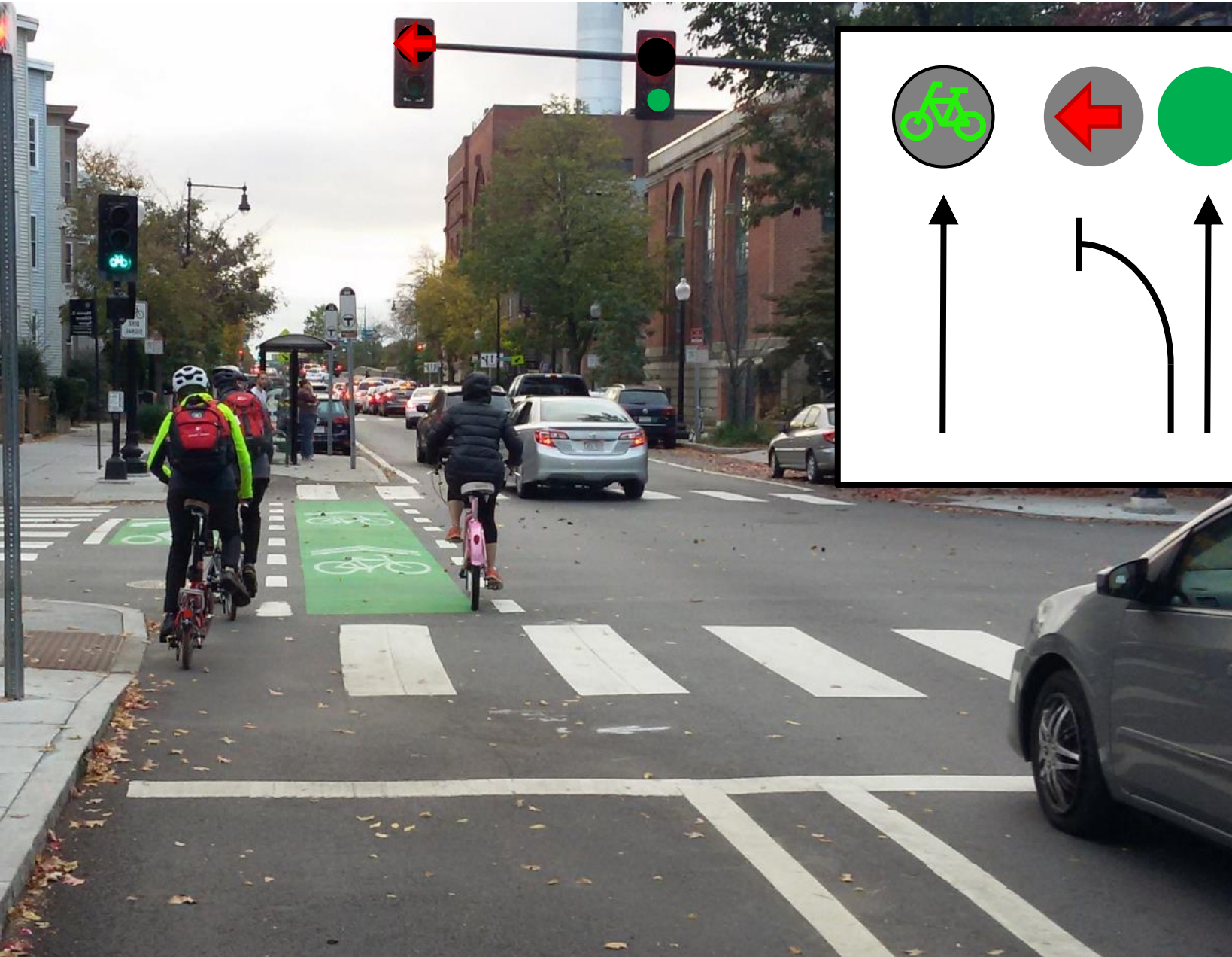
# Filter turning aids – cycle head starts



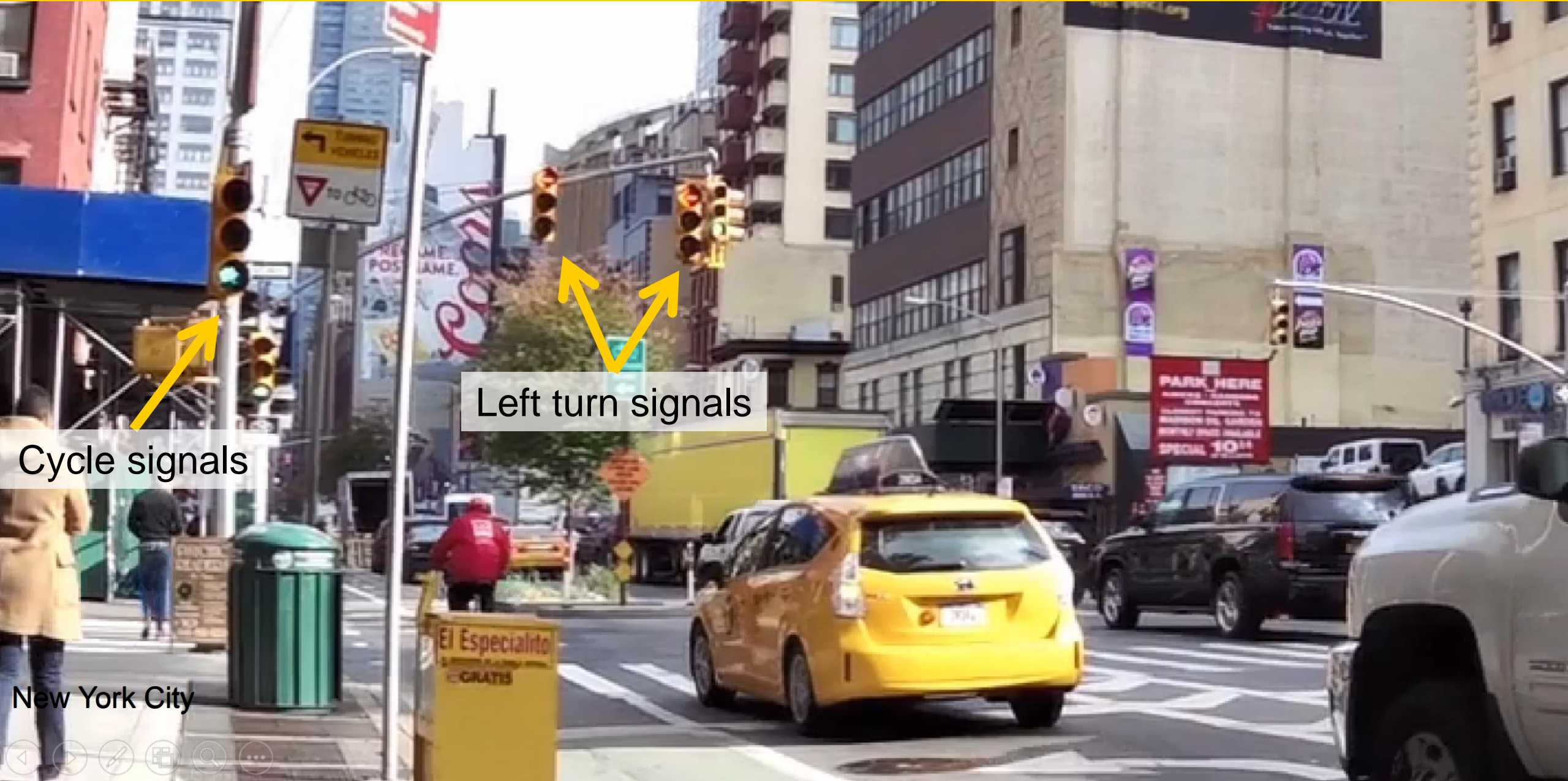
Cambridge (mirrored)



# Filter turning aids – partial protection



# Filter turning aids – flashing yellow arrows



Cycle signals

Left turn signals

New York City



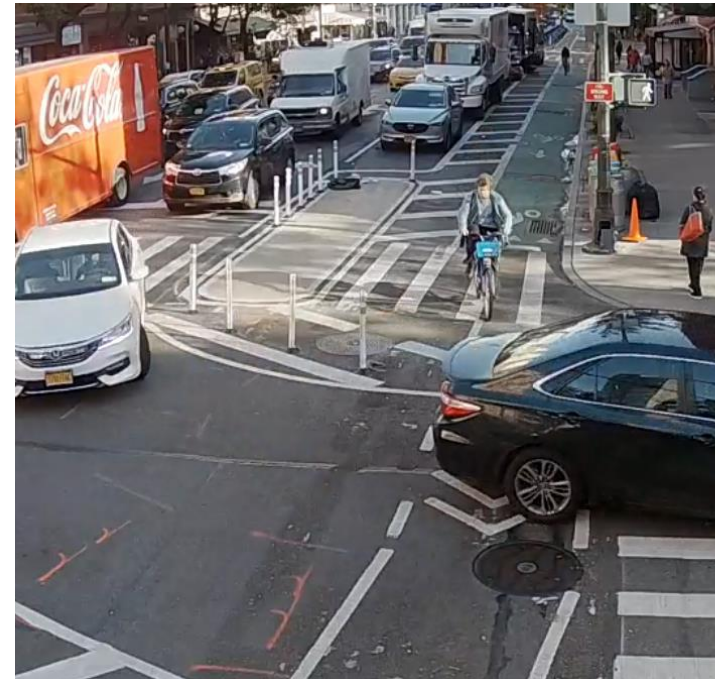
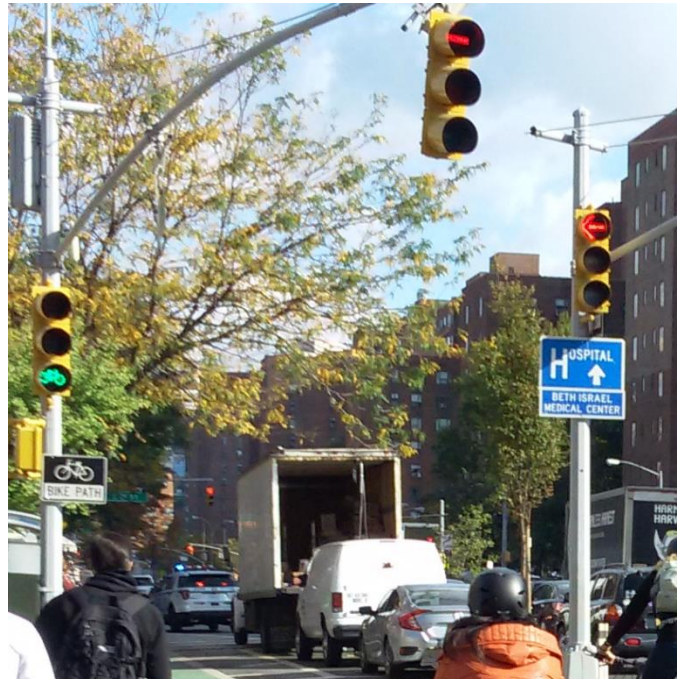
# Filter turning in NZ?

- Legal implications
  - Might still be a few grey areas (as seen at SNUG 2014)
    - **Ambiguous definition of “roadway” (Road User Rule)**
    - Limited definition of cycle aspect (Traffic Control Devices Rule)
  - Flashing yellow arrows would require an official TCD trial
    - *Might* also be a way around problems with above definitions
- Concerns
  - Already have a problem with filter turning through pedestrians – why extend this to cyclists?
  - Will drivers understand the flashing yellow arrow?



# NYC study: protection vs filtering

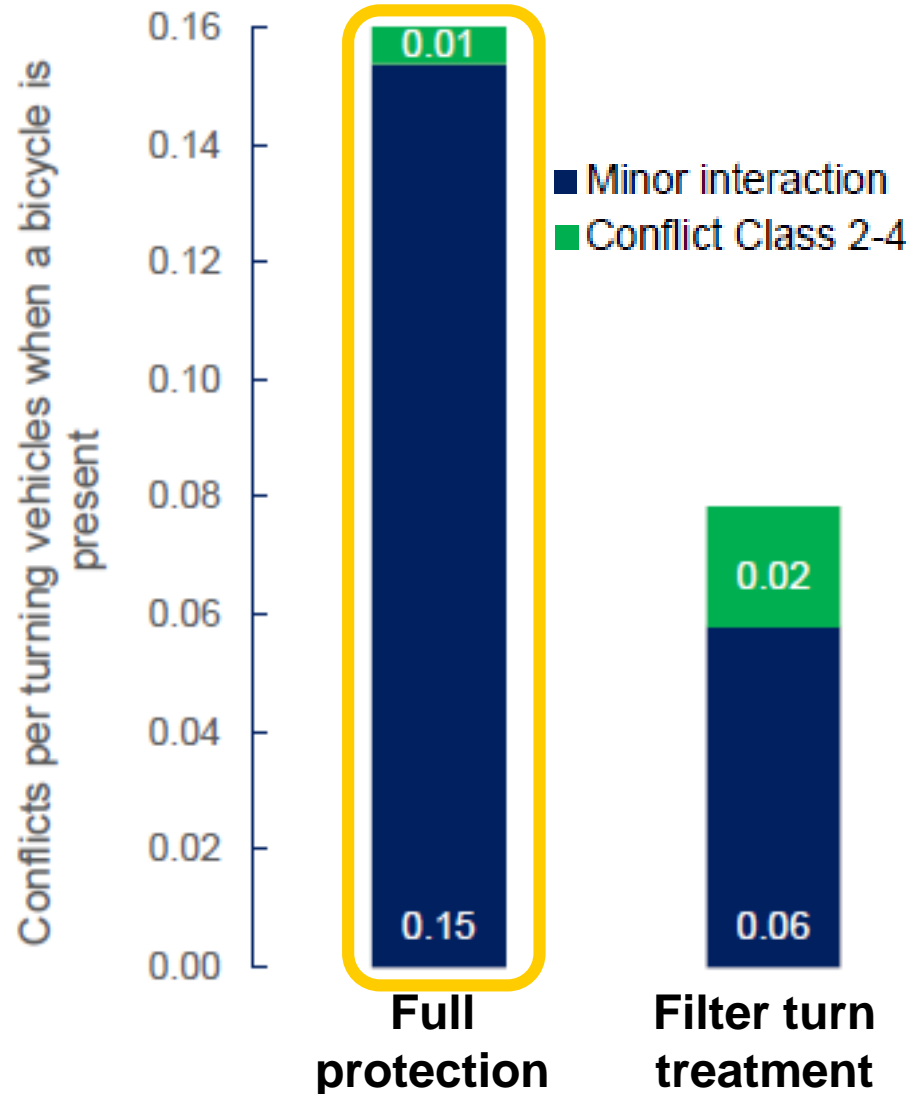
- 4 signalised intersection treatments for separated cycleways:
  - Mixing zones
  - Full protection
  - Filter turning (with partial protection + flashing yellow arrow)
  - Offset crossing (“Dutch intersection” design)



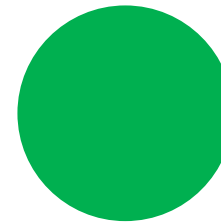


# NYC study: protection vs filtering

Conflicts per turning vehicle when a bicycle is present

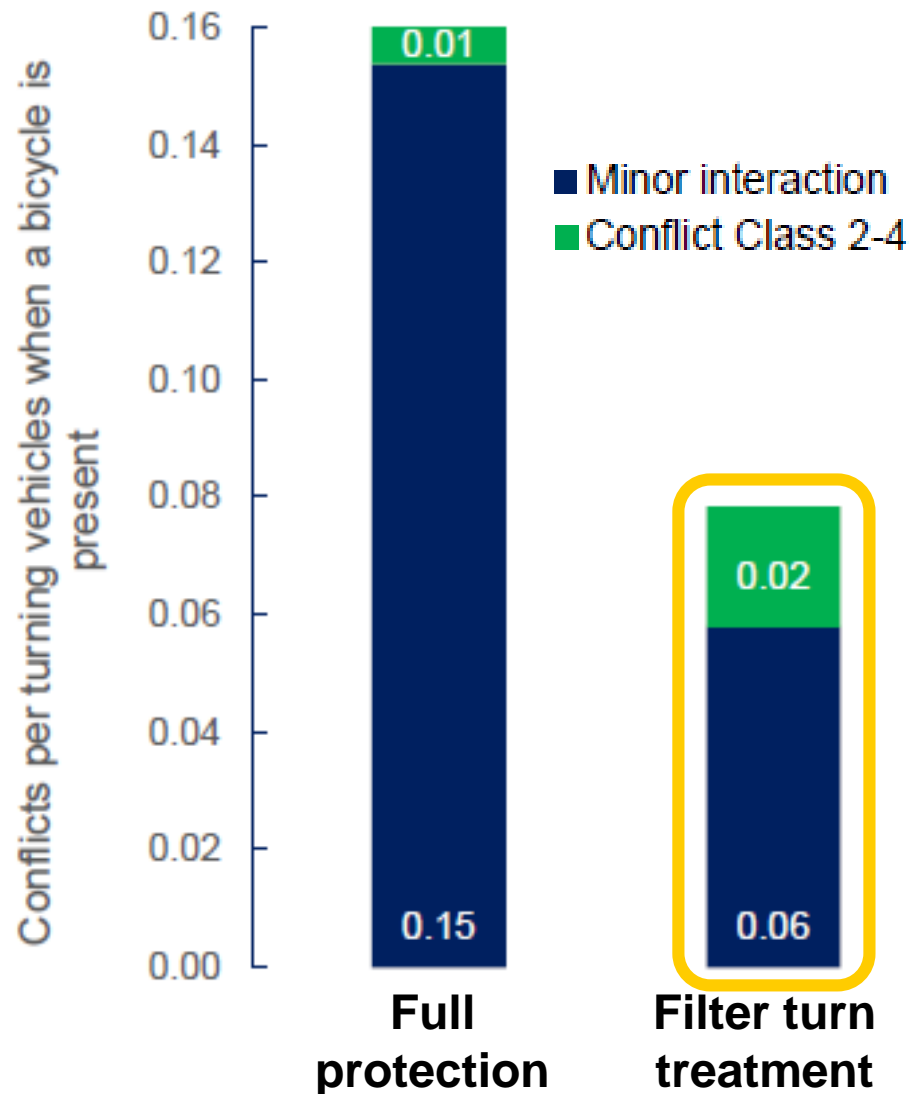


- Fewer conflicts for filter turn treatment!
- Conflicts at fully protected sites:
  - Red light running (mainly cyclists)

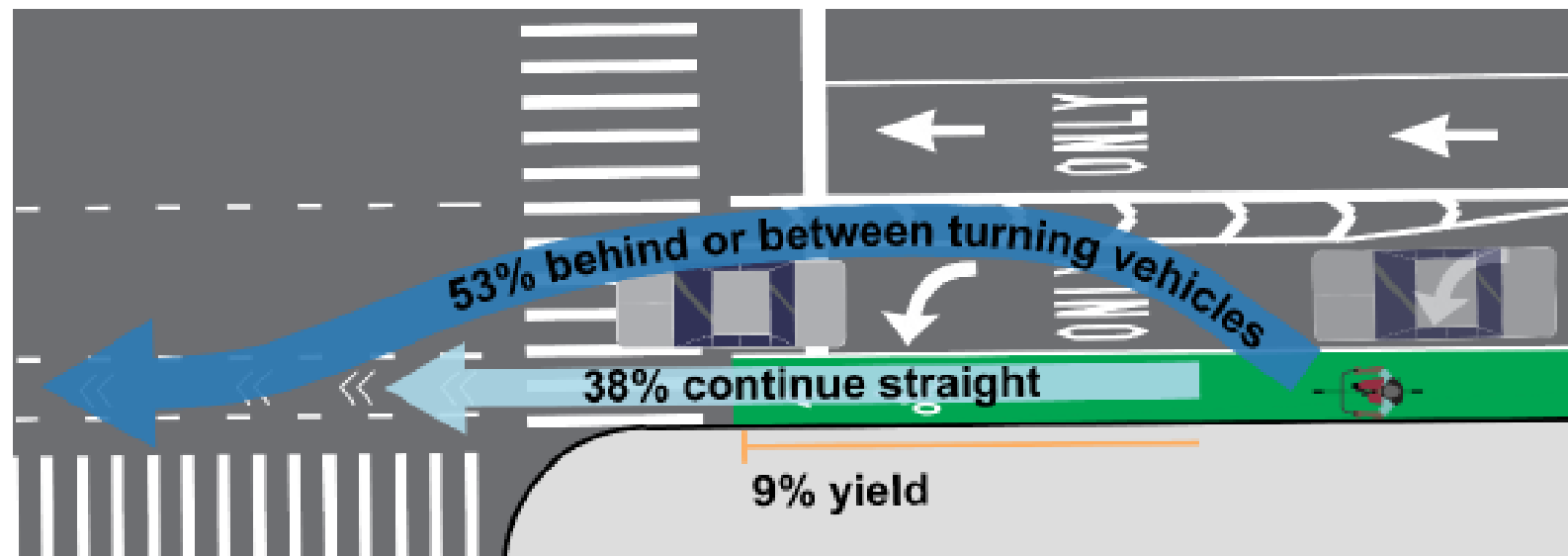


# NYC study: protection vs filtering

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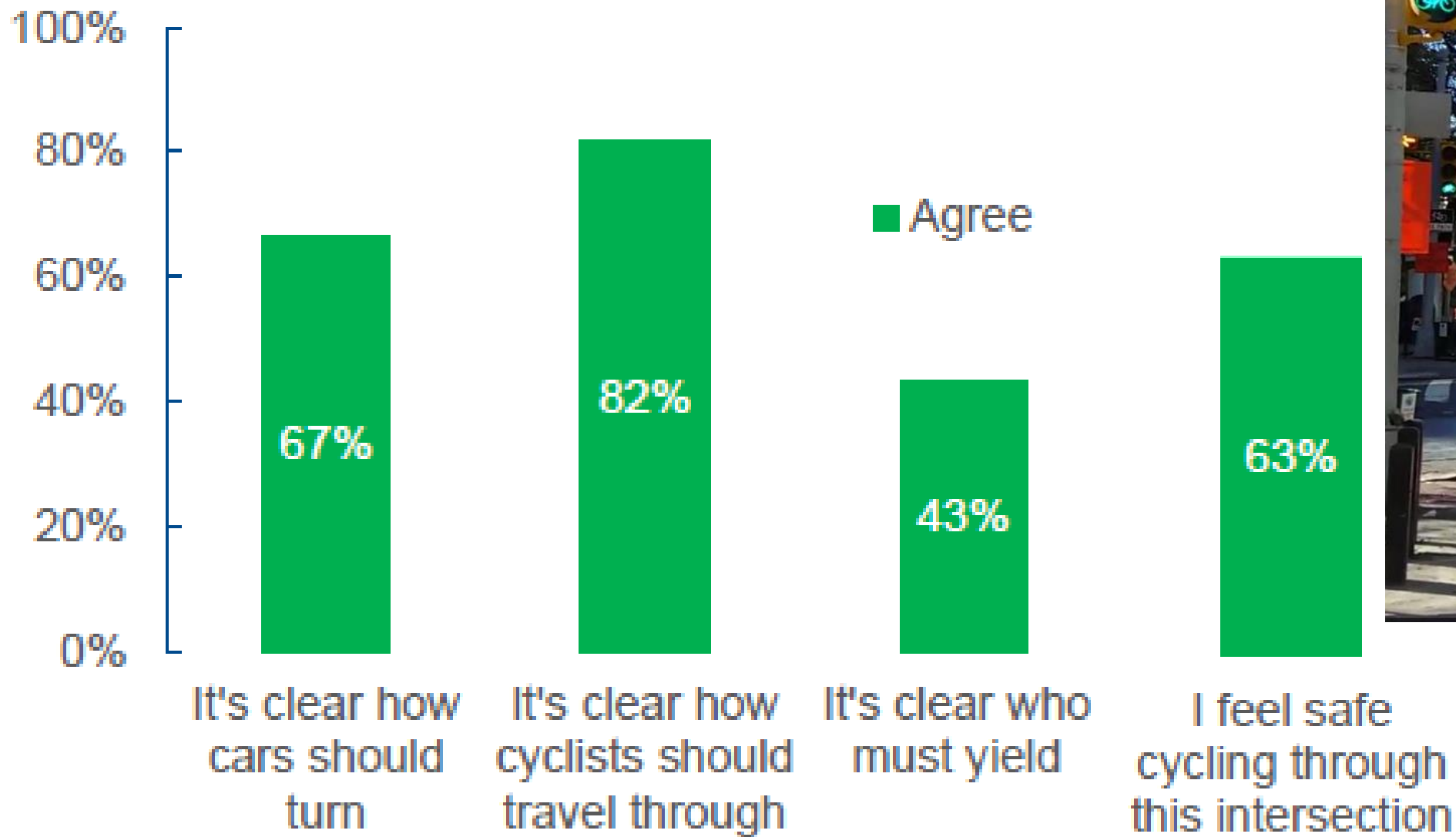


- Fewer conflicts for filter turn treatment!
- Conflicts at filter turn sites:
  - Cyclists treating it as a mixing zone
  - Drivers turning at start of flashing yellow arrow, without checking for cyclists
  - Drivers bypassing overflowing LT queue



# NYC study: cyclist opinions at filter turn sites

Intercept survey, 222 cyclists:



# A few ideas on thresholds

			Parallel street volumes (vehicles / hour)			
			One-way	Two-way		
				Left turn OR right turn	Left turn	Right turn
Separated cycleway direction	Cross street		Across 1 opposing traffic lane			Across 2 opposing traffic lanes
	direction	# lanes				
One-way	One-way	1	<b>150</b>	150	100/50+	<b>50</b>
		2+	60			
	Two-way		150			
Two way			100	100	50	0

**MassDOT and NYC**  
 MassDOT (2015)  
 NYC (2018)  
 Not specified

- CROW: 2-way cycleways – ALWAYS apply full protection!
  - Risk to cyclists in contra-flow direction much greater.

# Summary – what we think

- Filter turning can be safer than full protection
  - In some cases, just need to reconsider when to run cycle movement during phase
- Should consider trialling filter turning
  - + partial protection + flashing yellow arrows
  - Start with thresholds from previous slide?
  - NOT across 2-way cycleways
- Need to clear up some legal definitions



# What do YOU think?

- Filter turning can be safer than full protection
  - In some cases, just need to reconsider when to run cycle movement during phase
- Should consider trialling filter turning
  - + partial protection + flashing yellow arrows
  - Start with thresholds from previous slide?
  - NOT across 2-way cycleways
- Need to clear up some legal definitions



# Thank you!

## Questions and discussions



Megan Gregory & Axel Wilke

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