Empirical evidence of habits and patterns in public transport use

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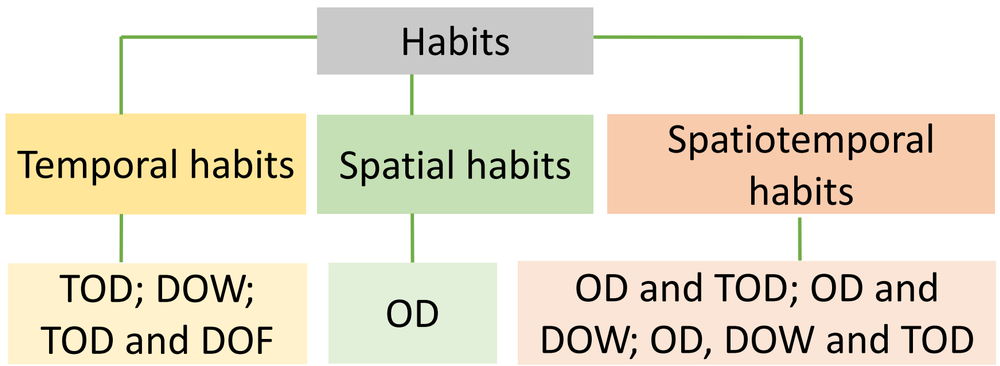
Motivation

- Many transit trips are repeated; and some repeated trips are habits
- Habits are predictable demand so we can use them to plan our system better
- Habits are the baseline against which we identify and quantify disruption

Objectives

- What fraction of travel is habitual?
- How can we measure habits?
- How do travel habits change after a disruption?

Habits and patterns



TOD = time of day, DOW = day of week, OD = Origin-destination

Table 1: Matrix of measures of the dimensions of habit.

	User	Habit	System
Duration	$D_{k,n}$		
Intensity	$I_{k,n}$	I_k	I_N
Extensivity	$E_{k,n}$	E_k	E_N
k= type of habit, n= unique user, N= population			

- There are 31,092,442 habitual trips from 269,018 unique card users in 4 years (January 2016 - December 2019) in Canberra
- Weekend trips are less habitual than weekday trips
- At the highest level, habitual travel accounts for 44% of the trip-level demand on the network
- 60% of all card users demonstrate at least one habitual behaviour in the data. By either measure, the extent of habitual behaviour is substantial and accounts for a large fraction of transit travel

Study area and data

- This study analyses MyWay card users over 5.5 years (Jan 2016 -Jul 2021)
- This data includes 186 million trips from 563,509 unique card IDs
- There are 2443 bus stops serving 64 bus routes
- This data shows patterns in the overall travel demand and shifts in transit use for individual users

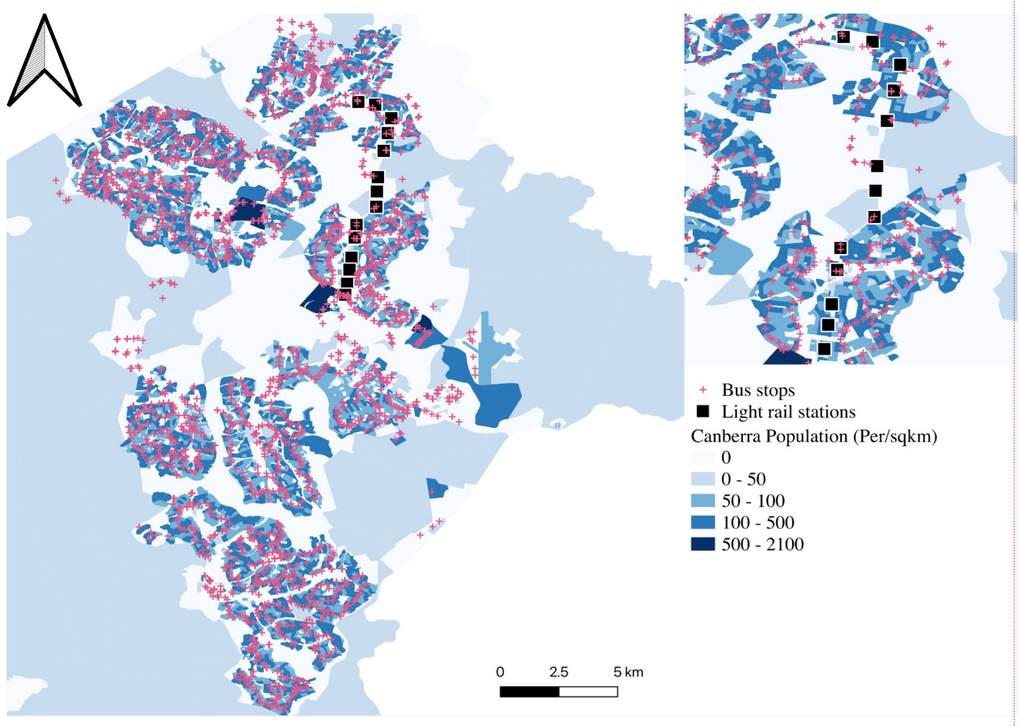


Fig 1: Map of bus stops and light rail stations of Canberra. Canberra is a planned city with bushland reserves separating town centres.

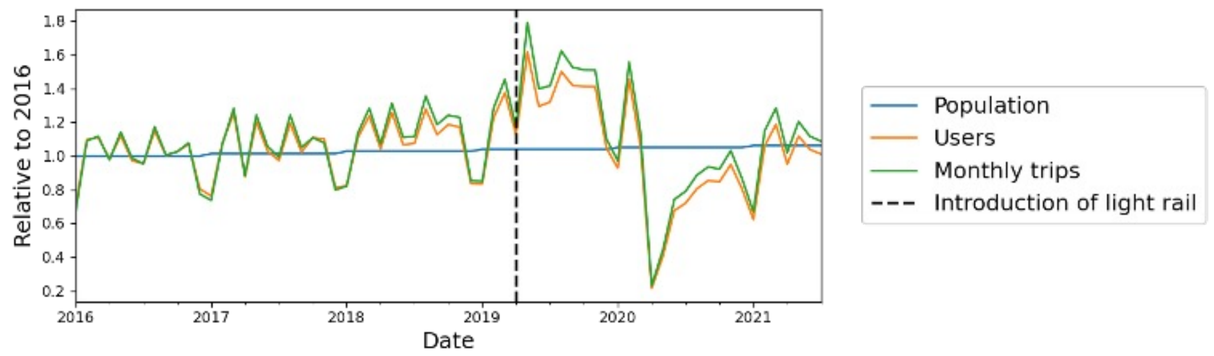


Fig 2: Population, number of trips and MyWay card users in 5 years indexed to January 2016.

Home location and relocation

Fig 3: Sample home location of people including most frequent stops, K-means clustering and DBSCAN centroid.

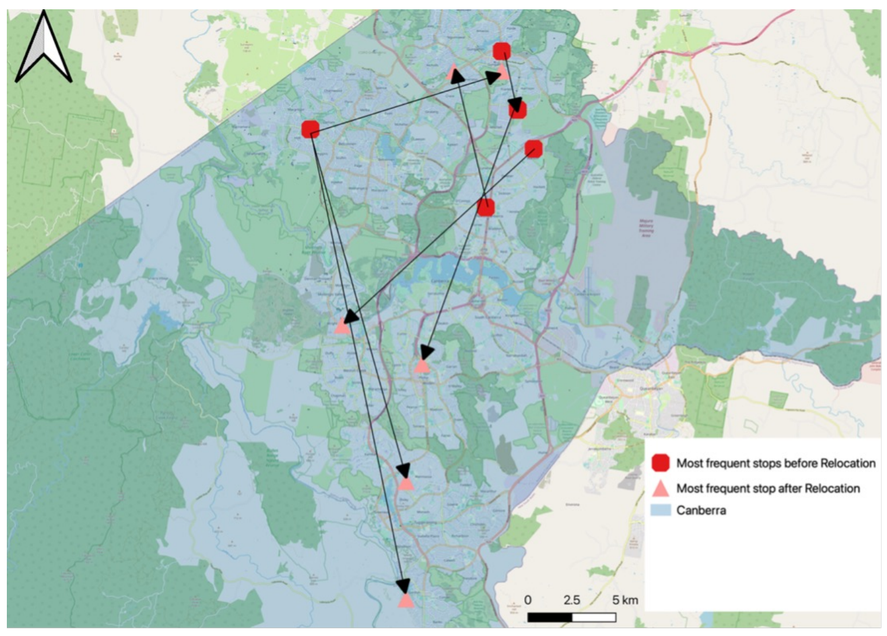


Fig 4: Changes of the most frequent stops of five smartcard users in 5.5 years.

Introduction of light rail

- The net increase of new card IDs in the year of the light rail opening was 48% higher than the average growth of 73,739 new card IDs in a year
- Users who increased their overall use of public transport after the introduction of light rail, represent a close distribution around the corridor
- 86.12% of super users of light rail live within a 1 km radius of the light rail stations

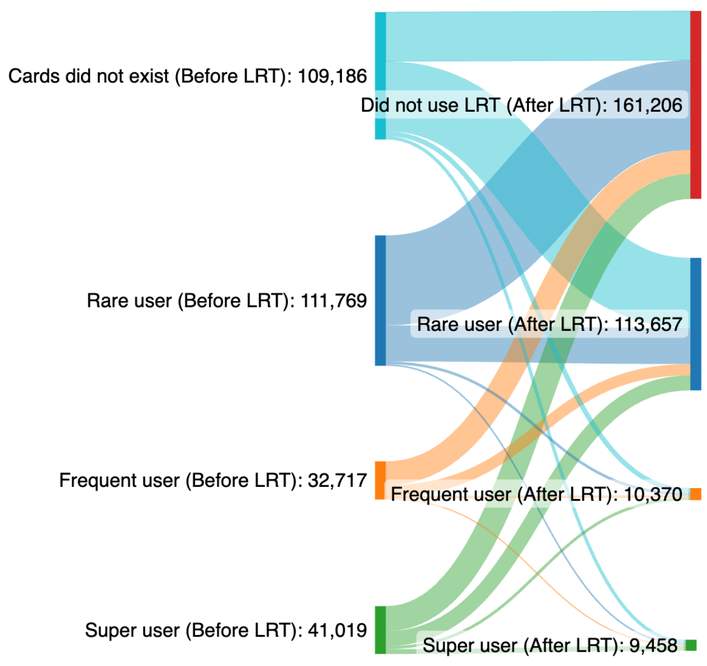


Fig 5: Flow distribution of user category nine months before and nine months after the introduction of light rail for LRT use.

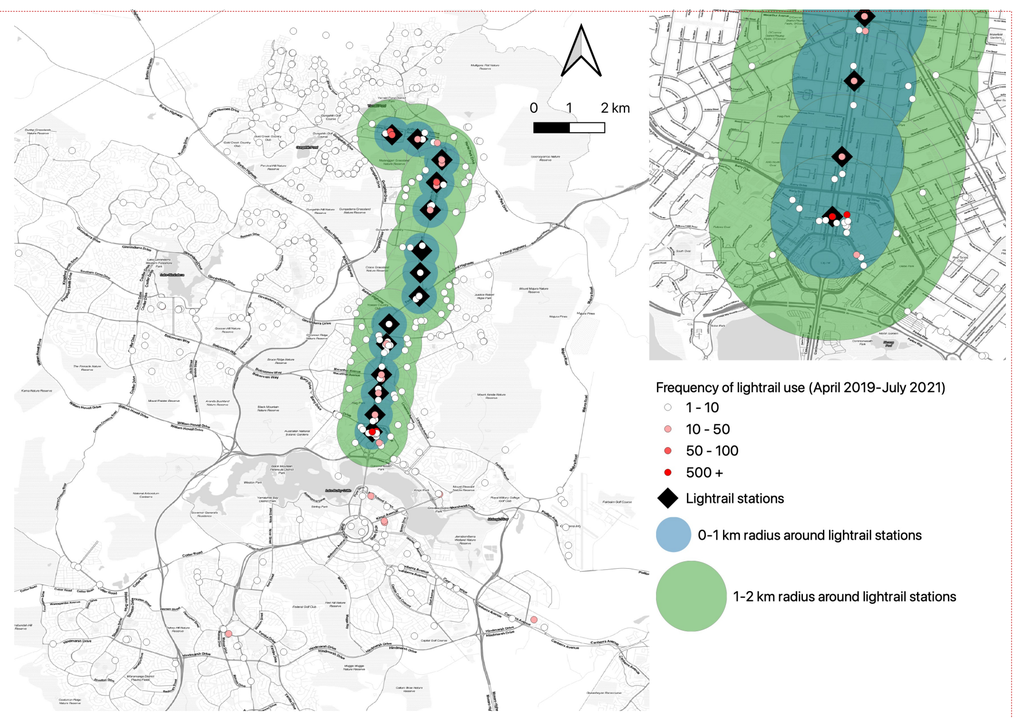


Fig 6: The distribution of the most frequent terminal stops of the super users of the light rail.