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An Analysis of Cyclist Path Choices Through Shared Space Intersections in England

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Analysis of cyclist path choices in shared space intersections in England

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General presentation outline

- Definitions
- Existing literature
- Questions, hypotheses, assumptions
- Methods, research design
- Findings
- Discussion
- Practical thoughts

What is shared space?

- Removal of curbs
- Removal of traffic control devices
- Removal of lane striping
- Entry monument
- Leveling of site
- Consistent paver, usually textured
- Street furniture and landscaping
- Geometric devices

(Hamilton-Baillie, 2005; Lutz, n.d.)

usa.streetsblog.org, town of Sneek, The Netherlands

What are shared space goals?

- Traffic calming
- Increased perception of risk
- Democratization of space
- Equal priority for all modes

Literature: where it began (for me)

SECTIONS HOME SEARCH The New York Times

EUROPE | THE SATURDAY PROFILE

A Path to Road Safety With No Signposts

By SARAH LYALL JAN. 22, 2005

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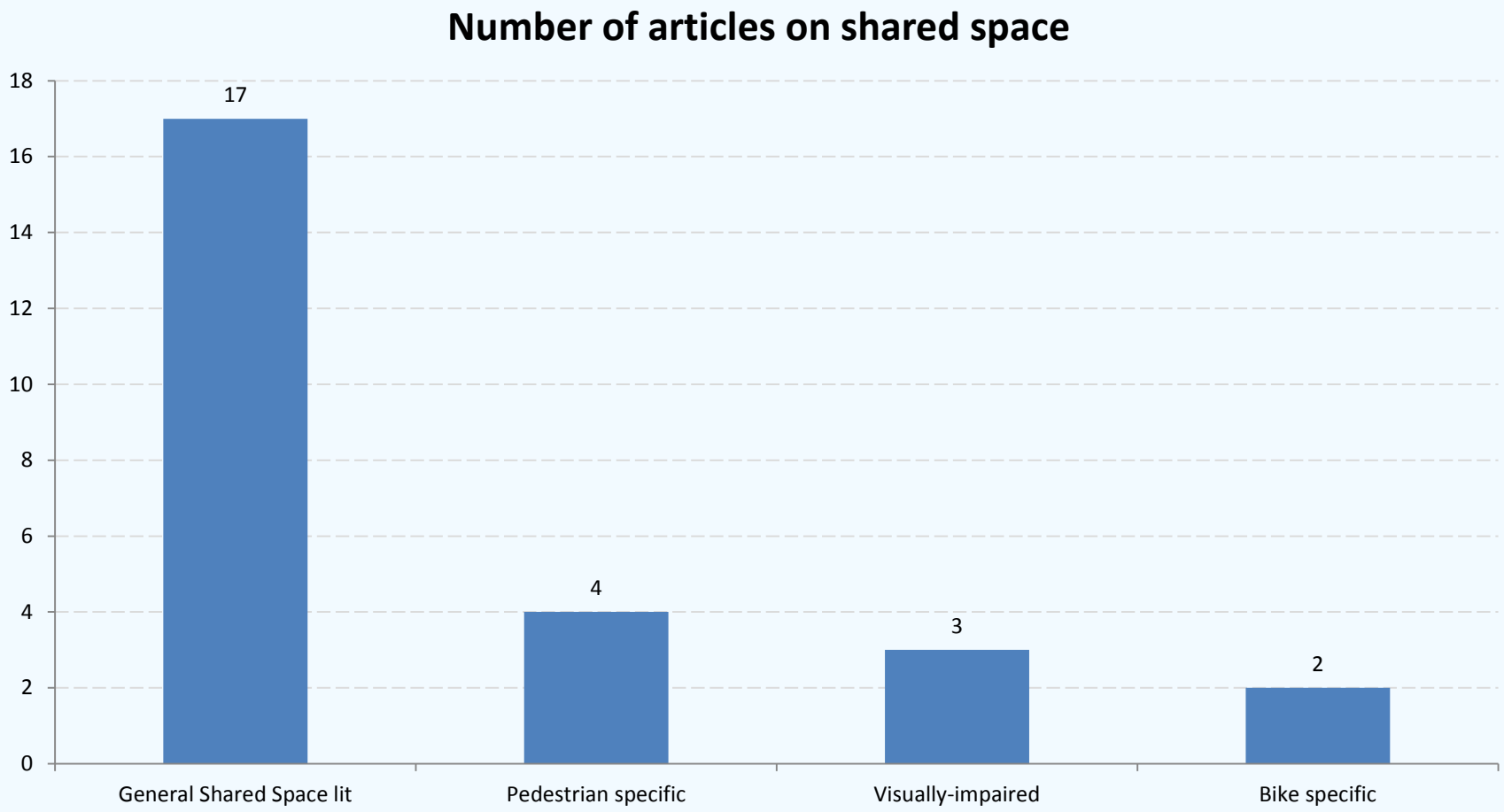
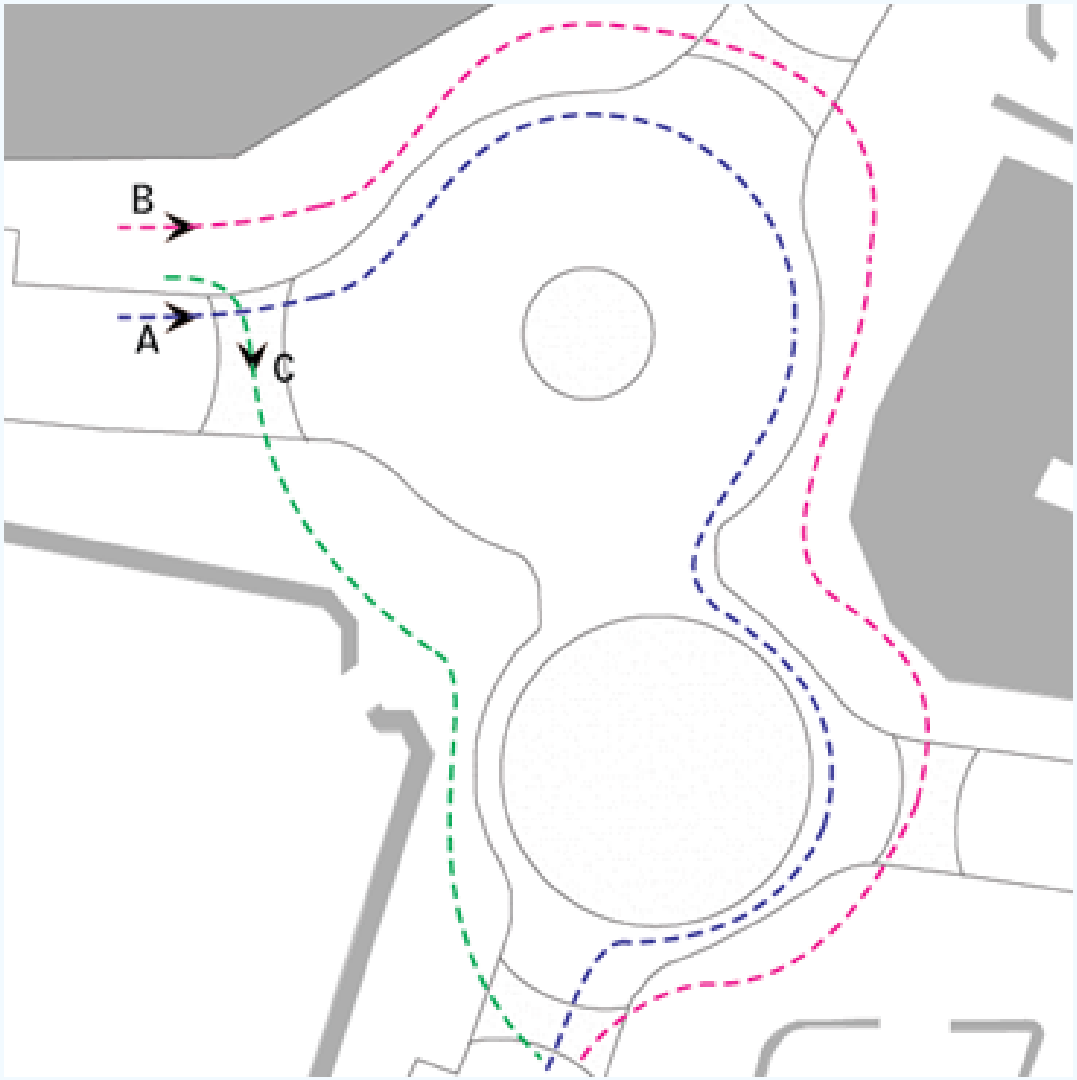
DRACHTEN, The Netherlands - "I WANT to take you on a walk," said Hans Monderman, abruptly stopping his car and striding -- hatless, and nearly hairless -- into the freezing rain.

Like a naturalist conducting a tour of the jungle, he led the way to a busy intersection in the center of town, where several odd things immediately became clear. Not only was it virtually naked, stripped of all lights, signs and road markings, but there was no division between road and sidewalk. It was, basically, a bare brick square.

Existing literature



Definitions: Paths



A **path** is defined at the intersection scale—it is the course that bike riders take when riding through an intersection.

Definitions, cont'd

- Nodes are the points required to define a path. The number of nodes describes the amount of deviation in a path.

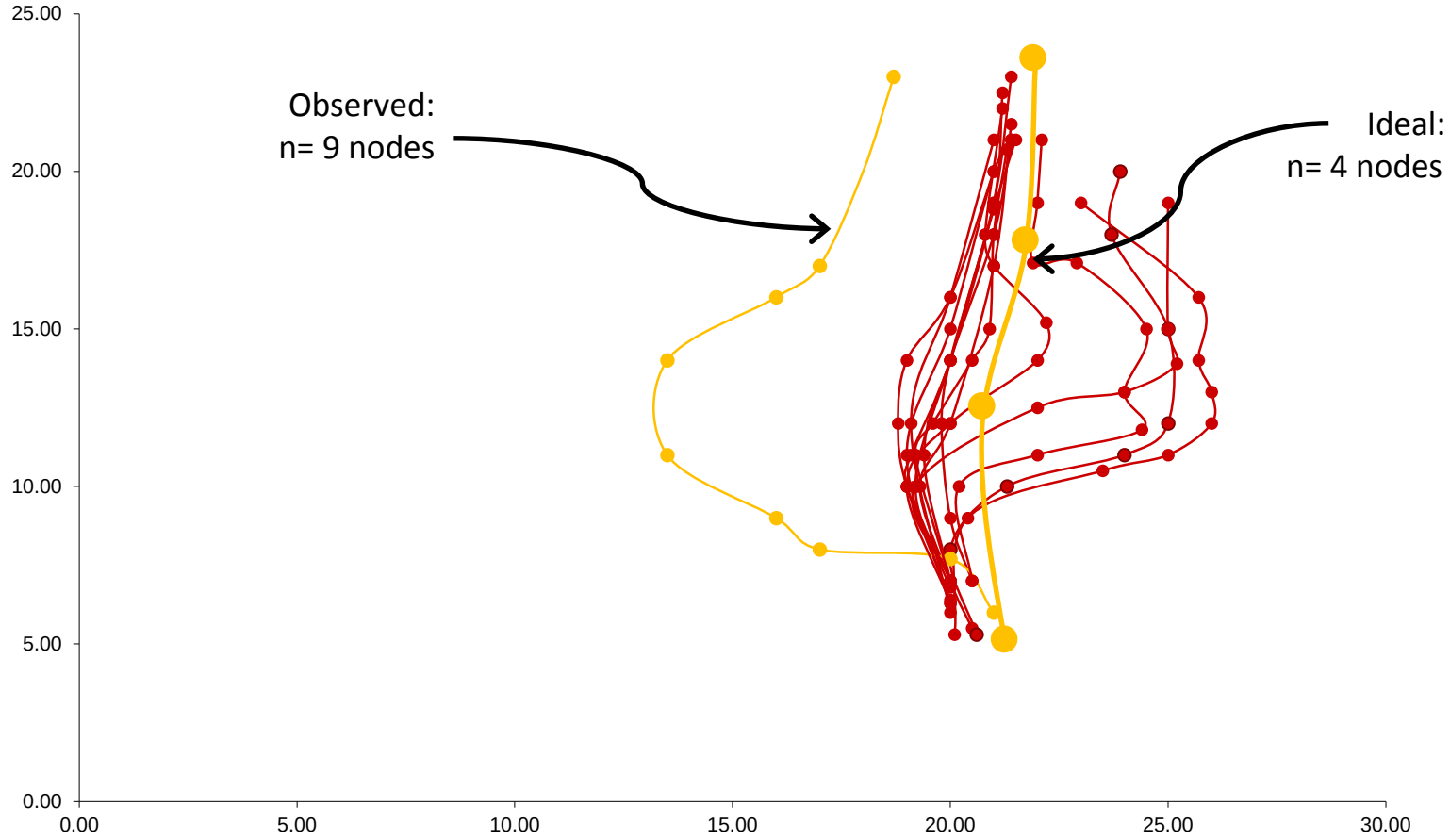
- An evaluative path unit

- Observed # nodes – ideal # nodes = node difference (the DV)

- OD: "origin-destination"

Nodes, node difference, and ODs

Coventry, **north to south** OD



- Observed # nodes – ideal # nodes = node difference (DV)

Research questions

- How do cyclists actually maneuver through shared space intersections?

- Does the shared space design influence bicyclist path?

Hypotheses

- No significant difference in paths ridden through shared and control intersections

- There will be greater path variation through more complex sites as compared to simpler shared spaces

Assumptions

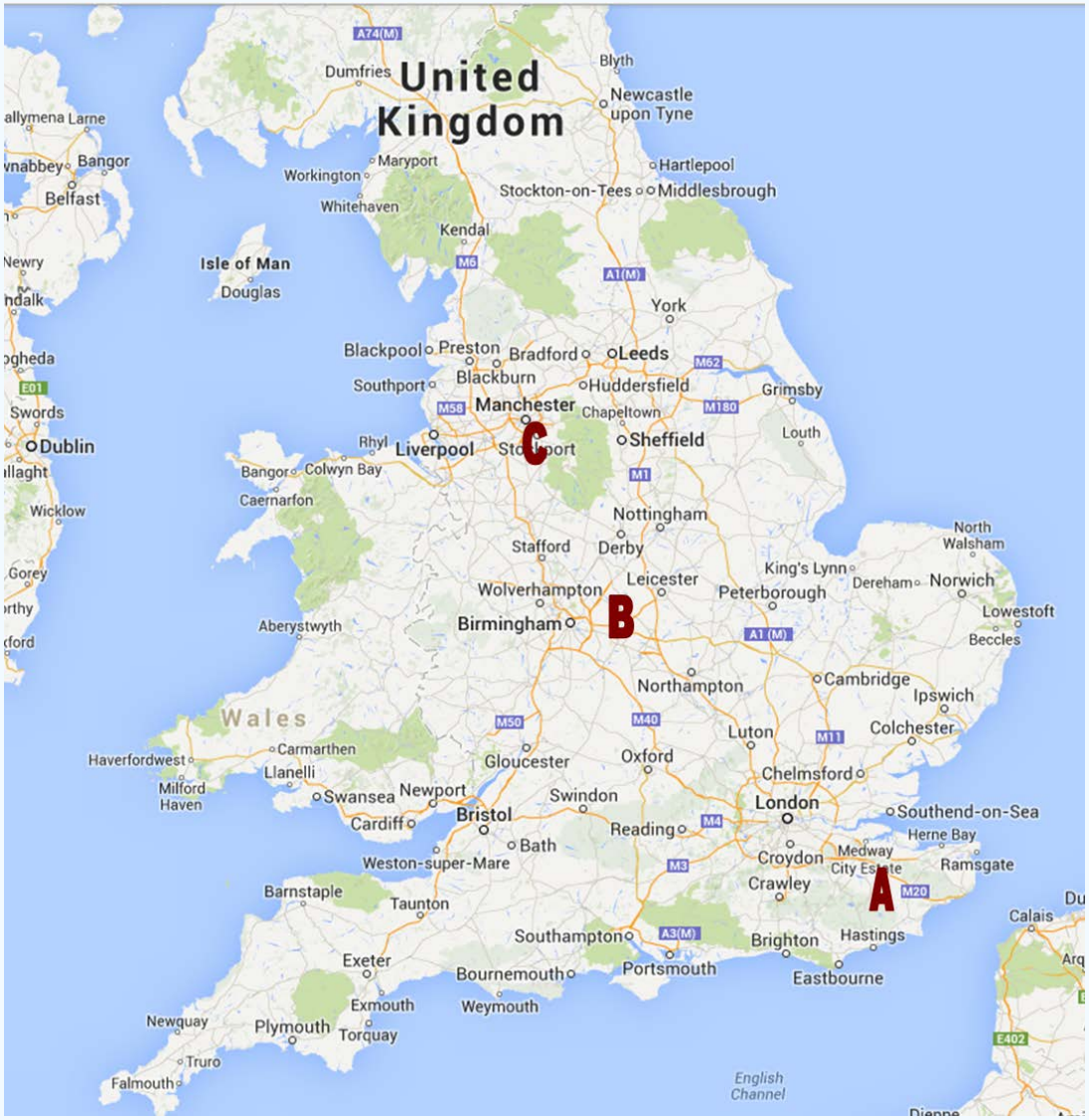
- Even some cyclists who are intimidated by the shared and control intersections will ride through the selected intersections.
- The path taken reflects a cyclist's perceptions of the intersection.
- Each path is counted separately, even if the same cyclist is seen on return trip.

Research design & methods

- Shared and control (non-treatment) intersections
- Video observations
  - At least 3 days per site, twice a day
  - All good weather days

My video set-up

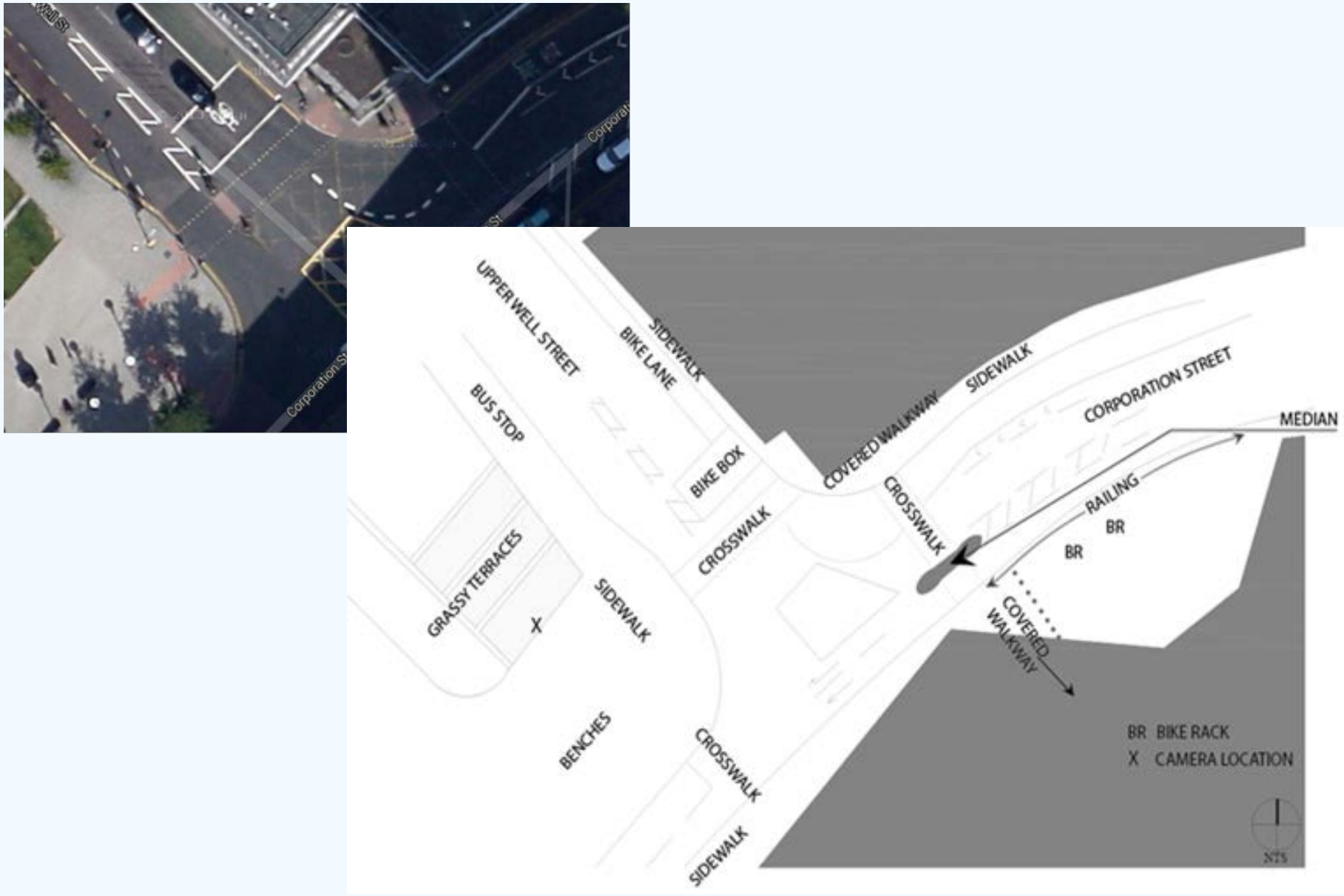
Study sites



- A Ashford
- B Coventry
- C Poynton

Study sites: Coventry control (n = 422)

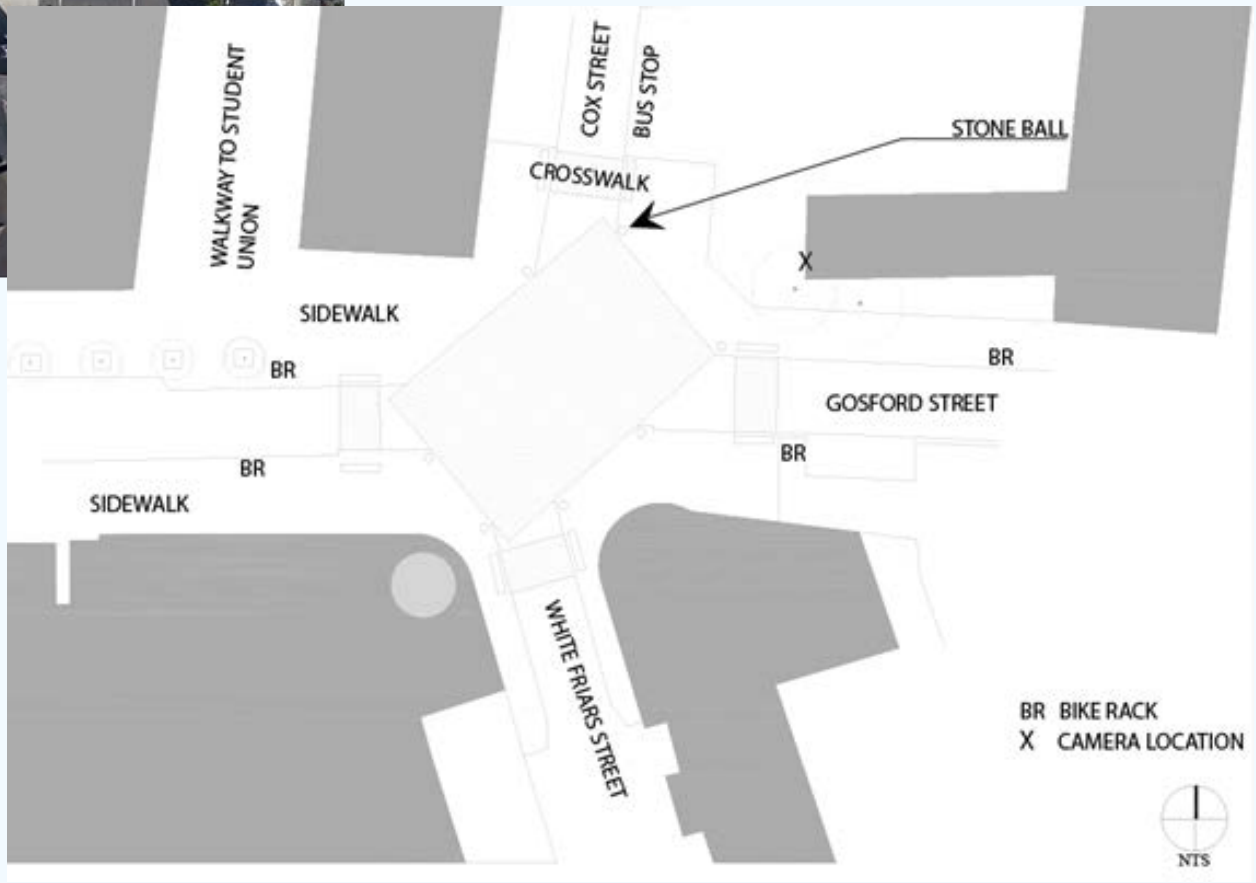
Study sites: Coventry control elements



Coventry control video

Study sites: Coventry (n = 490)

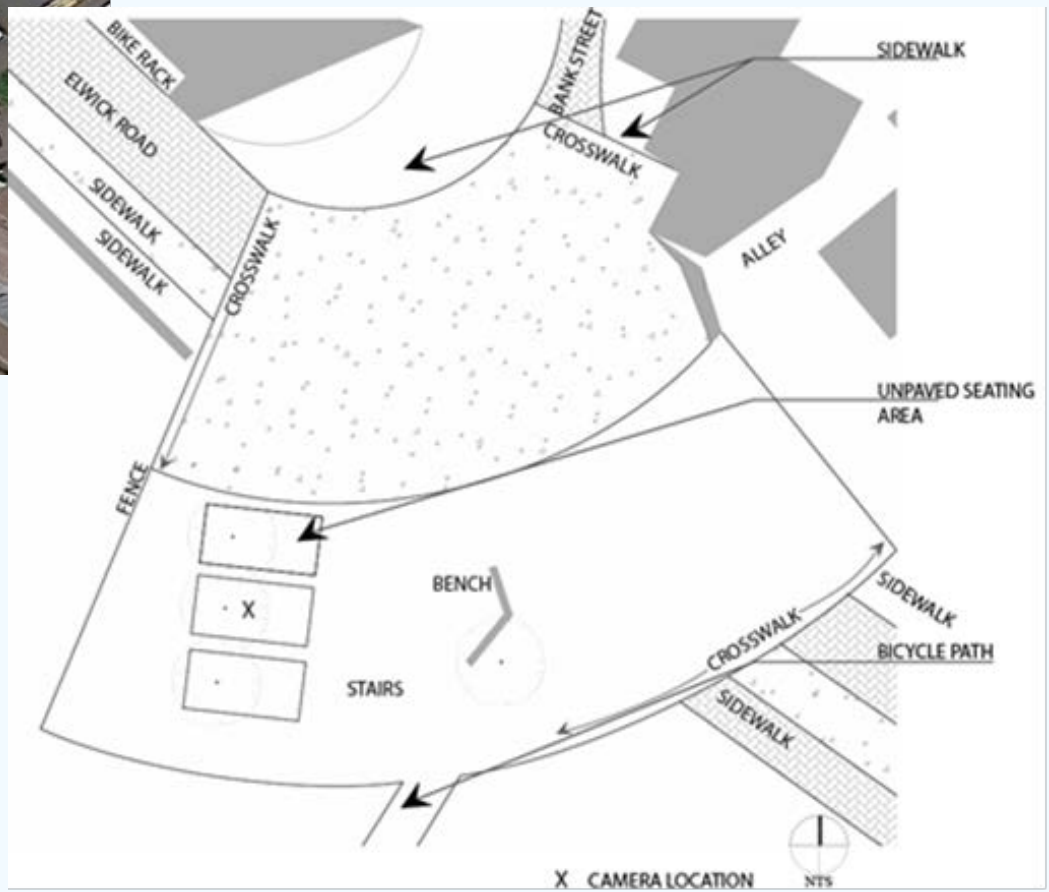
Study sites: Coventry elements



Coventry (shared) video

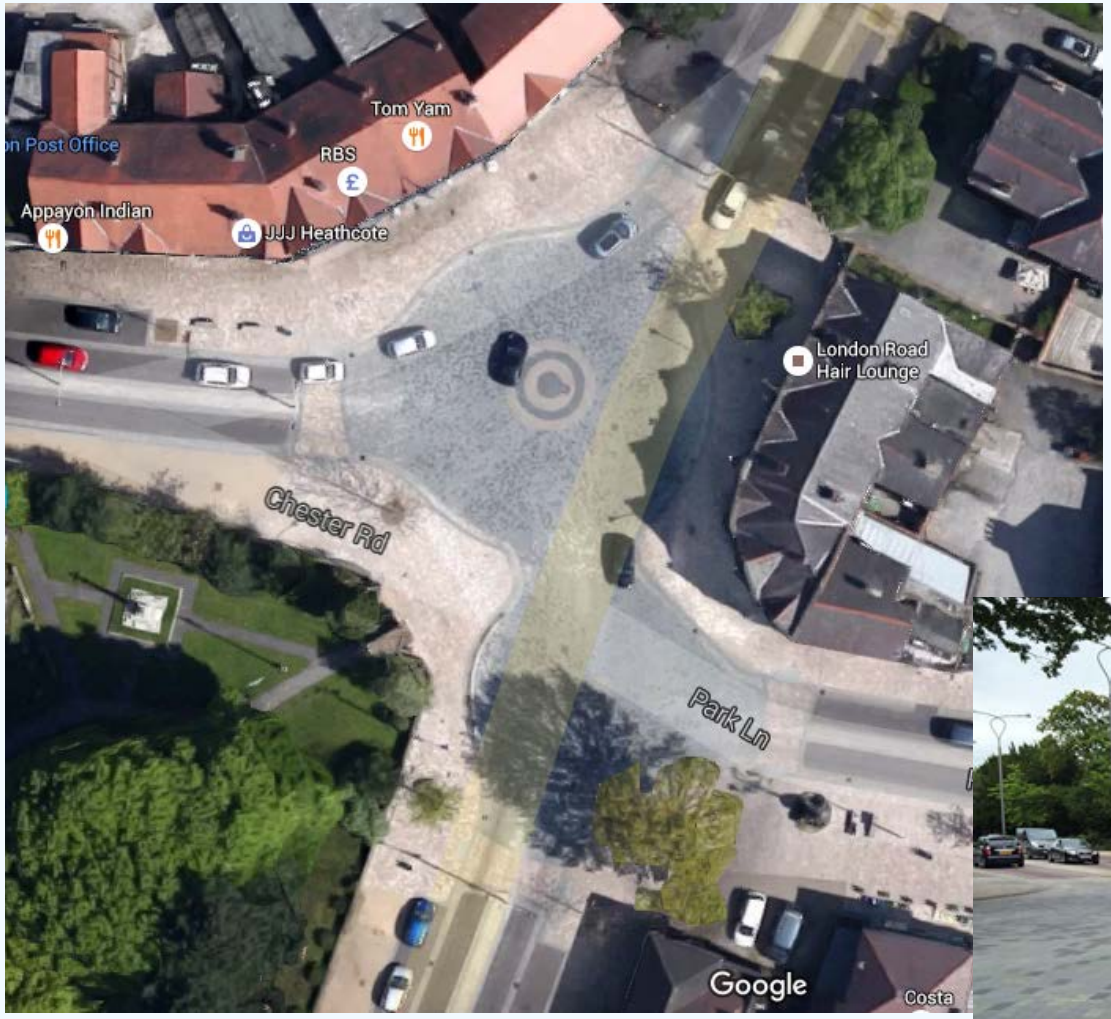
Study sites: Elwick Square (n = 357)

Study sites: Elwick Square elements

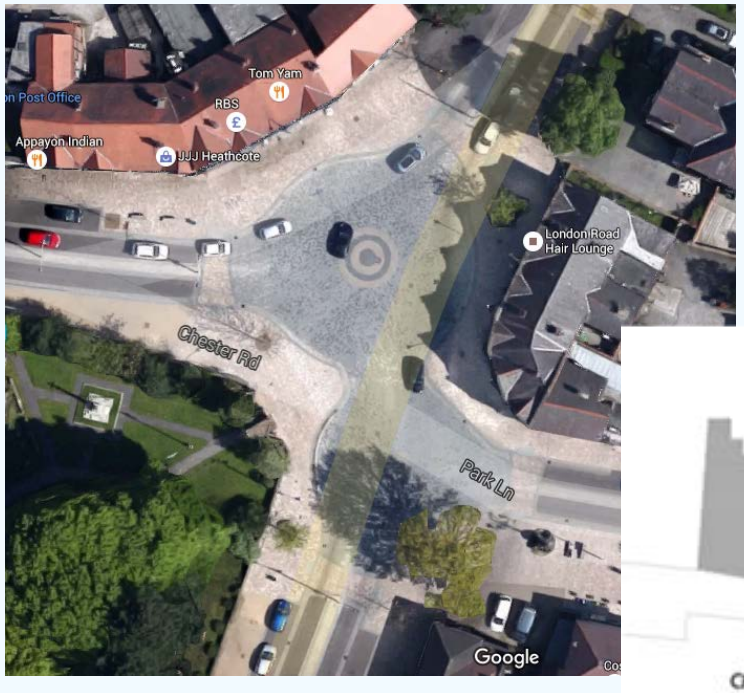


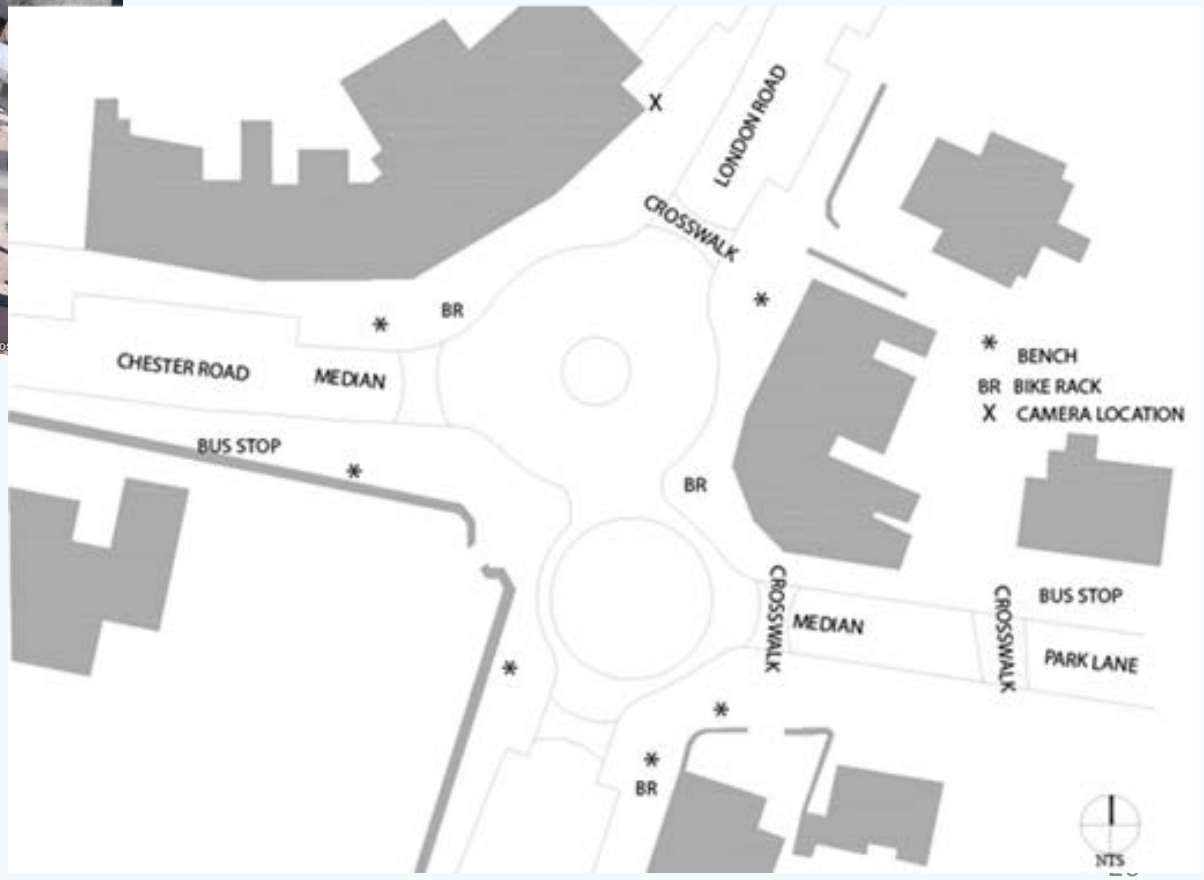
Elwick Square (shared) video

Study sites: Poynton (n = 206)



Study sites: Poynton elements



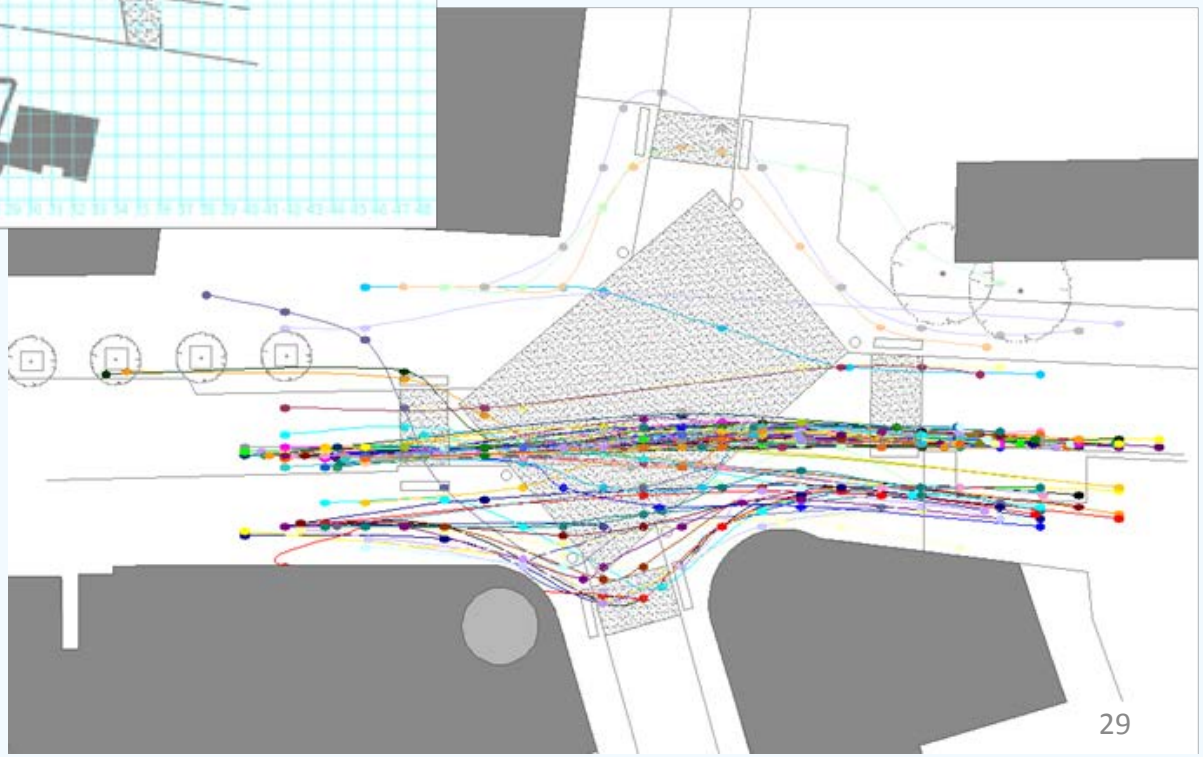


Poynton (shared) video

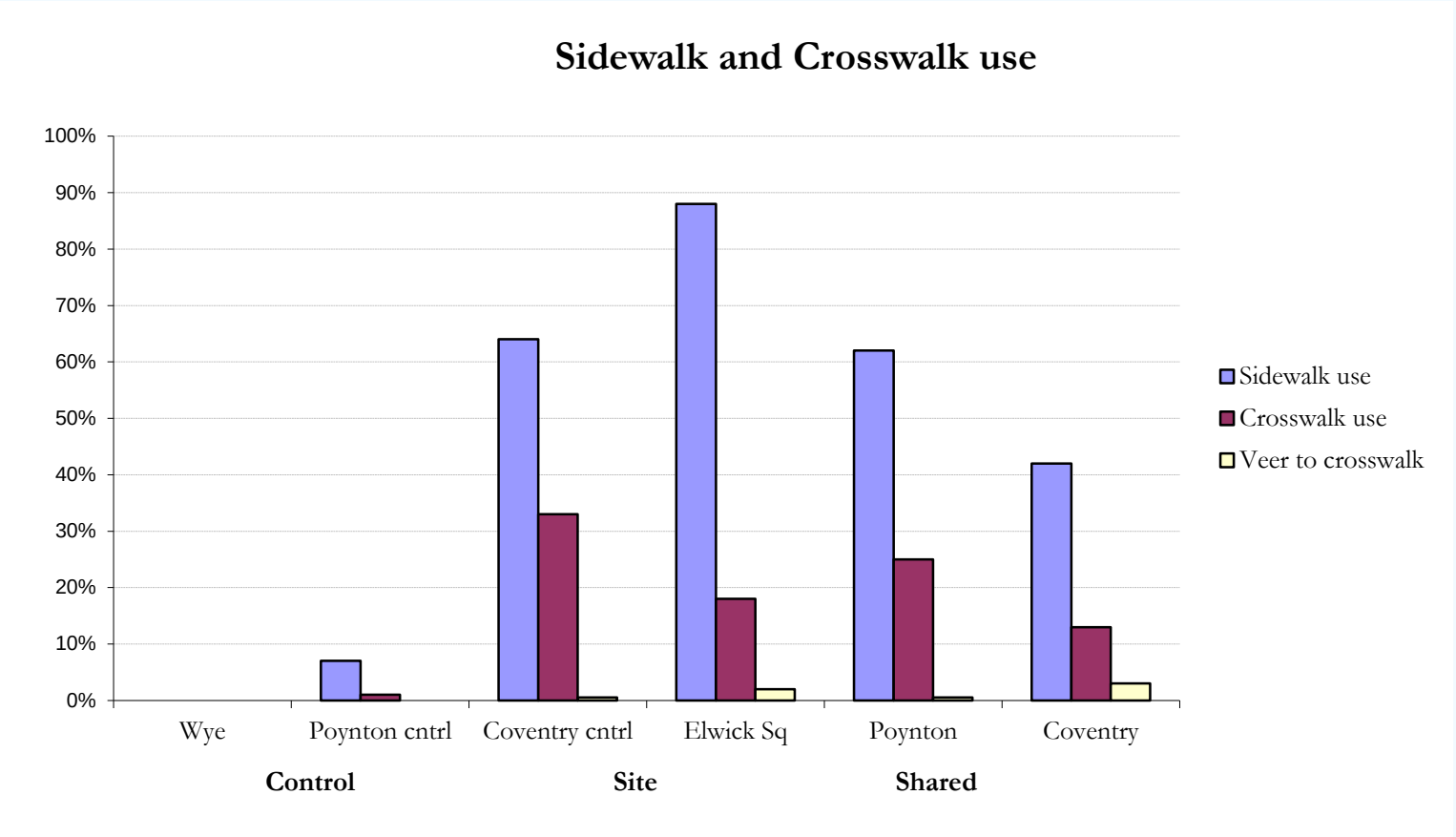
Video observations: variables

- Characteristic
  - Gender
  - Helmet
  - Bicycle type
- Behavioral
  - Sidewalk use
  - Crosswalk use
  - Curb use
  - Walking portion
  - Walking companion
  - Number of nodes
  - Node difference
  - OD

Video processing



Observational results: selected variables



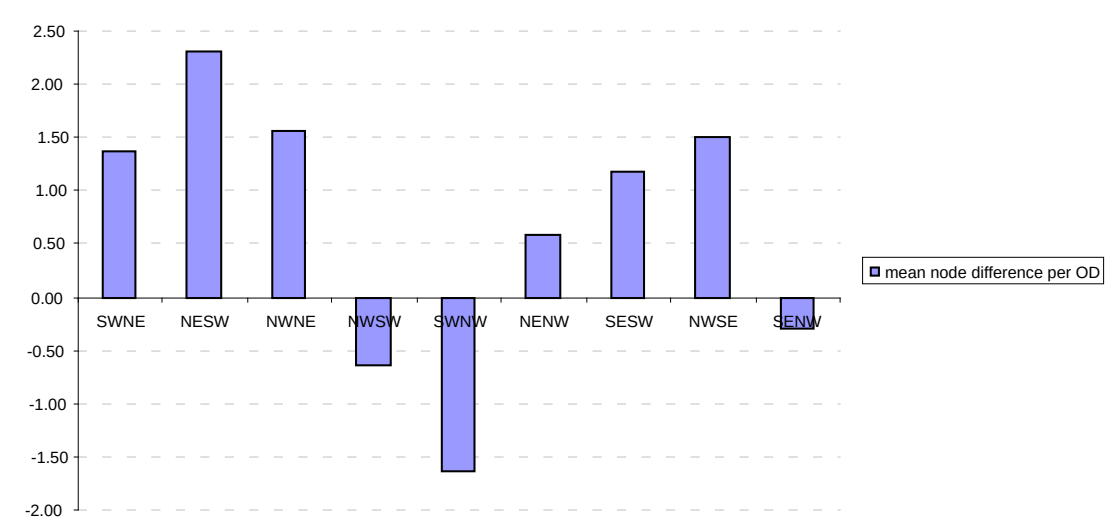
Chi-Square test: Sidewalk use
$p < .001$

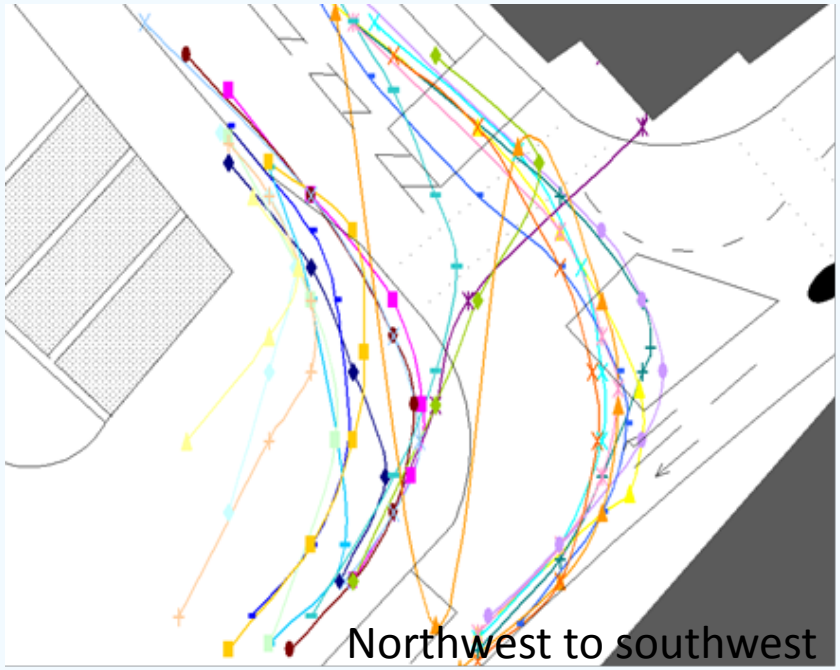
- Full data set
- Shared data set
- Control data set

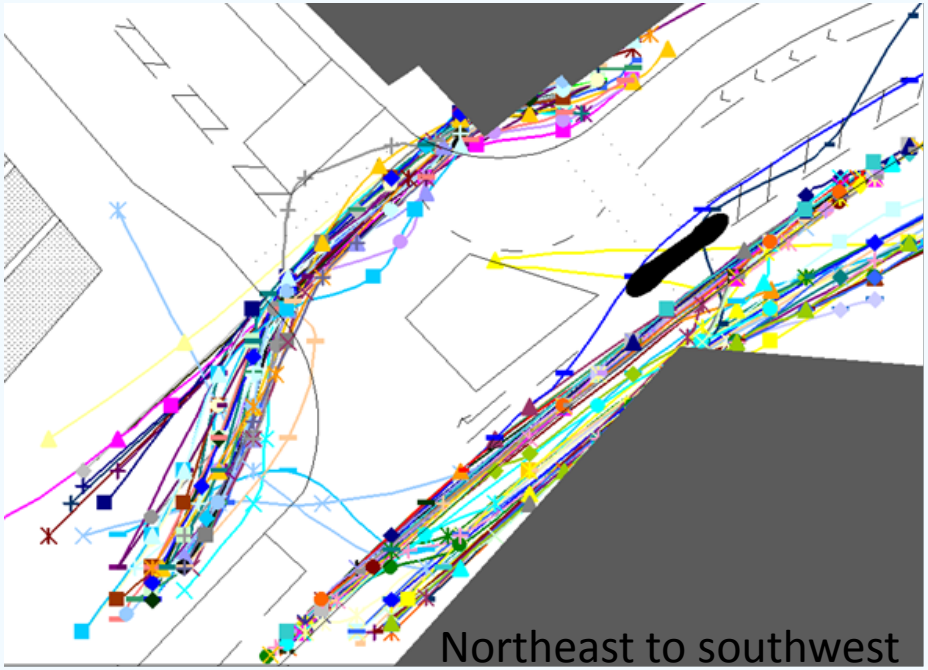
Chi-Square test: Crosswalk use
$p < .005$

- Full data set
- Shared data set

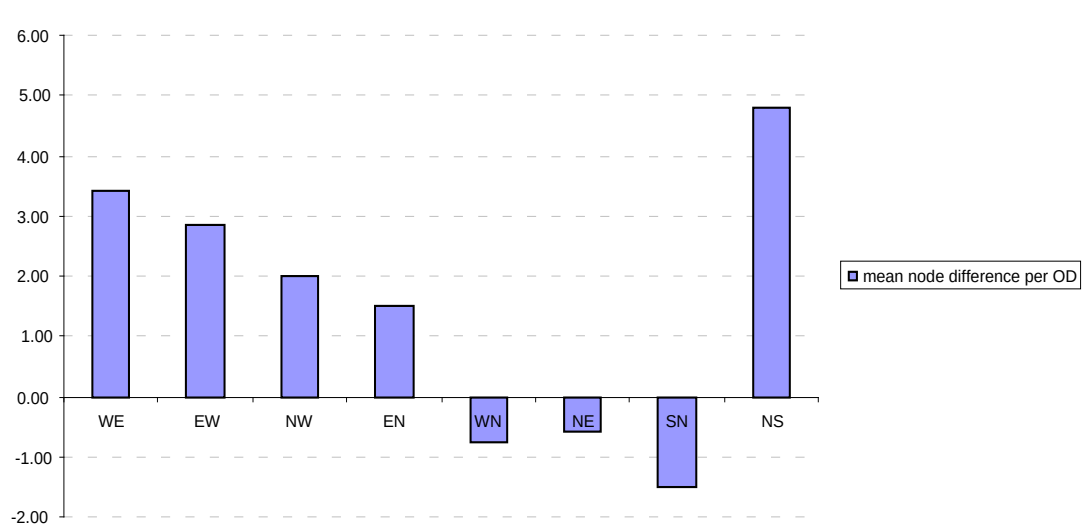
Coventry control

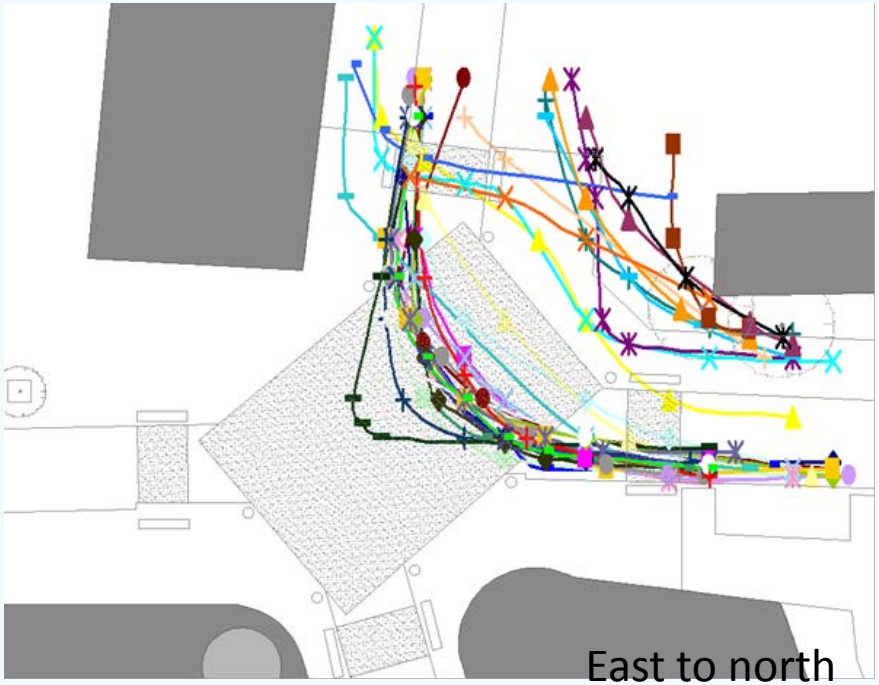




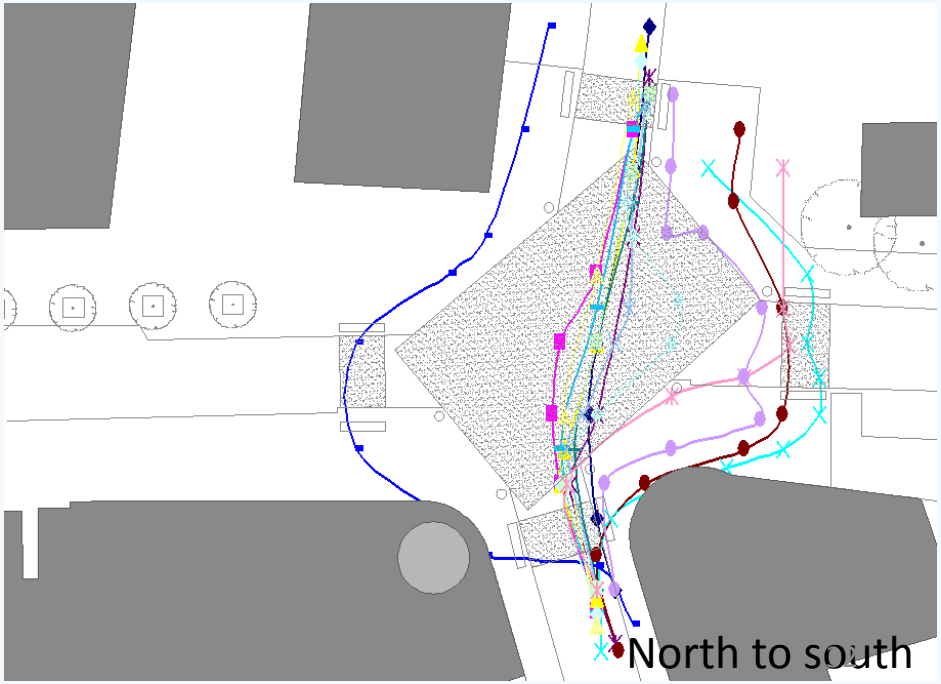


Coventry (shared)



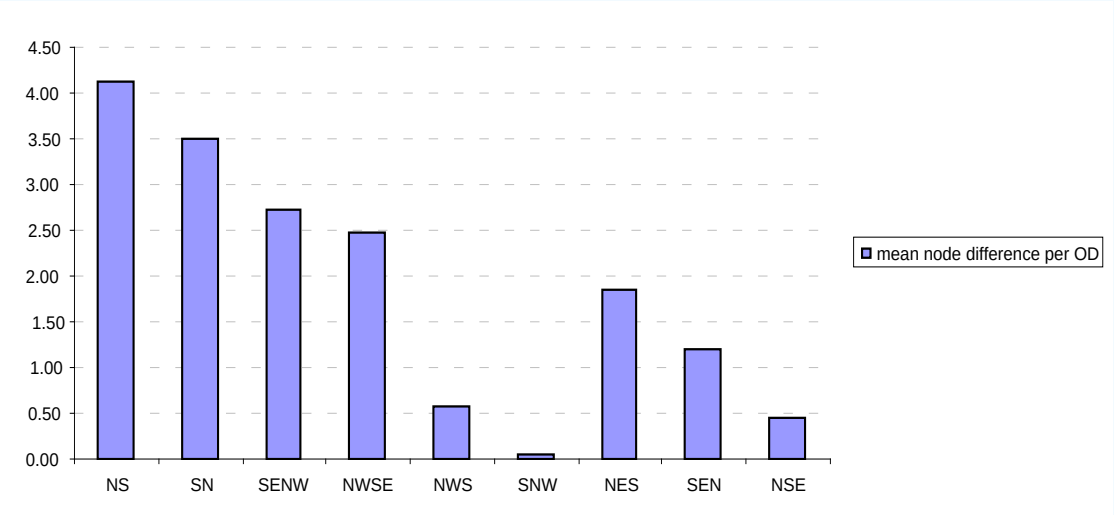


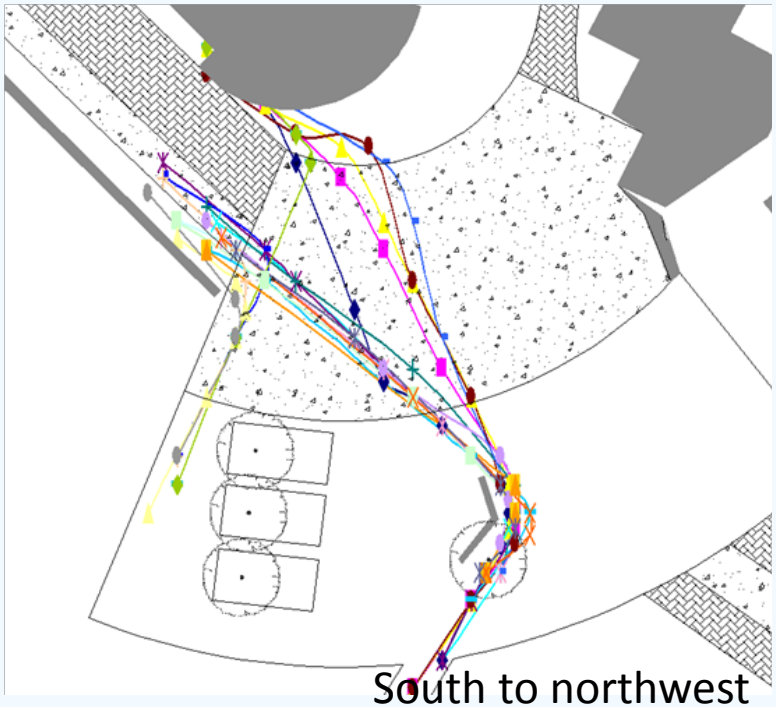
East to north



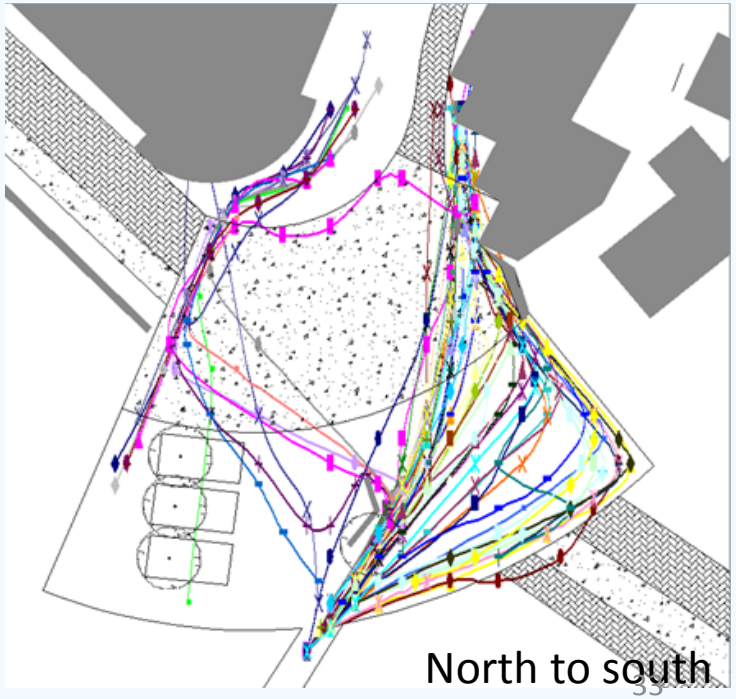
North to south

Elwick Square (shared)



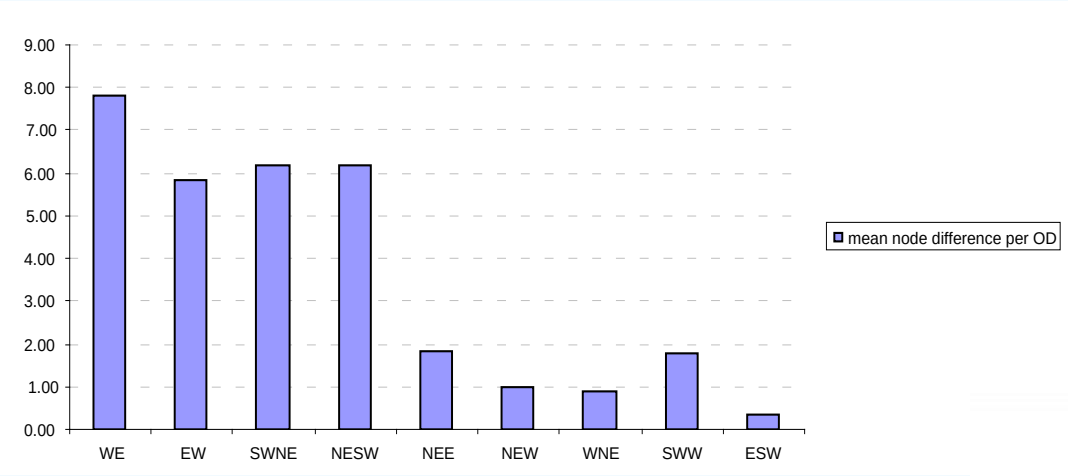


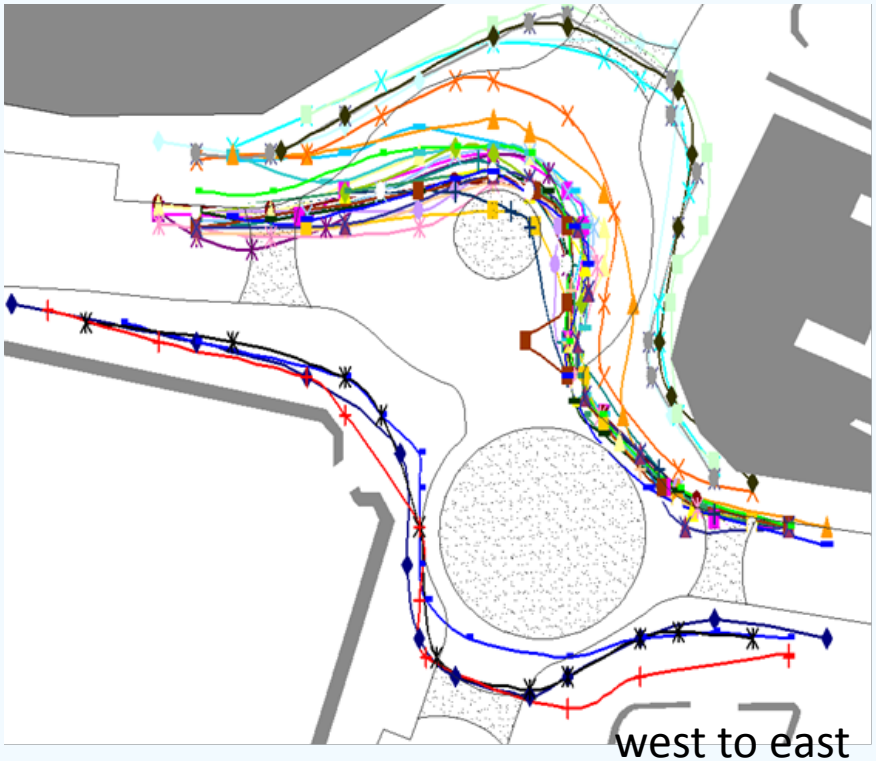
South to northwest



North to south

Poynton (shared)



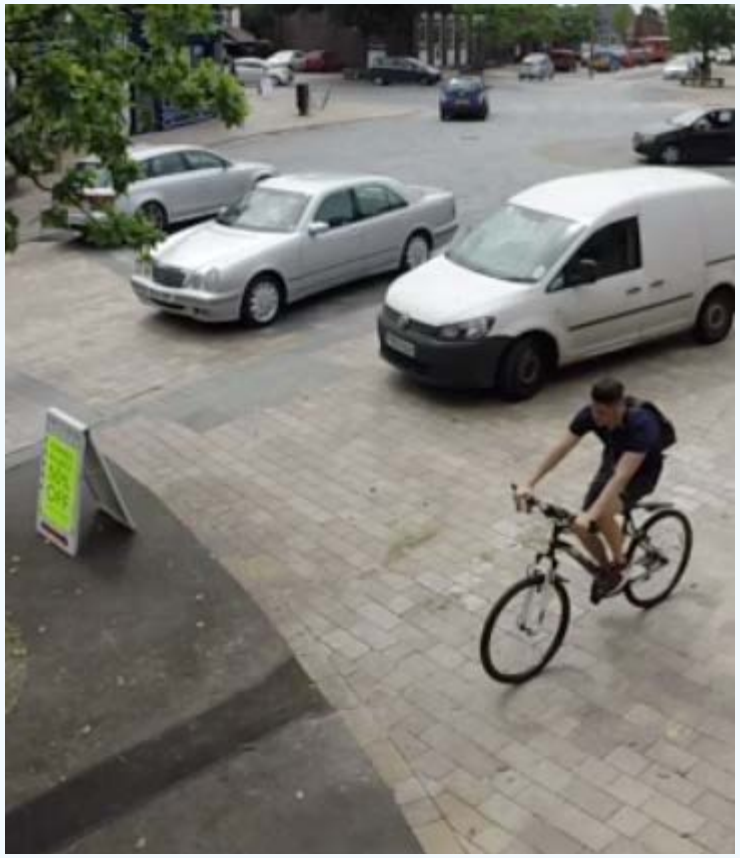


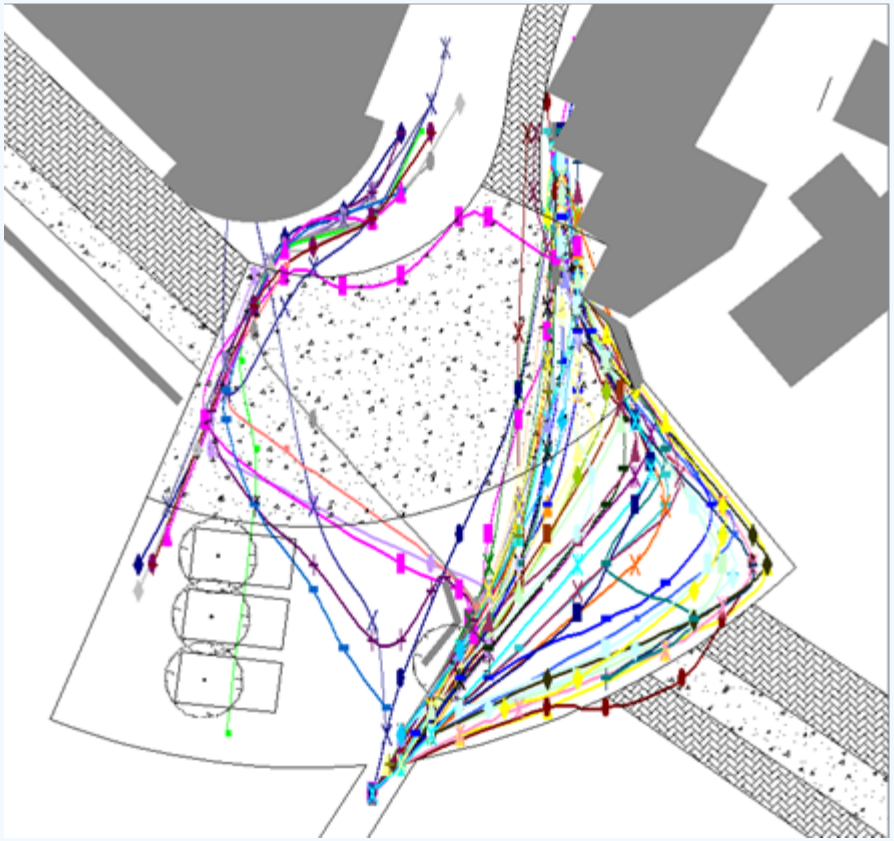
west to east

Southwest to northeast

Discussion

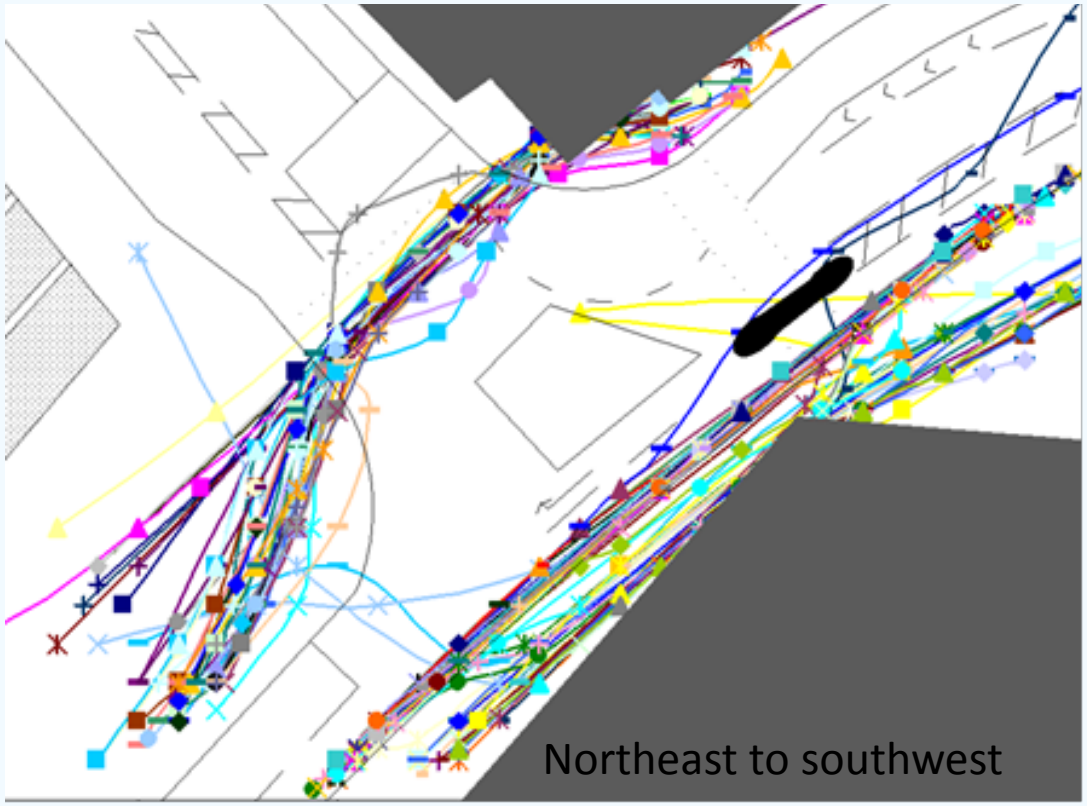
- Cyclists used the edges and crosswalks in both the control and shared spaces.
- Elements play a role





Discussion

- Crosswalk use
  - > sidewalk connector
  - Pressure relief zones
- Veering
  - General safe haven
  - Lateral movement
  - Increased deviation, number of nodes

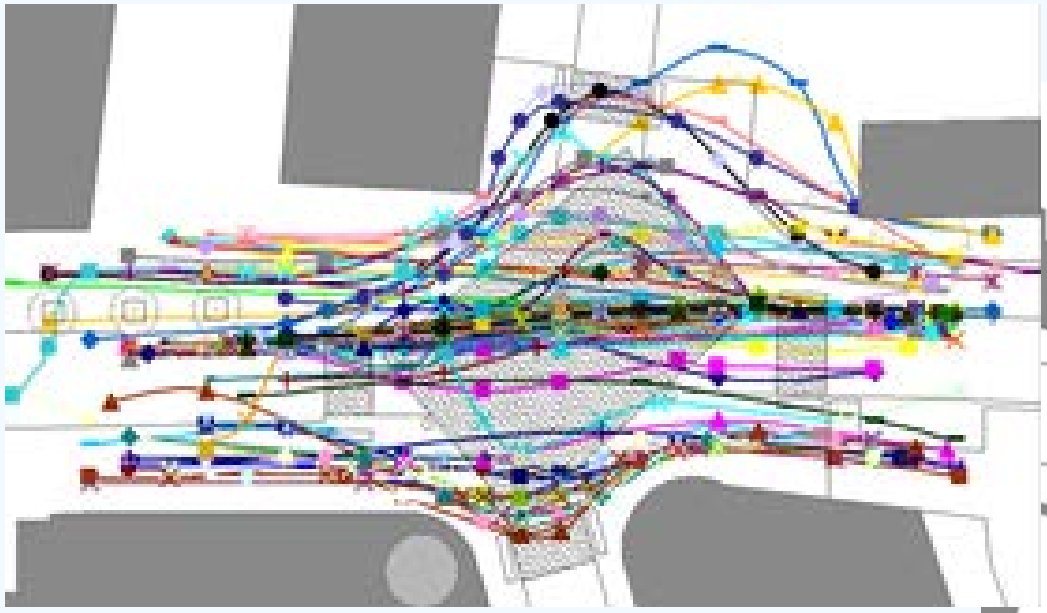


Hypotheses revisited

- No significant differences in paths ridden
  - Sidewalks, crosswalks
- Complex sites
  - Poynton vs Coventry

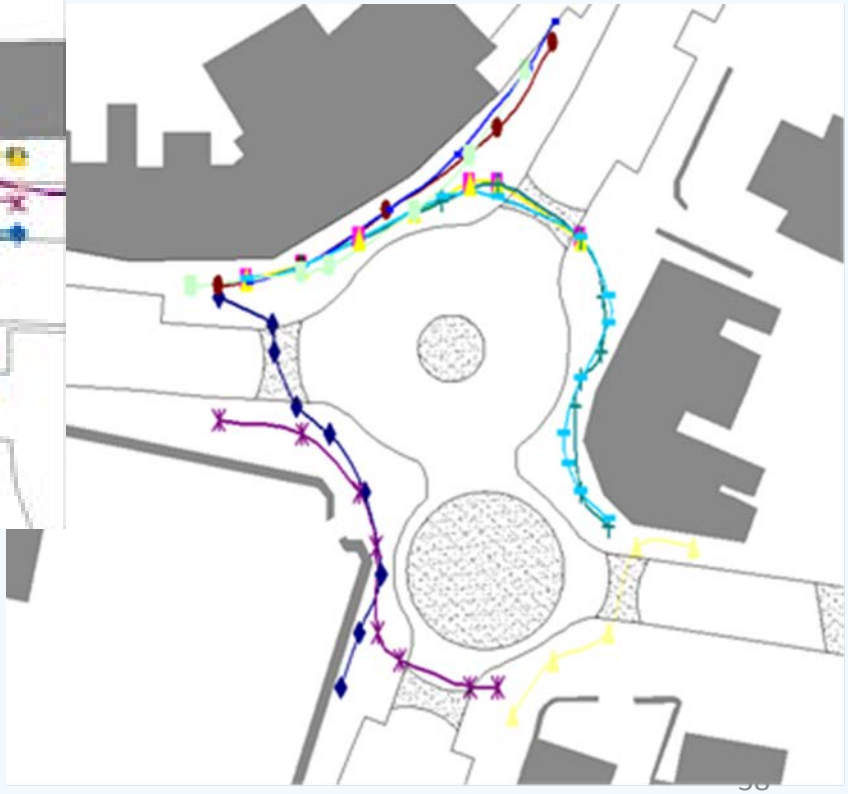
Summary

- Sidewalk and crosswalk use
  - Bicycle flexibility and versatility
  - Cyclist reluctance to ride as concept assumes



- The presence of a large sidewalk or additional plaza area expanded the rideable area

- When the space was available, many people chose to ride on it.



Contributions to practice and policy

- Bicycle riders want the space to avoid motor vehicles
- Provide room for lateral movement
- Integrate elements and landscaping
- Effective form of calming

Acknowledgements

This research was generously supported by a National Institute for Transportation and Communities Dissertation Fellowship.

Thank you

This research did not:

- Look specifically at intersection safety. Conflict and avoidance behaviors were only noted when obvious.
- Measure riding speed, time to cross, and time for drivers to yield.
- Look at driver behavior or pedestrian behavior.
- Look at variables such as age or clothing type.

Contributions to the literature

- Understudied mode
- Evaluation of cyclist movements on this scale
- Creation of a new, evaluative unit (nodes)
- Evaluation of street elements, furniture, and layout

Limitations

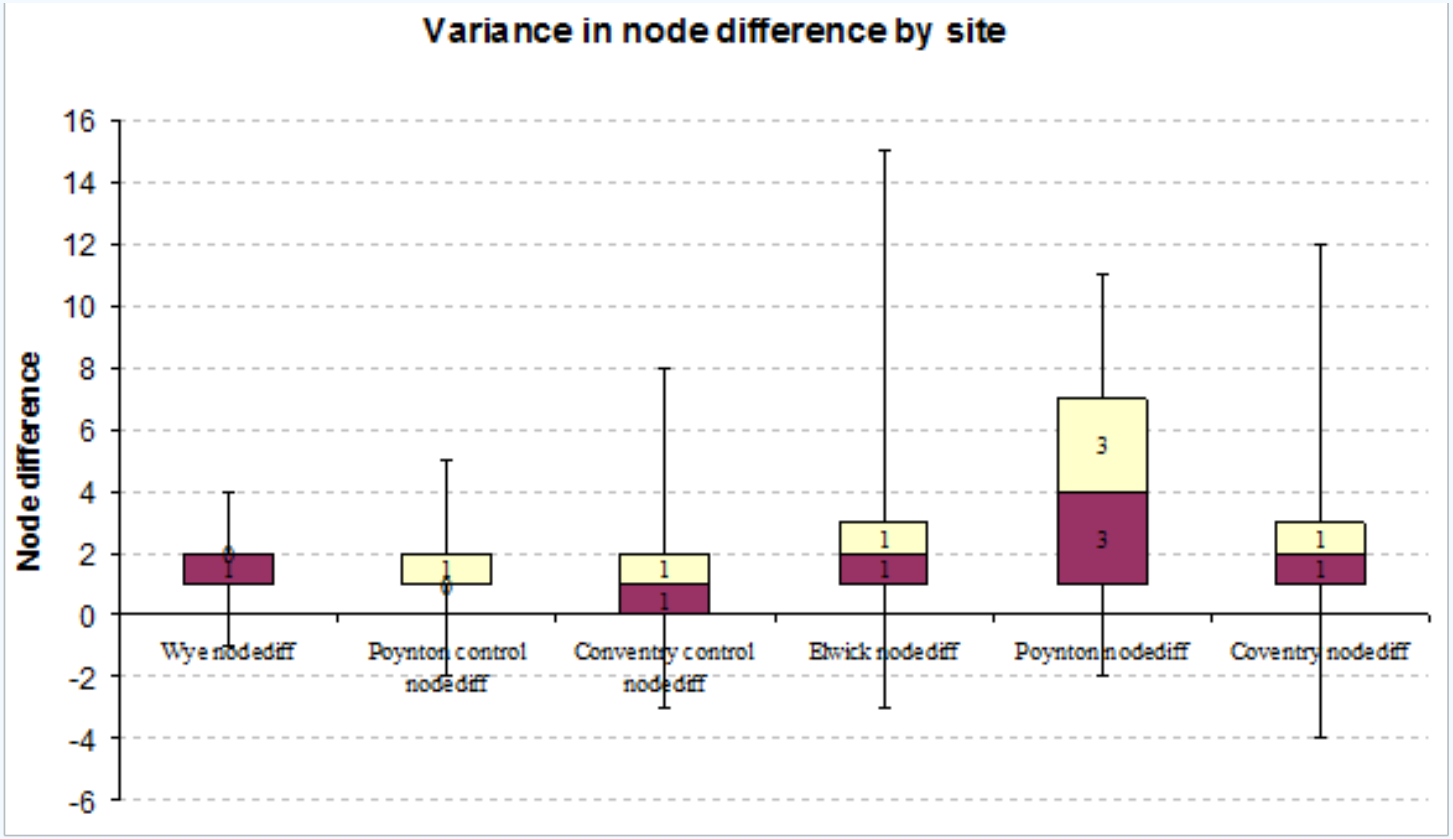
- Shared space projects are rare.
- Study sites were not ‘pure’ shared space designs.
- Two of the three control sites were eliminated.
- Video observations were limited by camera resolution as well as camera siting.
- It was difficult to evaluate the riding skill and confidence level.
- Node difference is not a perfect measure

Future research

- Comparative research at sites without marked crosswalks and segregated sidewalks including how drivers respond in sites lacking marked crosswalks.
- In-depth look at the placement of site furniture/elements and their impacts on cyclist behavior.
- Intercept surveys of cyclists who have just ridden through shared spaces to ask about their immediate experiences.

Variables		Total (n=1746)	Wye control (n=76)	Poynton control (n=195)	Coventry control (n=422)	Elwick Square (n=357)	Poynton (n=206)	Coventry (n=490)
Helmet use	Yes	39%	66%	87%	25%	18%	54%	38%
	Unk	14%	7%	3%	29%	9%	25%	7%
Gender	Male	48%	59%	64%	45%	45%	41%	48%
	Female	10%	24%	6%	8%	12%	7%	10%
	Unk	42%	17%	30%	47%	43%	52%	42%
Bike type	Flat bar	64%	53%	25%	68%	84%	39%	74%
	Drop bar	19%	37%	64%	10%	3%	35%	14%
Sidewalk use	Yes	53%	0	7%	64%	88%	62%	42%
Crosswalk use	Yes	19%	0	1%	33%	18%	25%	13%
	Veer	1%	0	0	0.5%	2%	0.5%	3%
Curb use	Curb cut	3%	0	0	7%	0	1%	3%
	jump	5%	0	1%	3%	0	7%	13%
Avoidance		2%	4%	0	3%	0.3%	0	4%
Conflict		0.5%	1%	0	0.2%	0.6%	0	1%
Walk comp		1%	0	0	1%	2%	3%	2%

Observational results: selected variables



Observational results: nodediff