Using Google Street View to Implement Community Audit Tools: The Pedestrian Environment Data Scan

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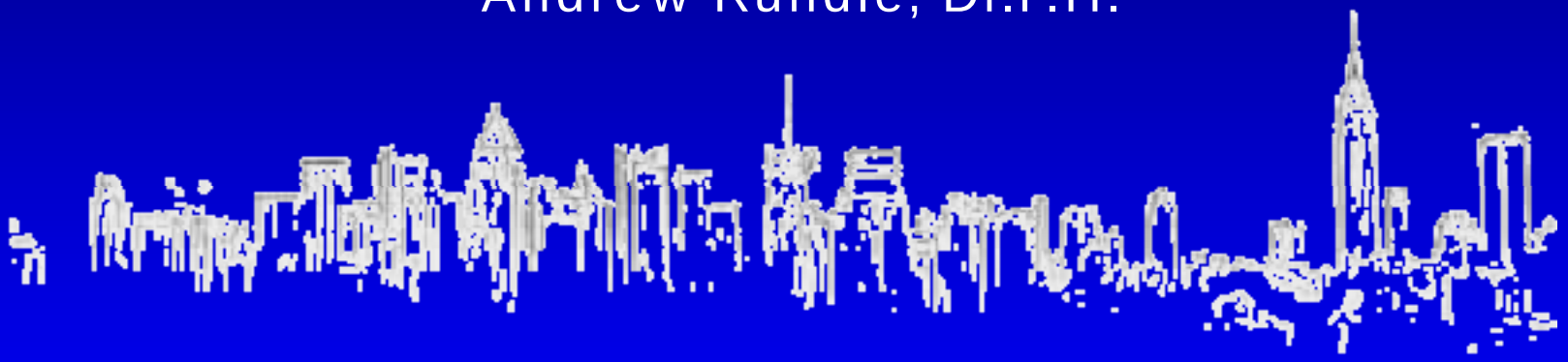

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In-Person Observational Audits to Measure Neighborhood Built and Social Environments

- ALR has funded the development and validation of several observational audits.
  - Can capture nuanced aspects of neighborhood environments.
  - Researchers determine the relevant aspects to measure.
  - Systematic observations permit reliable comparisons across neighborhoods.

Weaknesses of In-Person Observation

- Often sampling and logistical constraints dictate the size of an area that can be observed, and thus define neighborhood boundaries.
- Indices often developed from relatively sparse samples of neighborhood environments.
- Expensive to collect.

Factors in Cost of In-Person Observation

1. Time observing the neighborhood.
   (Relatively fixed cost)

2. Transcribing and cleaning after returning from the field.
   (Ways to fix & minimize costs)

3. Travel time to and from the neighborhood.
   (Most expensive aspect and costs increase non-linearly with area being studied)

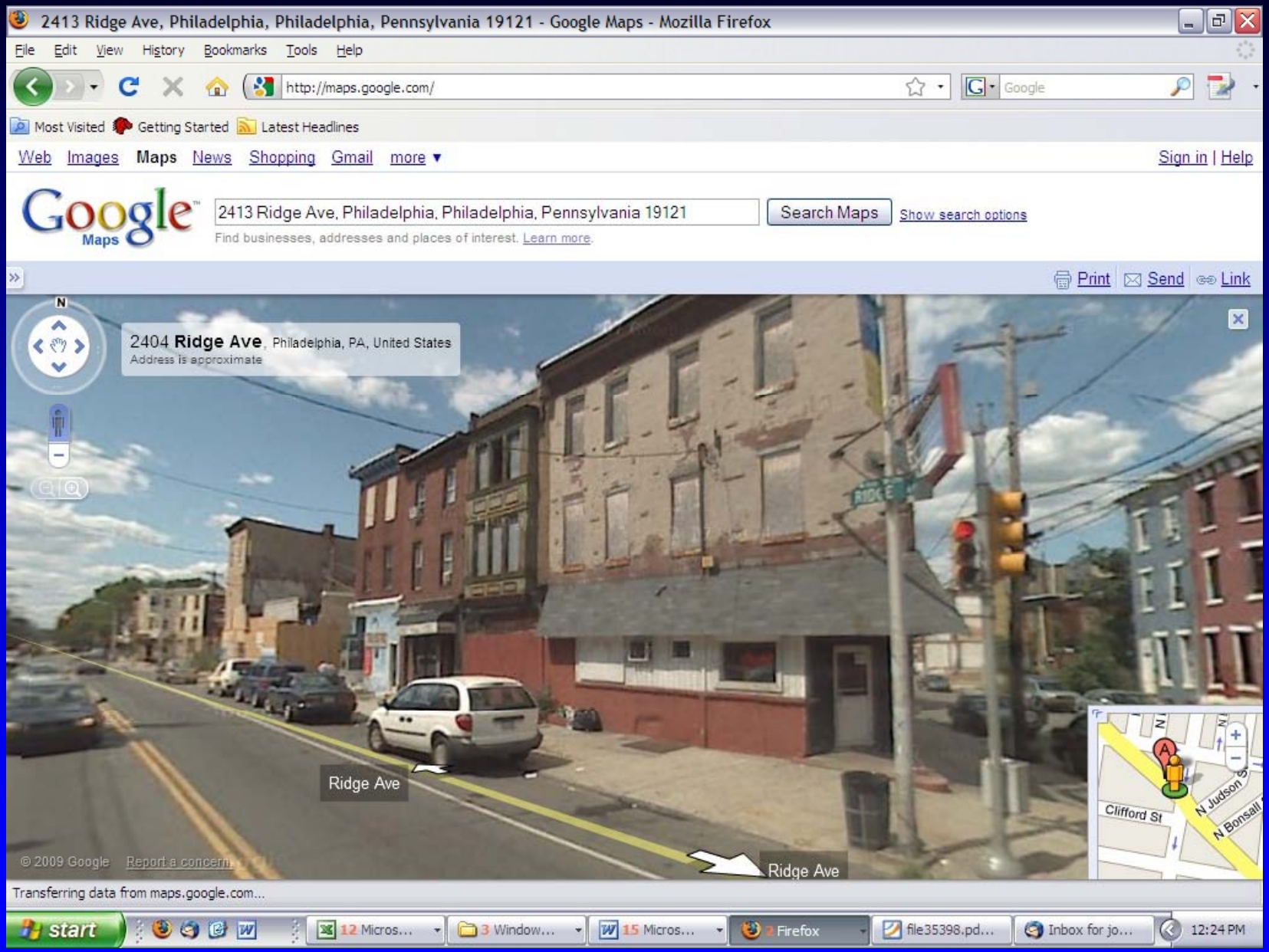
Industrializing “In-Person” Observations

Rather than sending people into the field, can digital technology be used to gather equivalent data?

- In prior work we have used GIS tools and geospatial data to implement Ewings’ Urban Design Inventory. [Purciel, JEP 2010]
- What if we used Google’s Street View to virtually send auditors into the field instead?

Questions for Assessing Virtual In-Person Observation

1. What is the quality of Google Street View imagery?
2. Is the inter-rater reliability on items comparable between “street viewed” and in-person viewed ratings?
3. How comparable are the measures obtained from either method?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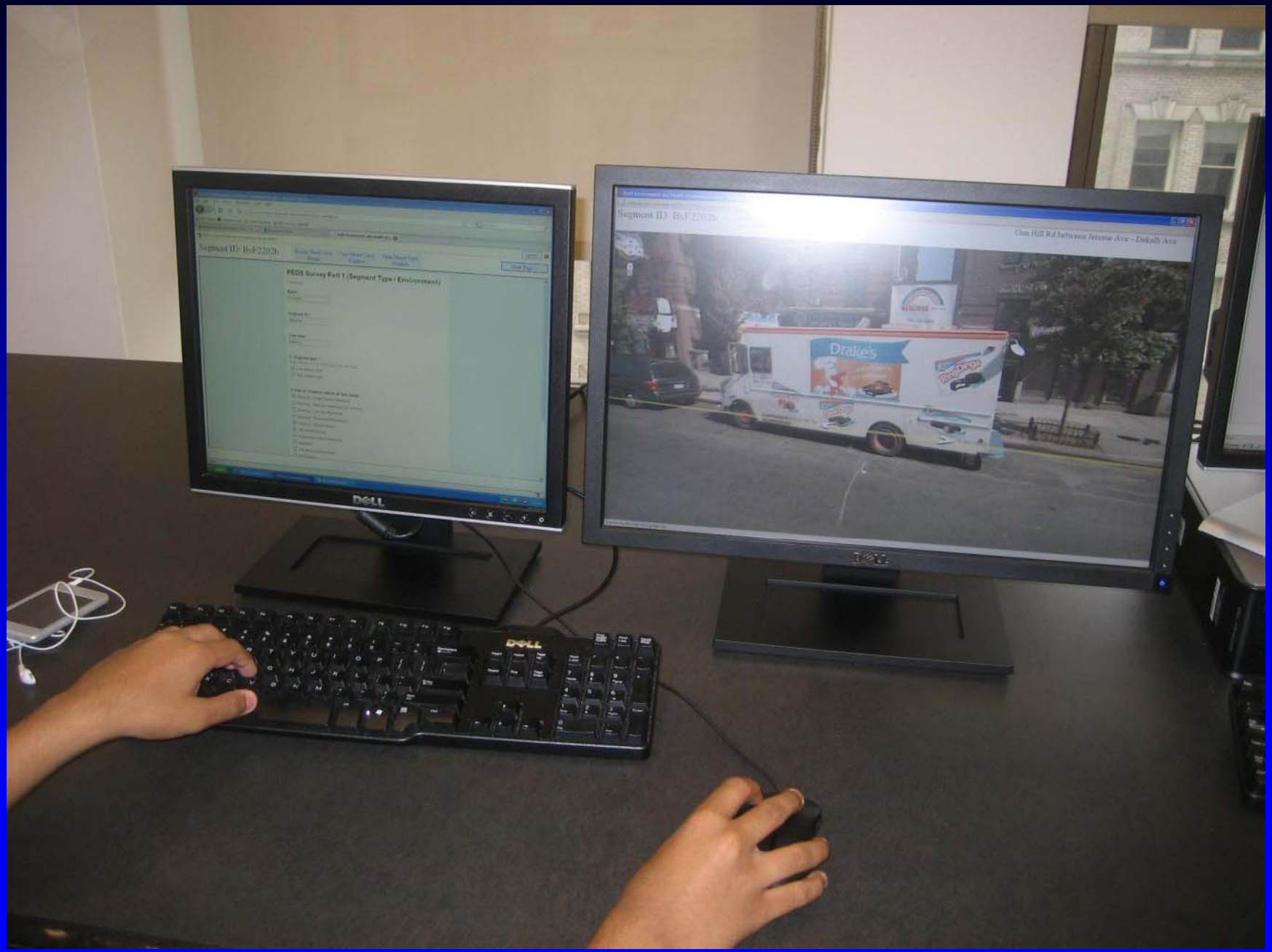
Street View Pilot Study

- 5 H.S. interns & 1 H.S. teacher.
  - Data from 1 intern dropped due to absence from in-person viewing.
- Observed 74 block faces from highly-walkable streets. [Neckerman, JPHP 2009]
  - Each face observed once on Street View & once in person by each intern.
  - All but one block face observable on Street View.

Street View Pilot Study

- Observation Instrument
    - Pedestrian Environmental Data Scan (PEDS) by Clifton et al., measures features of walkability.
- Computer Interface
    - Google Street View interface that served block faces to interns in a random order.
    - PEDS implemented via Google Forms.
- In-person observations were done with High School teacher supervision.


PEDS Survey Part 1 (Segment Type / Environment)
Drake's
DELL


MINI
MARKET

Costs of In-Person Audits Per Intern

- Travel time: 1,972 min. (~33 hrs.)
- Rating time: 616 min. (~10 hrs.)
- Lunch/break time: 322 min. (~5.5 hrs.)

21% of “billable hours” devoted to rating block faces.

Quality of Google Street View Images

Images Quality Issues

Obstruction Issue	% of block faces	0 Attest (block faces)	4 Attest (block faces)
Weather	6-14%	55	2
Shade	7-14%	54	1
Broken video feed	1-15%	54	0

Quality of Google Street View Images

Physical Obstructions of view

Physical Obstruction	% of block faces	0 Attest (block faces)	4 Attest (block faces)
None	10-32%	34	3
Obstruction Type			
Traffic	27-42%	29	6
Parked cars	32-70%	12	5
Parked trucks	15-34%	35	3
Trees	8-24%	50	1
Scaffolding	1-10%	64	1

Inter-Rater Reliability Within Methods

Amenities	Kappa (SV)	Kappa (IP)
Street Amenities		
Public garbage cans	0.55	0.40
Trees	0.84	0.36
Other Plants	0.04	0.16
Food Cart	0.48	0.55
Fruit / Veg Stand	0.15	0.66

Between-Method Reliability

Amenities	Kappa	% Agree
Street Amenities		
Public garbage cans	0.29	0.88
Trees	0.56	0.78
Other Plants	0.38	0.72
Food Cart	0.41	0.95
Fruit / Veg Stand	-0.01	0.97

Inter-Rater Reliability Within Methods

Amenities	Kappa (SV)	Kappa (IP)
Street Safety		
Traffic Lights	0.46	0.43
Stop Sign	0.79	0.47
Pedestrian Signal	0.60	0.52
Pedestrian Crossing Sign	0.50	0.40
Tree Buffer Between Cars and Pedestrians	0.83	0.84

Between-Method Reliability

Amenities	Kappa	% Agree
Street Safety		
Traffic Lights	0.59	0.92
Stop Sign	0.73	0.98
Pedestrian Signal	0.58	0.96
Pedestrian Crossing Sign	0.55	0.84
Tree Buffer Between Cars and Pedestrians	0.77	0.88

Inter-Rater Reliability Within Methods

Amenities	Kappa (SV)	Kappa (IP)
Bike Facilities		
Bike Lane	0.71	0.61
Bike Rack	0.09	0.41
Bike Route Signs	0.49	0.32
No Bike Facilities	0.50	0.43
Bus Facilities		
Bus Stop w/ Shelter	0.58	0.79
Bike Stop w/ Sign only	0.49	0.41
No Bus Facilities	0.61	0.65

Between-Method Reliability

Amenities	Kappa	% Agree
Bike Facilities		
Bike Lane	0.55	0.97
Bike Rack	0.07	0.88
Bike Route Signs	-0.01	0.96
No Bike Facilities	0.29	0.84
Bus Facilities		
Bus Stop w/ Shelter	0.44	0.88
Bike Stop w/ Sign only	0.42	0.83
No Bus Facilities	0.58	0.82

Conclusions

- Block faces are commonly partially obscured, but raters disagree on this.
- Kappas and percent agreement for Street View and in-person observation are consistent with those reported by Clifton et al.
- Reliability of items designed to be seen from the roadway appear higher for Street Viewers.
- Items not typically on the blocks during image capture are problematic.
- Hard to identify small items, like types of garbage or litter.

Collaborators

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