Estimating Time and Cost Sensitivity in New Yorker's Transport Decisions:

Evidence from the Second Avenue Subway

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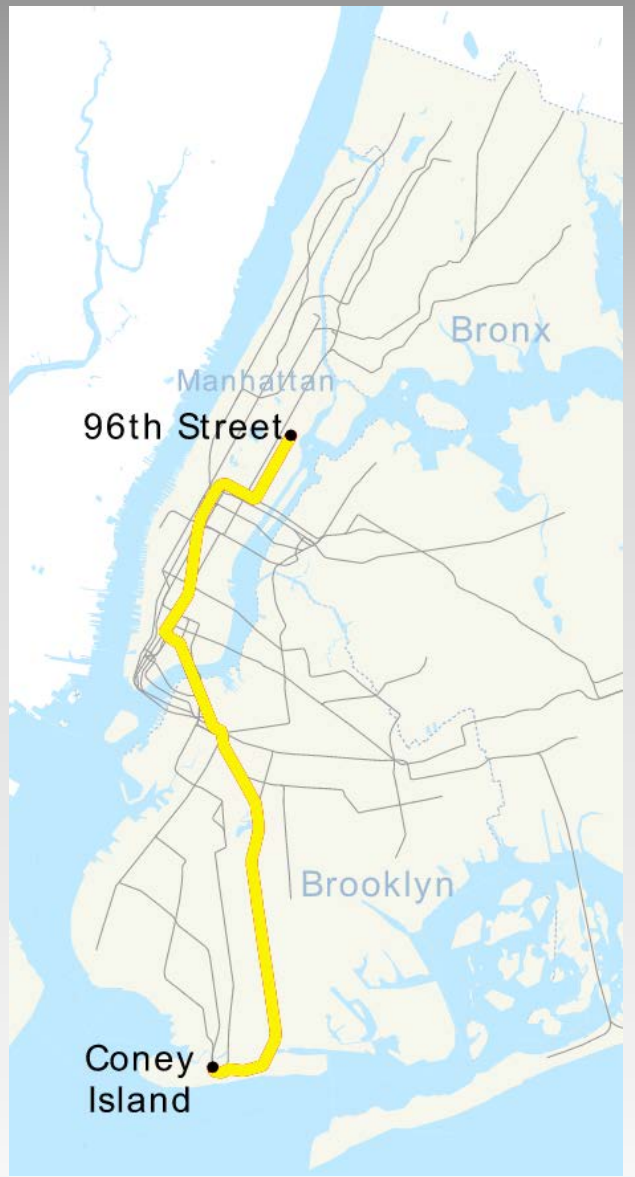
10/18/2017

SUMMARY

- **Background** :
  In January 2017, three subway stations opened on the Upper East Side as part of the long-awaited Second Avenue Subway.

- **What we want to do:**
  - use high-resolution transport and weather data
  - to understand how the subways affected New Yorkers' decisions on what mode of transport to take.

- **Why choose these new stations:**
  - as a 'natural experiment'
  - to get new estimates of customer's demand functions for different modes of transportation
  - In futue: it will be helpful for transport planning such as the siting of new stations.



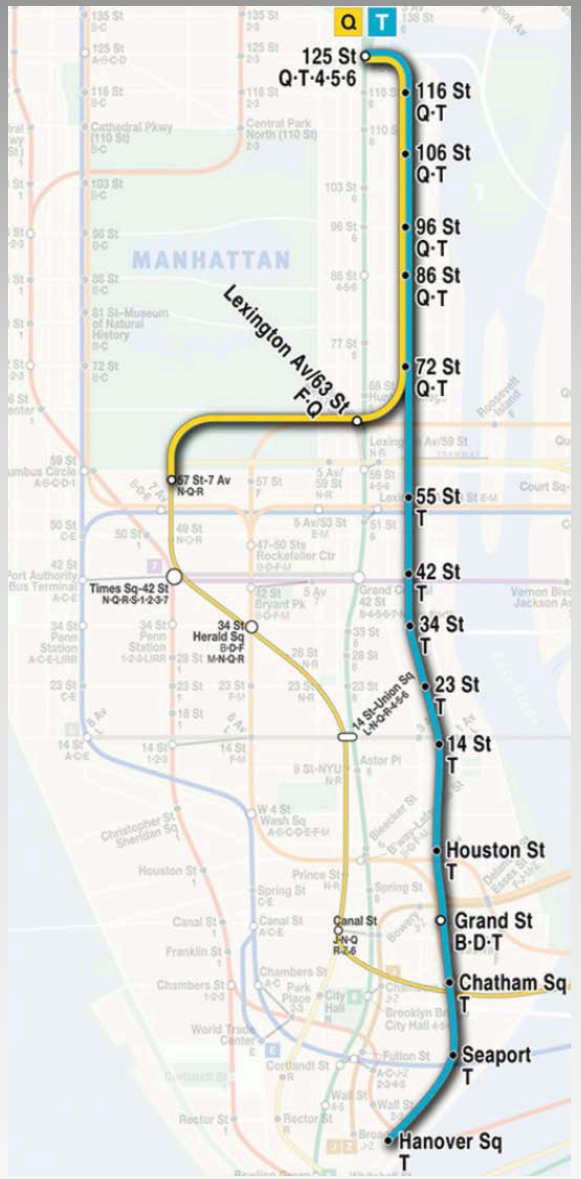
RESEARCH QUESTION

- **Team Interest:**
  how the mobility of the neighborhood was affected by the opening of the new subway stations

- **To Understand this:**
  - Investigate taxi pick-ups and drop-offs in the surrounding area
  - Investigate how distance from subway station affects the number of pick-ups.

- **Hypothesis: There are differences in average taxi pick-up numbers between neighborhoods with/without new subway station**

- We will test for the existence of this distance to subway effect



WHY IS IT IMPORTANT

- **Multimodal transport**
- choose between subway, taxi, (bus, Uber, walking and cycling)
- aims to promote quick and easy mobility, at low cost

- **Data-based transportation planning**
- important to use data and evidence for transport planning (subways are extremely expensive)
- distance sensitivity of demand for subway trips vis-a-vis taxi trips will be helpful for MTA planning decisions (eg. Station distance)

DATASET

Data type	Accessibility and description
TLC Trip Record Data	• Variables of interest include pick-up time, drop-off time, trip distance, longitude, and latitude. • Data is high spatial and temporal resolution.
Weather data	• Customized historical and real-time weather datasets are available.
Maps	• Subway entrances • Subway stations • Subway lines

METHODS

1. Two parts: Outbound trips & Inbound trips

2. Before & after the Second Avenue Subway was opened

- Before: January 1 – July 1 2016
- After: January 1 – July 1 2017

3. Variables

- Pick-up location
- Destination
- Trip duration
- Pick-up time
- Weather condition

METHODS

4. Approaches

i)Hypothesis testing

- **Test group**: neighborhoods have new stations
- **Control group:** the Upper East Side between 60th – 70th St
- **t-test**: Test the differences of mean pick-up/drop-off numbers of different neighborhoods during rush hour.
- **Chi-square test**: test the differences of pick-up/drop-off numbers of different neighborhoods under different weather conditions.

ii)Regression

- The distance of pick-up locations to subway stations
- Destination
- Weather condition
- Pick-up time

iii)Cluster analysis

- Different neighborhoods' times series of pick-up/drop-off numbers

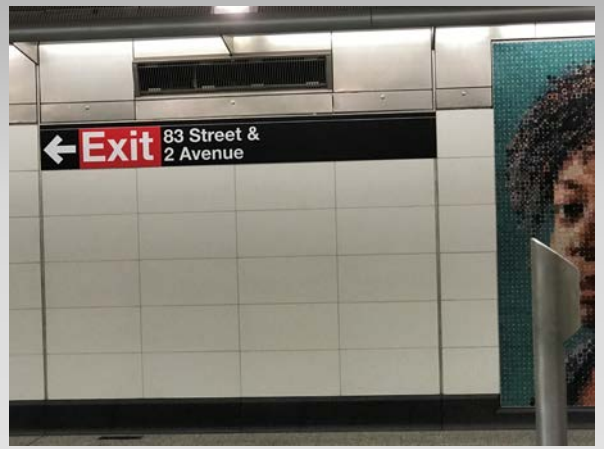
ANTICIPATED ROLES

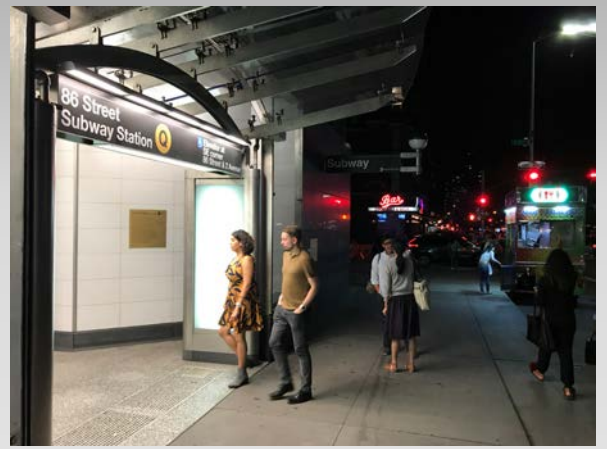
- **Hao:**
  GIS lead, data collection, data wrangling

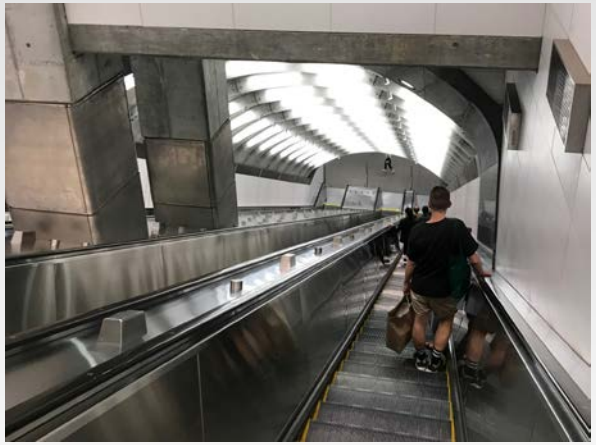
- **Fangshu:**
  Literature review, data collection, data analysis, model building

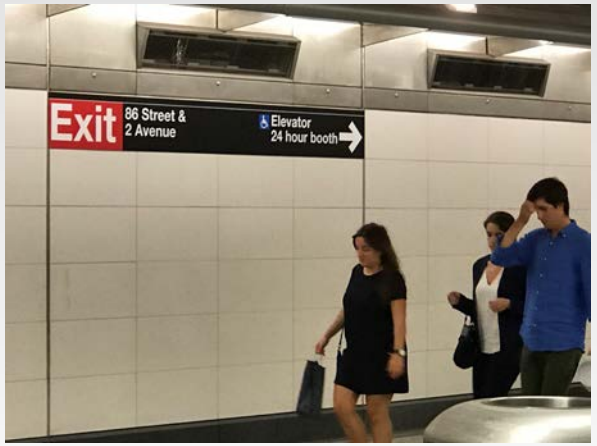
- **Guobing:**
  Data collection, data analysis, model building, visualization

- **Nick:**
  Literature review, data collection and analysis, model building









photography work by Nick

Thank You！

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