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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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12 February 2016
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.)
What are shared space goals?

- Traffic calming
- Increased perception of risk
- Democratization of space
- Equal priority for all modes
A Path to Road Safety With No Signposts

By SARAH LYALL  JAN. 22, 2005

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

Number of articles on shared space

- General Shared Space lit: 17 articles
- Pedestrian specific: 4 articles
- Visually-impaired: 3 articles
- Bike specific: 2 articles
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

Observed: $n = 9$ nodes
Ideal: $n = 4$ nodes

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

Coventry, north to south OD
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
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

![Bar chart showing mean node difference per OD]

Northwest to southwest

Northeast to southwest
Elwick Square (shared)
Poynton (shared)

Mean node difference per OD:

- 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

Northeast to southwest
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

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

• The presence of a large sidewalk or additional plaza area expanded the rideable area
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.
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<th>Wye control (n=76)</th>
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<th>Coventry control (n=422)</th>
<th>Elwick Square (n=357)</th>
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Observational results: selected variables

Variance in node difference by site

[Graph showing variance in node difference by site with specific site names and values]
Observational results: nodediff

Control vs Shared: mean node differences

Control vs Shared: Coefficient of variation