

Course Introduction

GGR424 - Transportation Geography & Planning

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University of Toronto

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Today:

- ▶ Introductions
- ▶ Why study transportation?
- ▶ Course Outline
- ▶ Core Concepts
- ▶ Mode prioritization

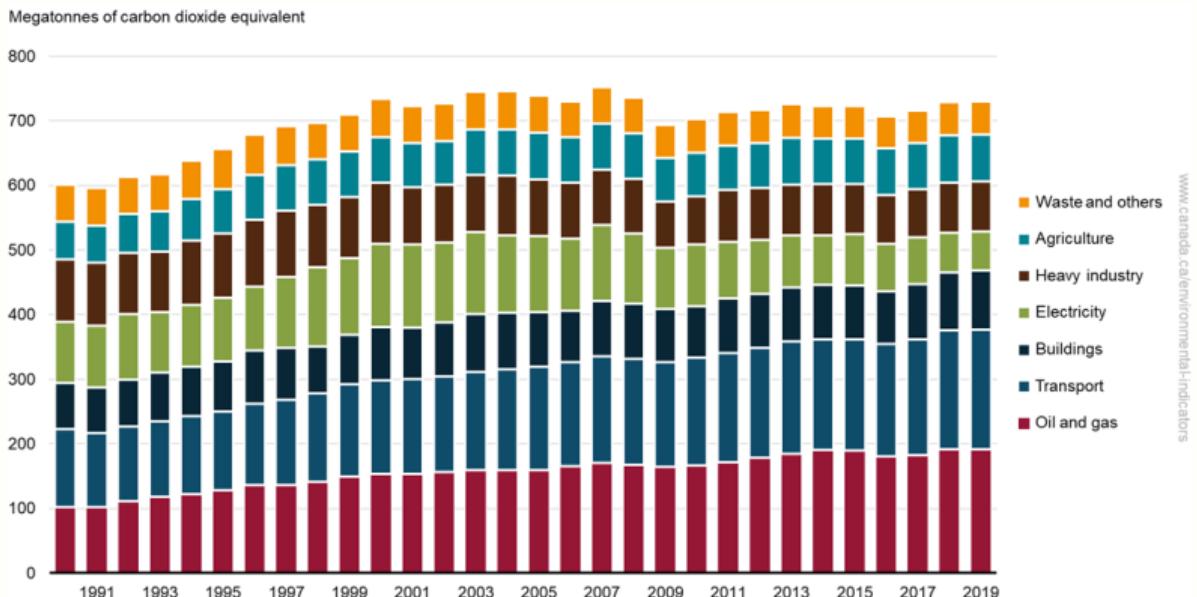
Introductions:

About Me

- ▶ PhD Candidate in Geography
- ▶ Researches Urban Geography, Transportation, & GIS
- ▶ Cartography / Data Science Consulting

Why Study Transportation?

Why Study Transportation? Environment

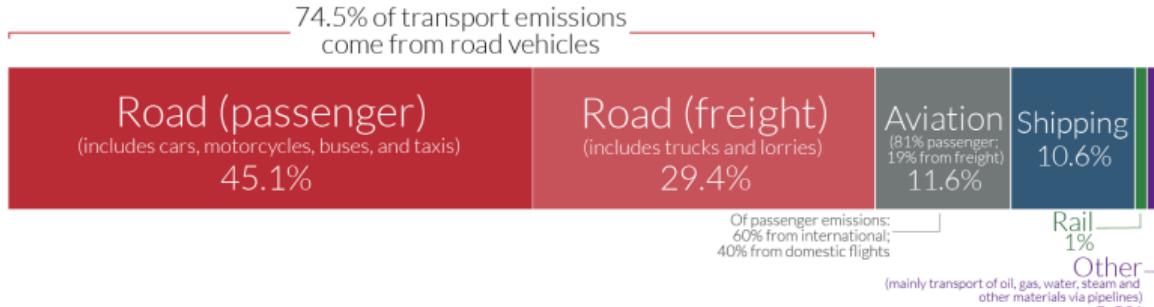


Why Study Transportation? Environment

Global CO₂ emissions from transport

This is based on global transport emissions in 2018, which totalled 8 billion tonnes CO₂. Transport accounts for 24% of CO₂ emissions from energy.

Our World
in Data



[OurWorldinData.org](https://ourworldindata.org/) - Research and data to make progress against the world's largest problems.
Data Source: Our World in Data based on International Energy Agency (IEA) and the International Council on Clean Transportation (ICCT).

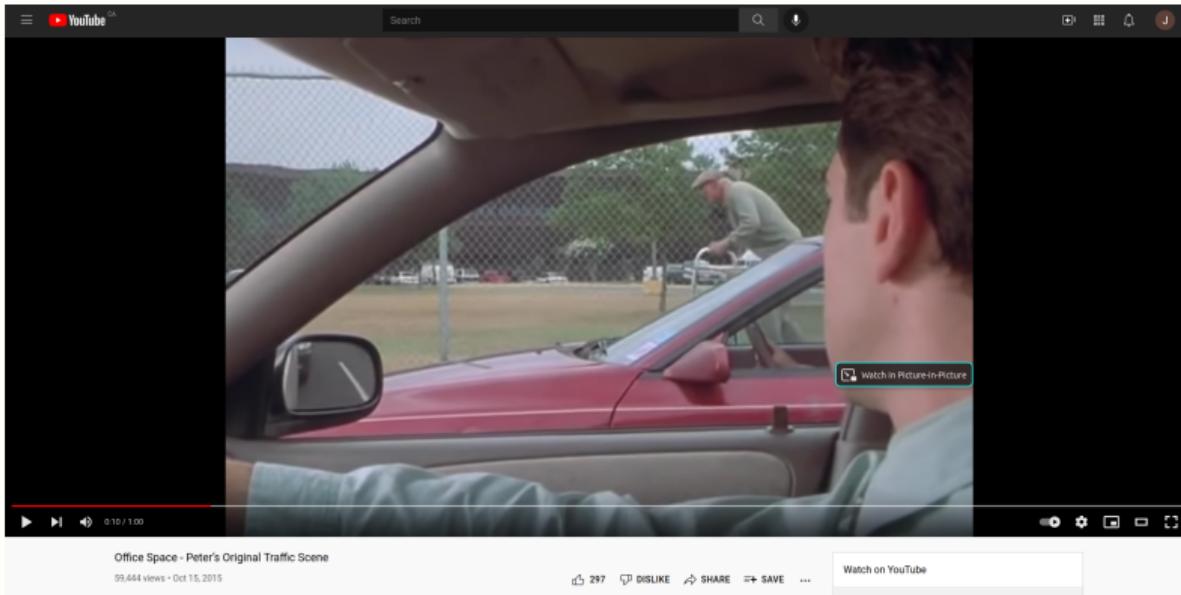
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Why Study Transportation? Congestion



<https://www.shutterstock.com/video/clip-18150214-toronto-ontario-canada-july-2015-epic-rush>

Why Study Transportation? Congestion

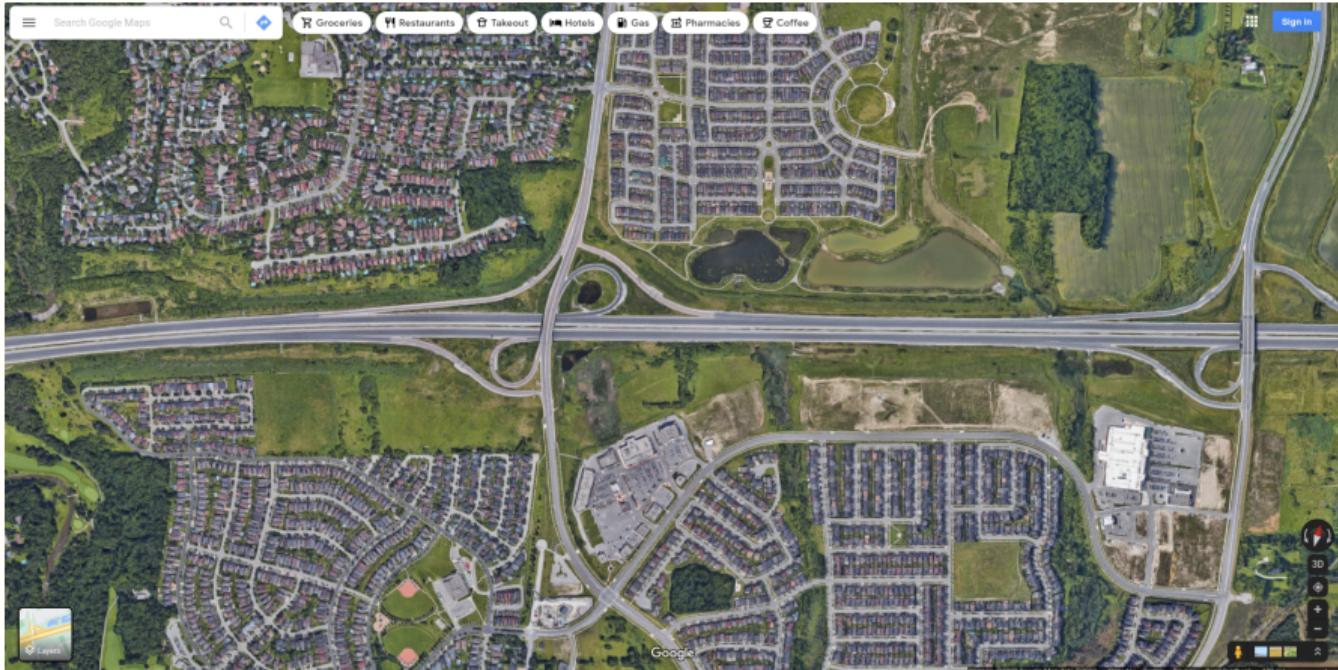


<https://www.youtube.com/watch?v=LcCdB46MybQ>

Why Study Transportation? Land Use



Why Study Transportation? Land Use



Why Study Transportation? Land Use



International Journal of
*Environmental Research
and Public Health*



Article

Associations between Urban Sprawl and Life Expectancy in the United States

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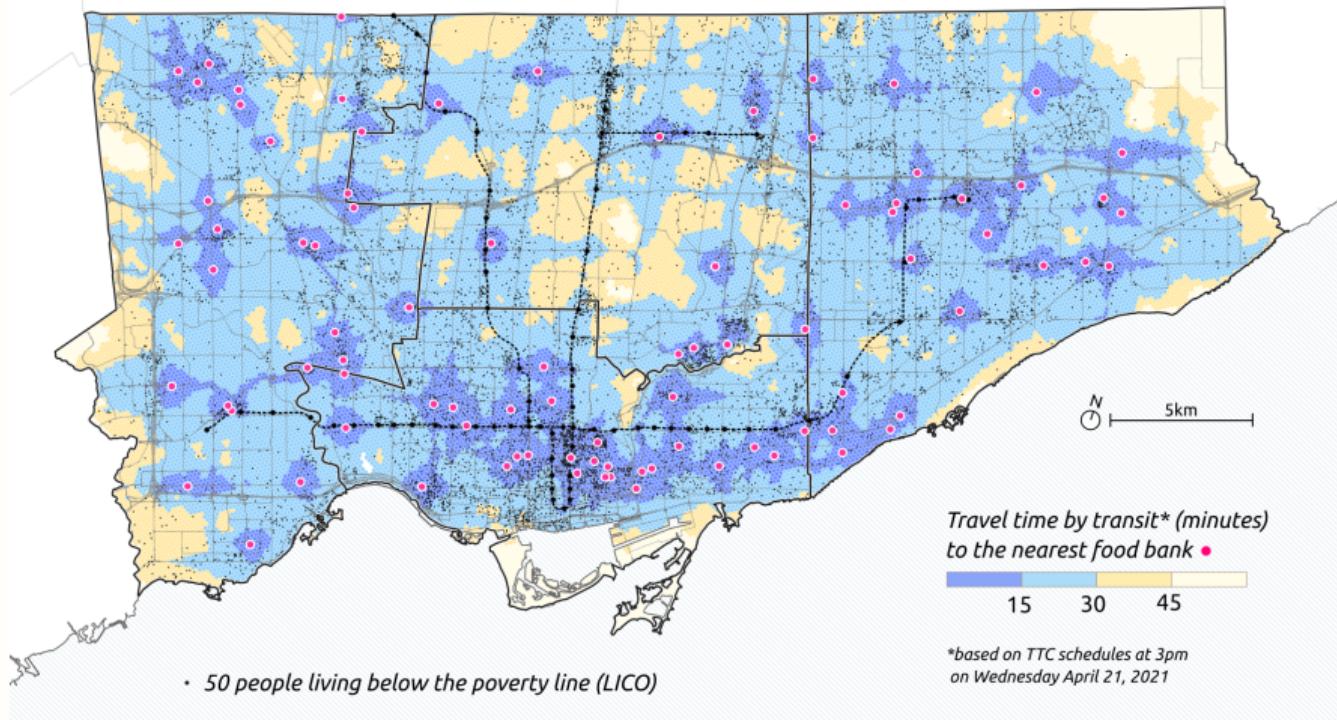
Abstract: In recent years, the United States has had a relatively poor performance with respect to life expectancy compared to the other developed nations. Urban sprawl is one of the potential causes of the high rate of mortality in the United States. This study investigated cross-sectional associations between sprawl and life expectancy for metropolitan counties in the United States in 2010. In this study, the measure of life expectancy in 2010 came from a recently released dataset of life expectancies by county. This study modeled average life expectancy with a structural equation model that included five mediators: annual vehicle miles traveled (VMT) per household, average body mass index, crime rate, and air quality index as mediators of sprawl, as well as percentage of smokers as a mediator of socioeconomic status. After controlling for sociodemographic characteristics, this study found that life expectancy was significantly higher in compact counties than in sprawling counties. Compactness affects mortality directly, but the causal mechanism is unclear. For example, it may be that sprawling areas have higher traffic speeds and longer emergency response times, lower quality and less accessible health care facilities, or less availability of healthy foods. Compactness affects mortality indirectly through vehicle miles traveled, which is a contributor to traffic fatalities, and through body mass index, which is a contributor to many chronic diseases. This study identified significant direct and indirect associations between urban sprawl and life expectancy. These findings support further research and practice aimed at identifying and implementing changes to urban planning designed to support health and healthy behaviors.

Why Study Transportation? Inequality



Why Study Transportation? Inequality

Transit Accessibility to Food Banks in May, 2021



Why Study Transportation? Injuries and Death

The Washington Post
Democracy Dies in Darkness

CA\$0.99 every four weeks

Sign in

This article is more than 1 year old

Transportation

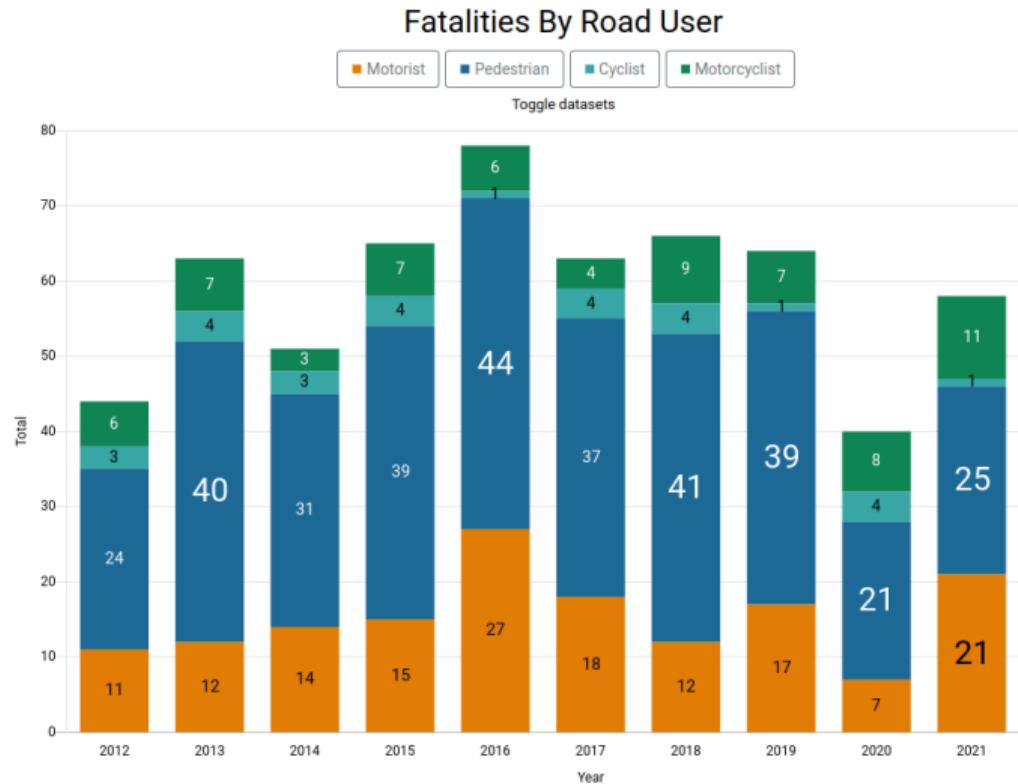
More Americans have died in car crashes since 2000 than in both World Wars



Emergency personnel work at the scene of fatal crash along Interstate 465 in Indianapolis on July 14. (Rita L. Reith/Indianapolis Fire Department/AP)

https://www.washingtonpost.com/local/trafficandcommuting/more-people-died-in-car-crashes-this-century-than-in-both-world-wars/2019/07/21/0ecc0006-3f54-11e9-9361-301ffb5bd5e6_story.html

Why Study Transportation? Injuries and Death



<https://www.toronto.ca/services-payments/streets-parking-transportation/road-safety/vision-zero/vision-zero-dashboard/fatalities-vision-zero/>

Why Study Transportation?

What does a "good" transportation system achieve?



<https://en.wikipedia.org/wiki/Utrecht>

Course Objectives

- ▶ Understand fundamental concepts and theories in urban transportation geography and planning.
- ▶ Identify and critically assess major social, political, economic, and environmental issues related to urban transportation.
- ▶ Analyze and visualize transportation-related data (including using GIS) to describe travel behaviour, transportation networks, land use, and accessibility.
- ▶ Apply the theoretical and practical knowledge you have acquired from the course to develop recommendations on improving urban transport systems.

Course Outline

(open up the silly-bus)



Key Concepts in Urban Transportation

- ▶ Travel Demand
- ▶ Activity Participation
- ▶ Utility
- ▶ Travel Behaviour

Travel Demand

- ▶ **Demand** - desired consumption of a good
- ▶ Travel is often considered a **derived demand** because we don't directly benefit from it (usually)
- ▶ People travel because they want to consume a *final good*
- ▶ The final good is **Activity Participation** (e.g., work, shopping, entertainment)
- ▶ Travel is required to participate in activities that take place at different locations

Utility

- ▶ When trying to understand people's travel decisions, we often assume that each individual is making the **best** choice for themselves
- ▶ **Utility** is a notion of how much benefit or satisfaction is derived from consuming a good
- ▶ Transportation planners/engineers often assume that a travel choice is made to **maximize** one's individual utility

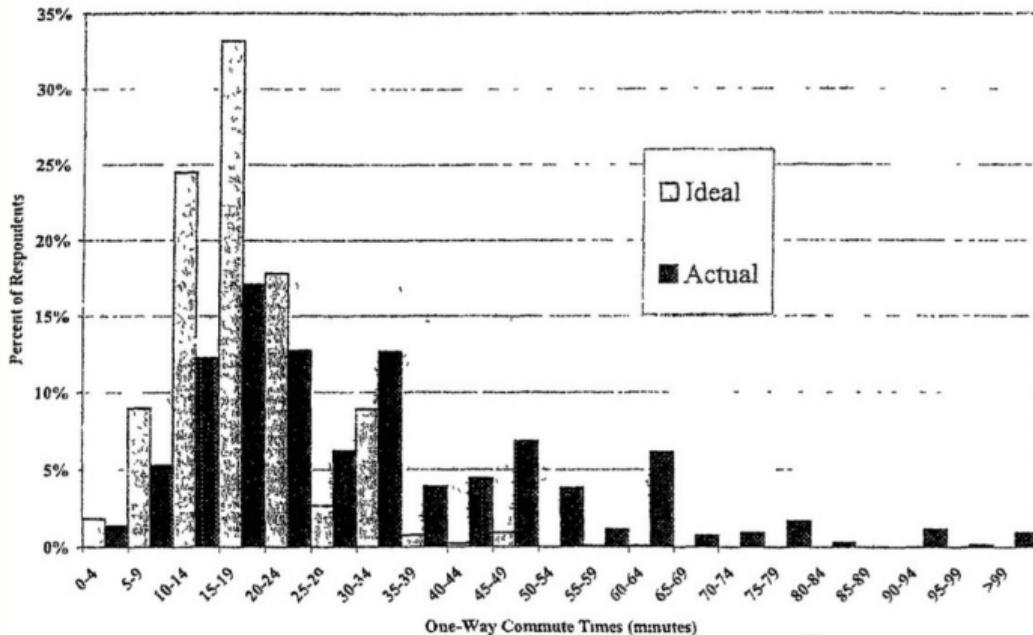
Utility

- ▶ In the case of travel, it is generally assumed that travel is a *negative utility* (but not always!)
- ▶ *Negative utility* is often framed in terms of **Costs** (e.g. monetary costs, time costs, stress, discomfort, etc.)
- ▶ People are therefore making choices that attempt to minimize the **disutility** of travel
- ▶ People take trips when the utility of travelling and activity participation are positive (i.e. outweigh the negatives)

Example of *positive utility* of travel:

The Ideal Commute Is Not Actually No Commute

- It's normal for people to want a little time to detach from the workplace.



Travel Behaviour - the study of how people travel

Trip Characteristics

- ▶ Where from?
- ▶ Where to?
- ▶ Why? (Activity Participation!)
- ▶ With Whom?
- ▶ When?
- ▶ How? (Mode Choice)
- ▶ Which route? (Route Selection)

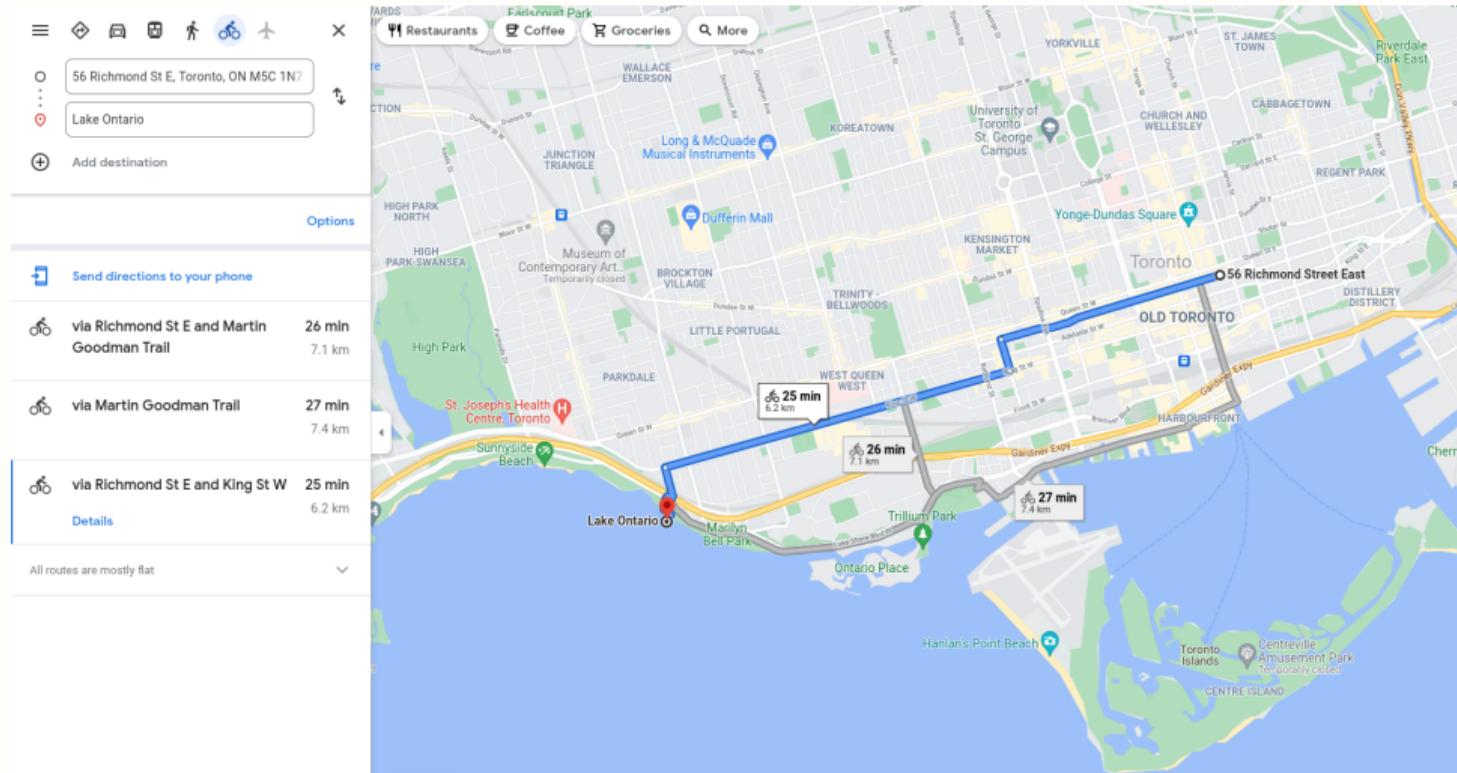
Mode Choice - i.e. which mode of travel should I use?

Pick the mode with the greatest utility (i.e. minimize dis-utility), based on the summation of various factors, e.g. consider two modes...

	Automobile	Public Transit
Travel Time	In-vehicle time	In-vehicle time
	Parking search	Ingress/Egress
		Waiting
Out-of-pocket costs	Gas / Maintenance	Fare
	Parking	
	Toll	

What are some other factors?

Route Selection - i.e. which route should I take?



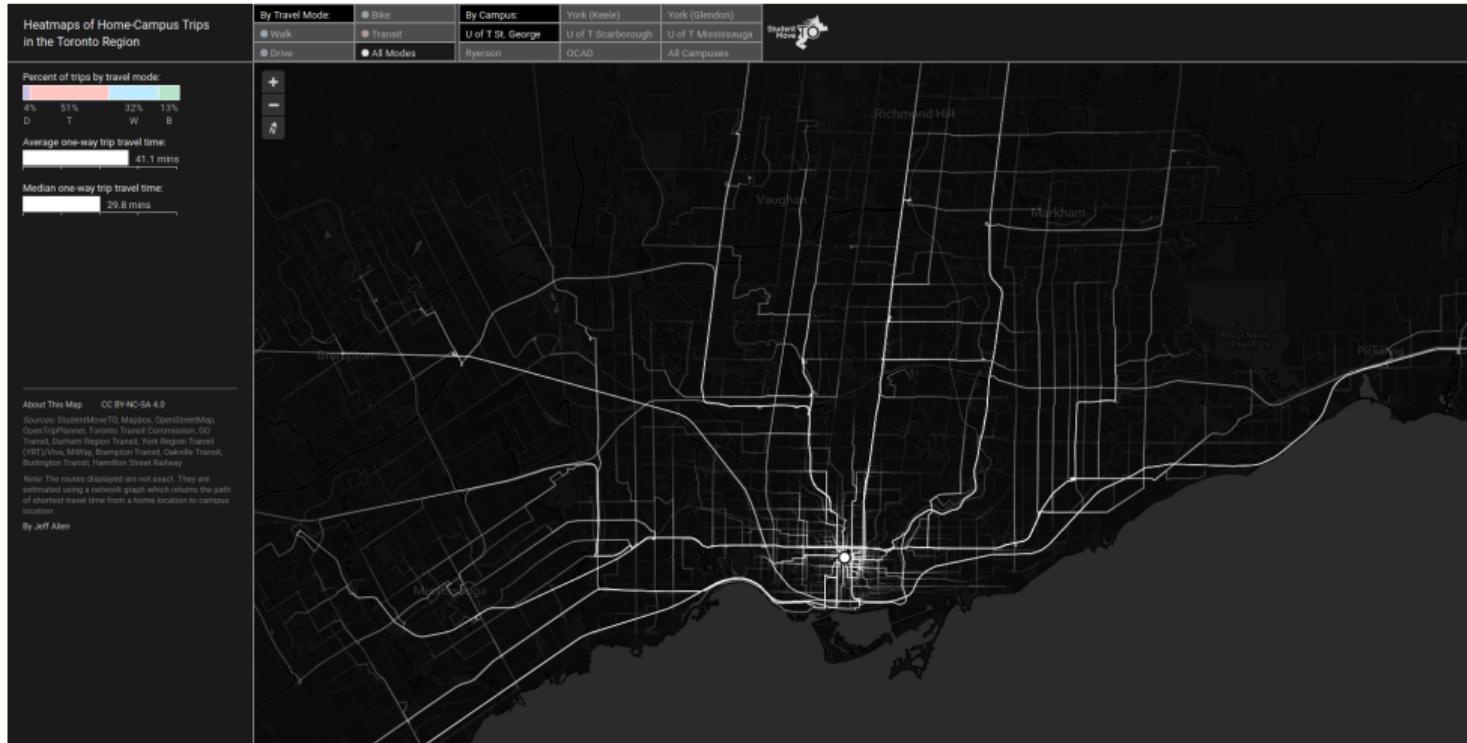
Travel Behaviour - the study of how people travel

Factors affecting travel behaviour are often divided into two categories

1. Urban spatial structure (locations of activities, transport networks)
2. Individual attributes, preferences, and constraints

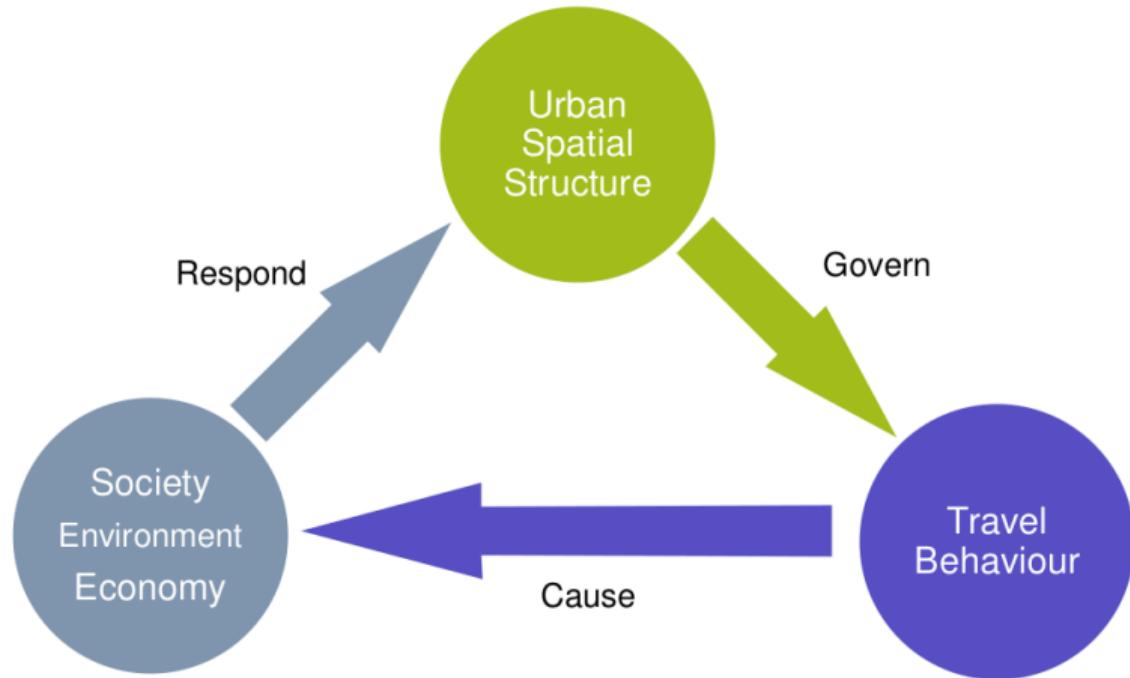


Think about all the trips people take in a city ...



https://sausy-lab.github.io/SMT0_web_map/

Big picture:



Transportation Demand Modelling

- ▶ Complex models built by transportation engineers to predict population-level distribution of trips in a region
- ▶ Use these predictions to help decide where new infrastructure should be built
- ▶ Often used as part of evaluating the costs and benefits between a set of alternatives (Cost-Benefit Analysis)
- ▶ Results have been used to justify new highways, transit lines, etc.

Planning & Design Challenges

- ▶ Lower GHG emissions
- ▶ Reduce congestion
- ▶ Safer streets
- ▶ Better accessibility
- ▶ Improving equity
- ▶ Affordability
- ▶ Encouraging active travel
- ▶ etc.
- ▶ etc.

Activity!

Which travel mode should be promoted most in the GTHA?

Mode	% of Trips
Transit	15.96%
Auto	76.50%
Bicycle	1.44%
Walk	5.15%
Other	0.95%

Source: 2016 Transportation Tomorrow Survey

Next Week

Cars, Roads, & Highways:

- ▶ Rise of cars as the predominant mode of travel in Canadian cities.
- ▶ How the infrastructure of automobiles has transformed transportation and land-use and has affected daily life.