

1. Maps For Navigation / 2. Sustainability

GGR424 - Transportation Geography & Planning

Jeff Allen

University of Toronto

February 28, 2022

Announcements

- ▶ Transportation data analysis assignment due March 3
- ▶ Project Proposal due March 10
- ▶ Monday office hours 3:30pm to 5:00pm in SS5060 (I'll also keep my Zoom room open during this time)
- ▶ Friday office hours still only on Zoom, 2:30pm to 3:30pm

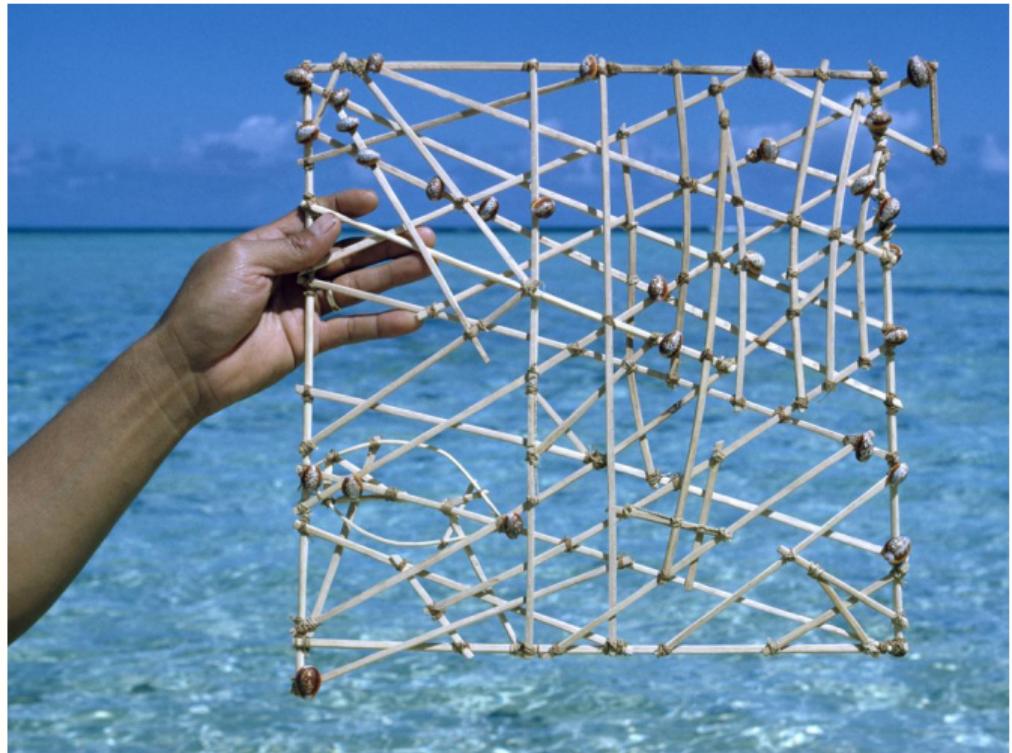
Today

- ▶ Maps for navigation
- ▶ Chat about final project
- ▶ Sustainable transport

Maps for navigation

"Stick Charts" from the Marshall Islands

- ▶ Shells represent islands
- ▶ Sticks represent ocean swells and wave-crests



More info: http://marshall.csu.edu.au/MJHSS/Issue2005/MJHSS2005_103.pdf

Maps for navigation

Peutinger Table

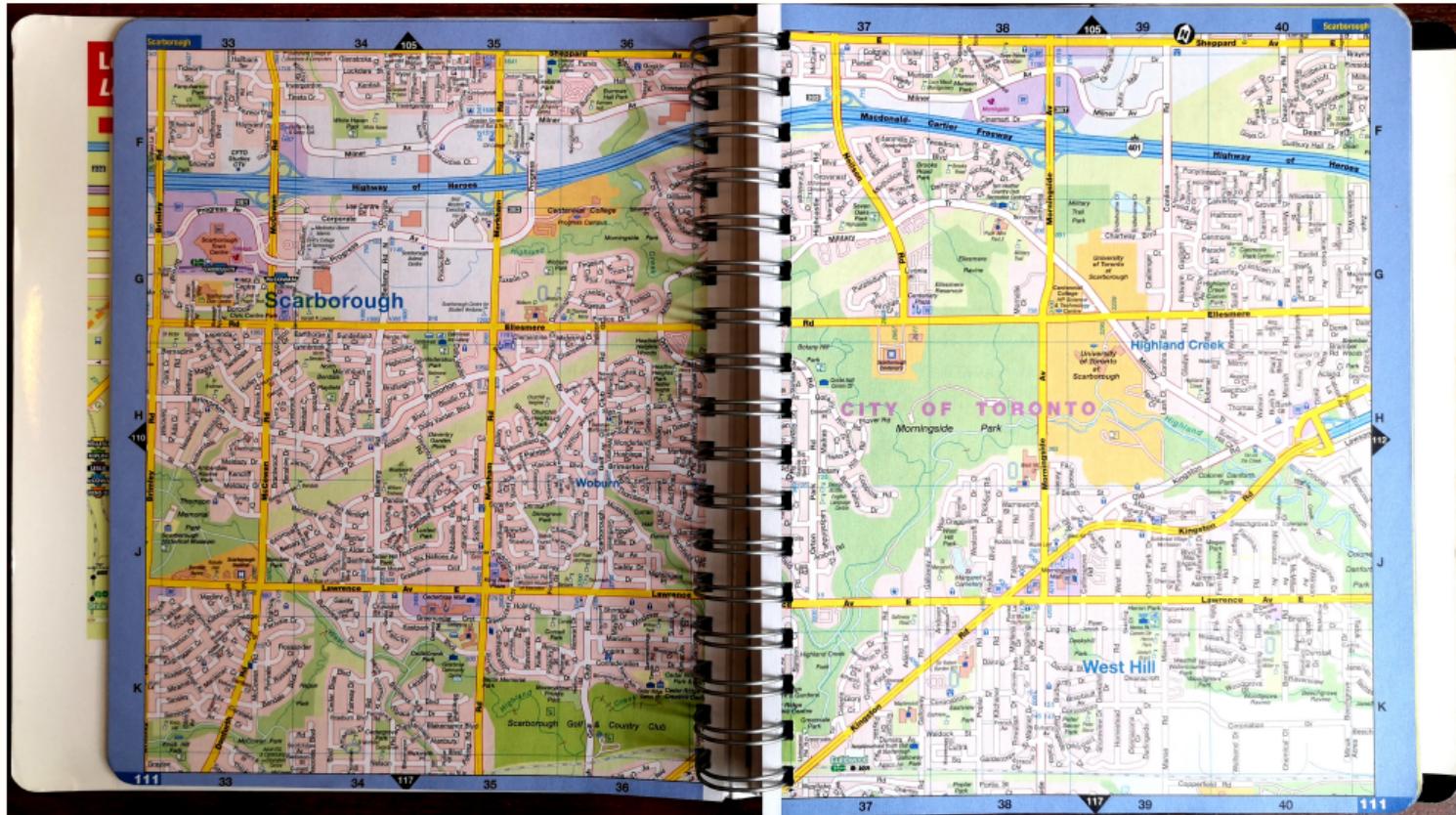
- ▶ a road map of the Roman Empire
- ▶ (this is a 13th century copy of an unknown original)



Source:

<https://commons.wikimedia.org/wiki/File:TabulaPeutingeriana.jpg>

Maps for navigation - e.g. 20th and early 21st century road maps

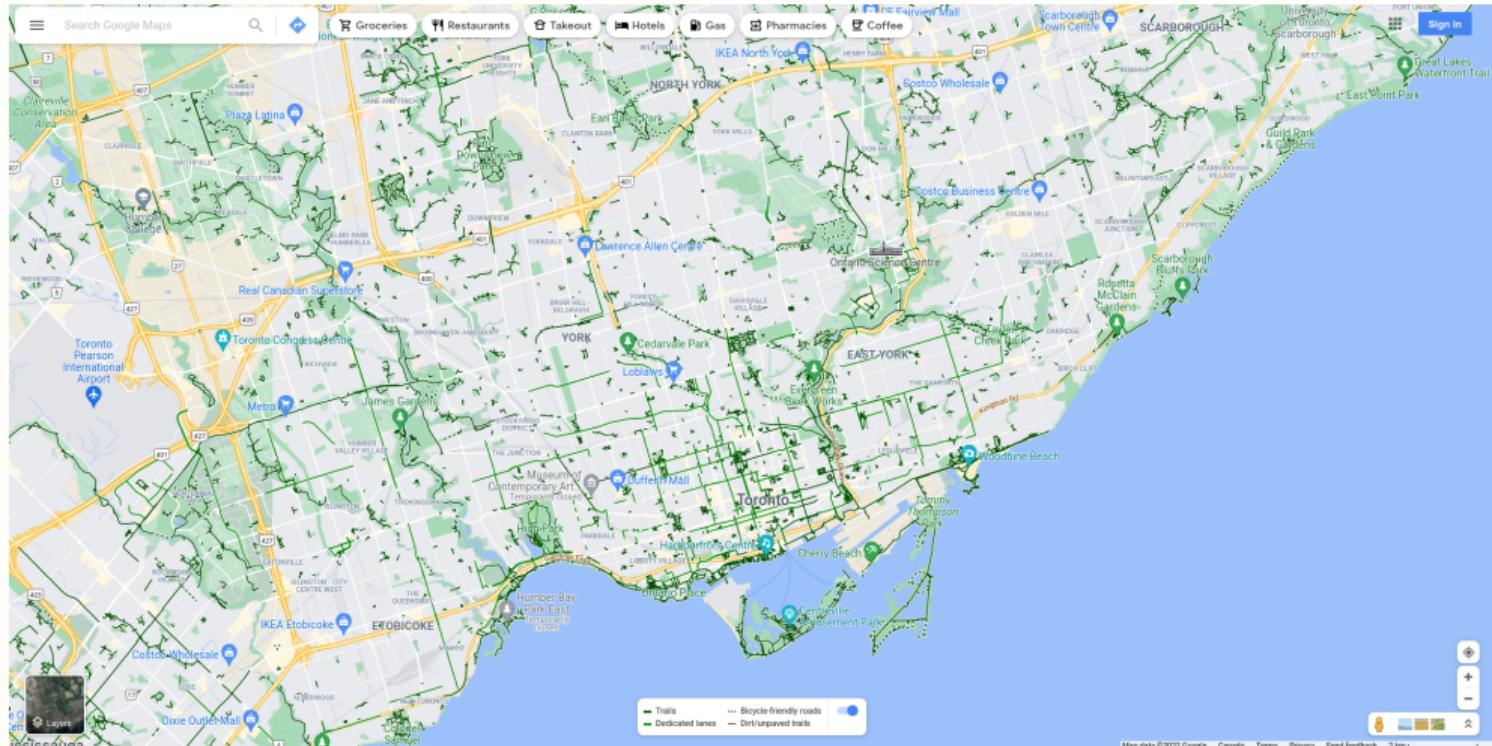


Maps for navigation - e.g. TTC System Map



<https://www.ttc.ca/routes-and-schedules>

Maps for navigation - e.g. Google Maps



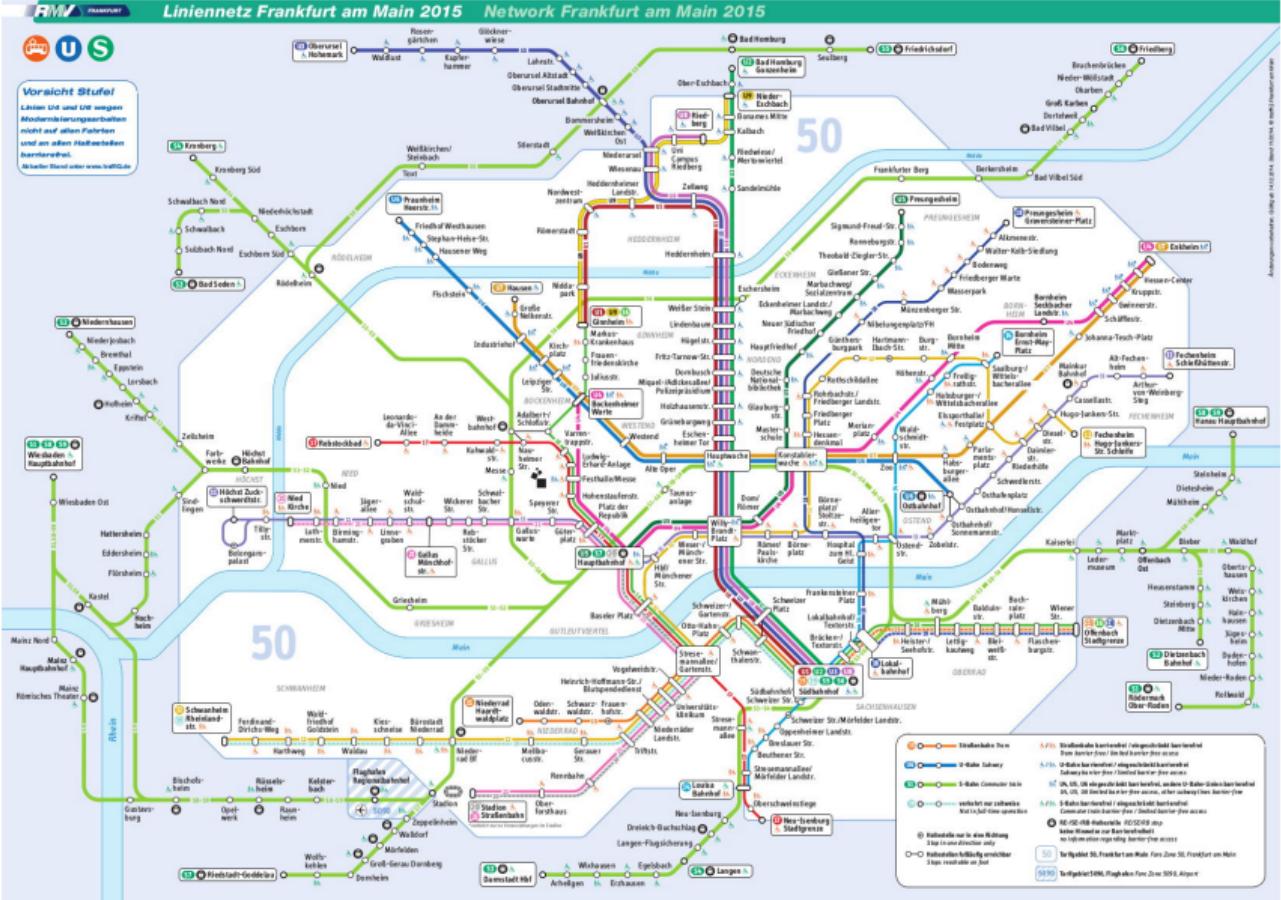
<https://www.google.ca/maps/@43.6574817,-79.4021975,13.25z>

What are the design elements that make a good navigational map?





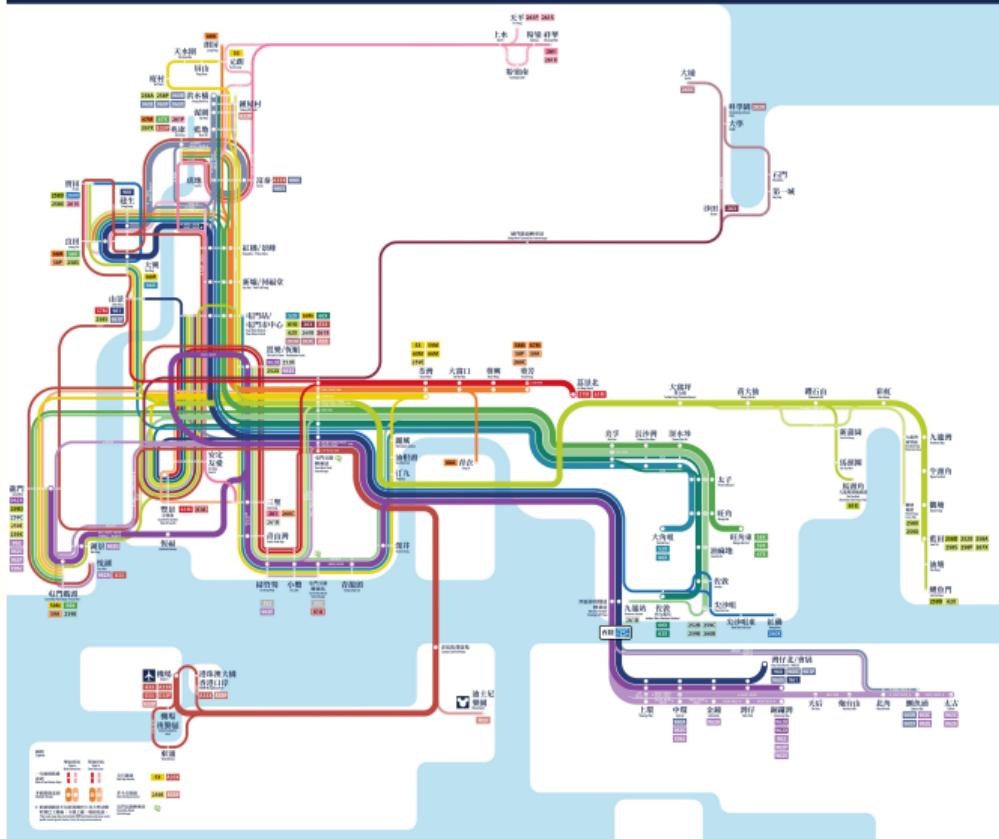
Liniennetz Frankfurt am Main 2015 Network Frankfurt am Main 2015



<https://map-a-metro.com/en/germany/frankfurt/frankfurt-u-bahn-map.htm>

屯門區巴士路線圖 Tuen Mun District Bus Route Map

Ver 1.00 By Haydon Cha



<https://www.behance.net/gallery/96041633/Tuen-Mun-District-Bus-Route-Map-Design>

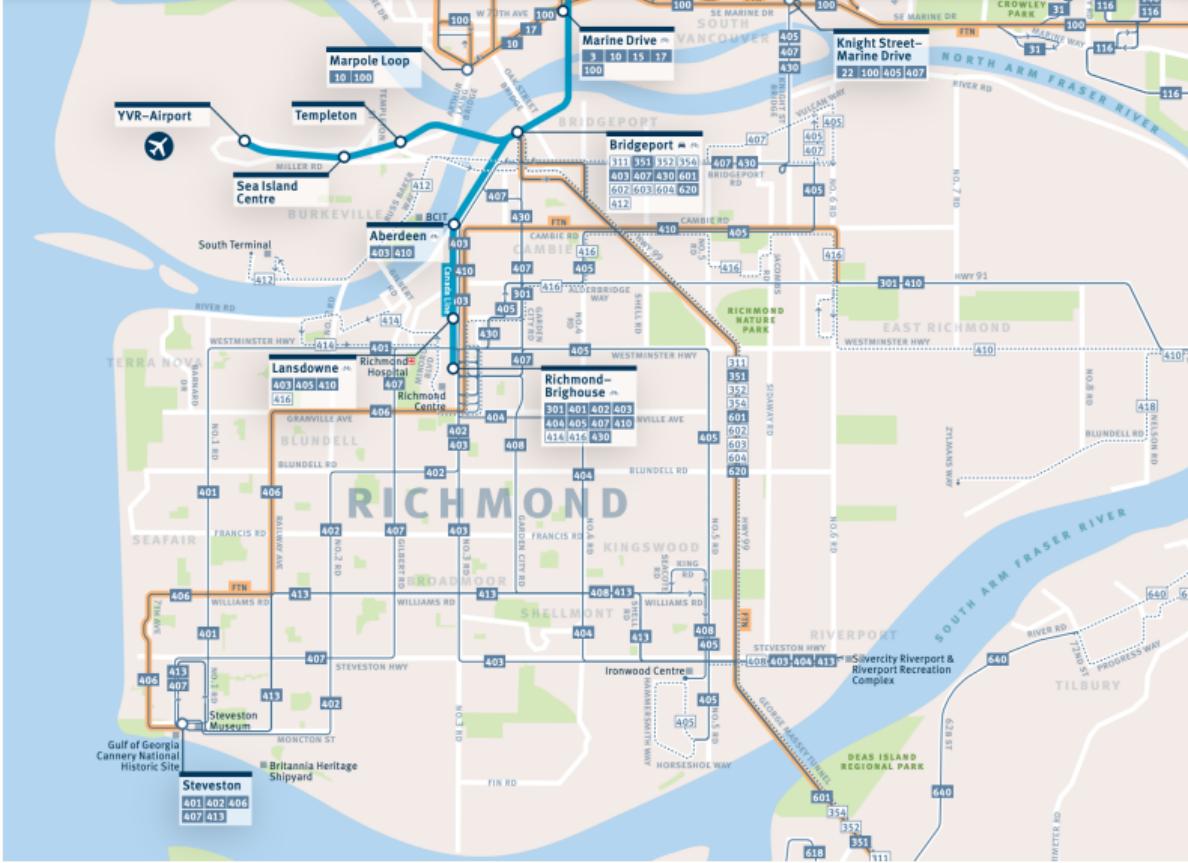
Navigational maps have to balance between detail and legibility

Cartographic Selection

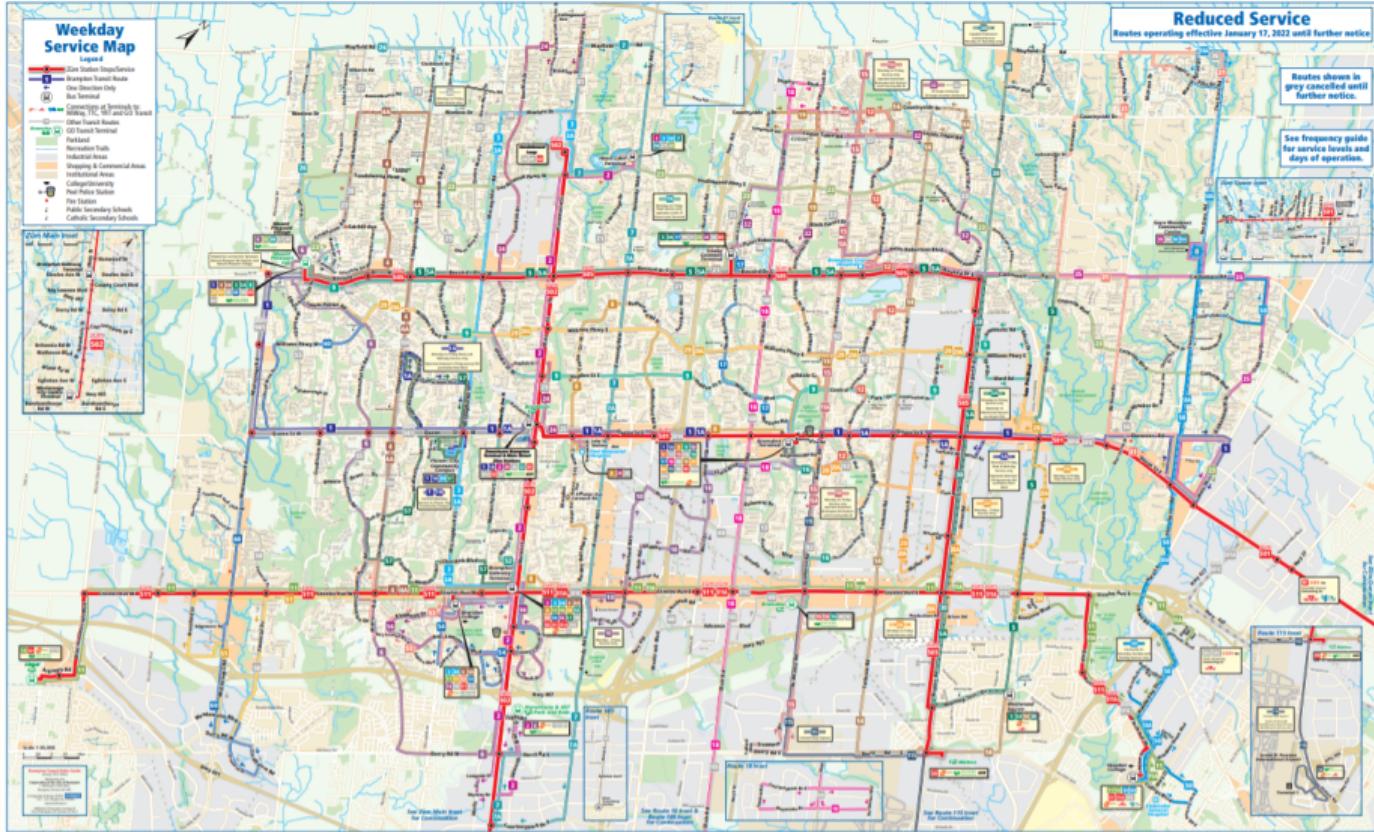
- ▶ deciding what layers to include on a map, and what not to include

Cartographic Generalization

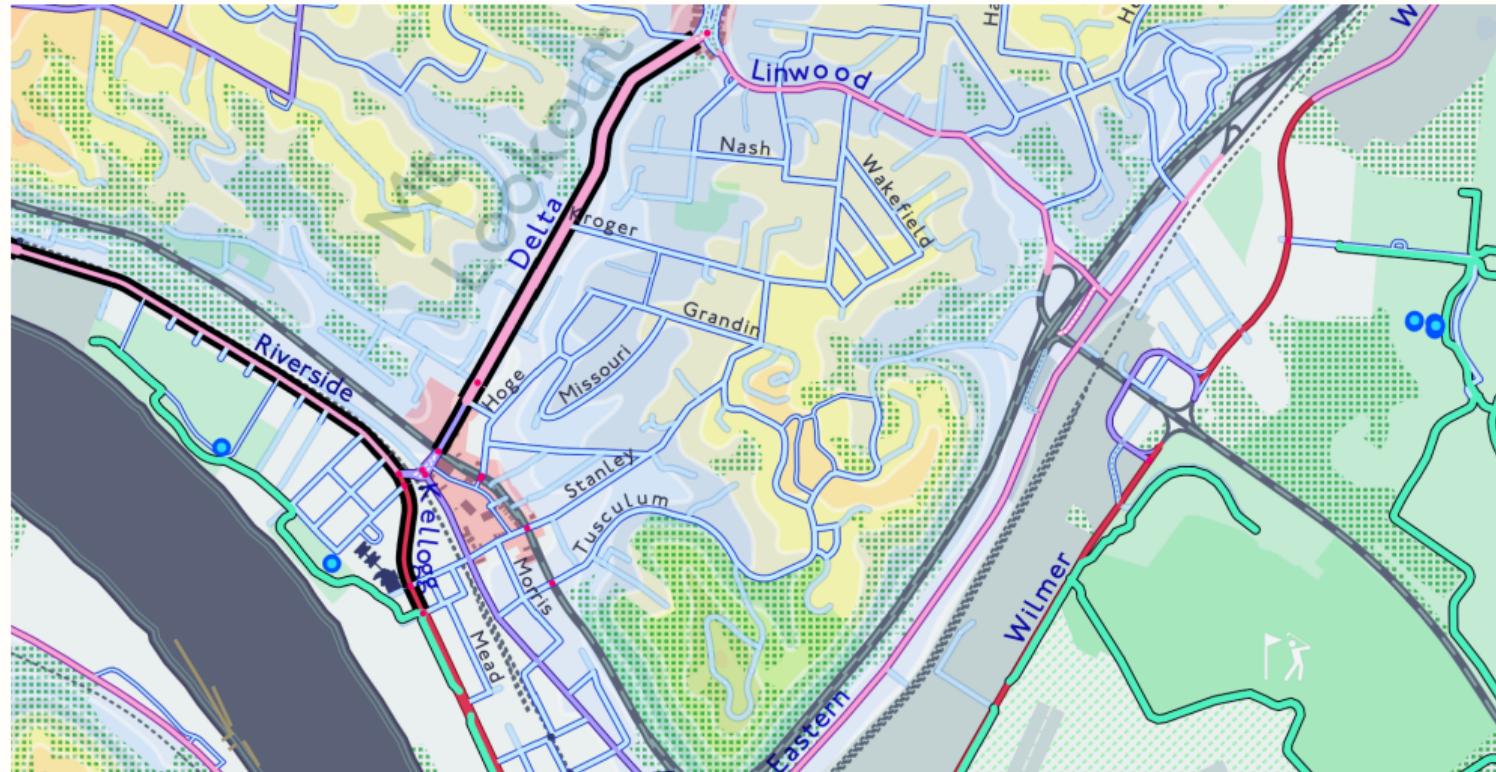
- ▶ simplifying the precision and detail of features to only show what's essential
 - ▶ e.g. smoothing a line
 - ▶ e.g. merging areas, aggregating points
 - ▶ e.g. reclassifying data
 - ▶ e.g. exaggerating features



https://www.translink.ca/-/media/translink/documents/schedules-and-maps/transit-system-maps/regional-maps/january-2022/rdt_2022-01-03.pdf

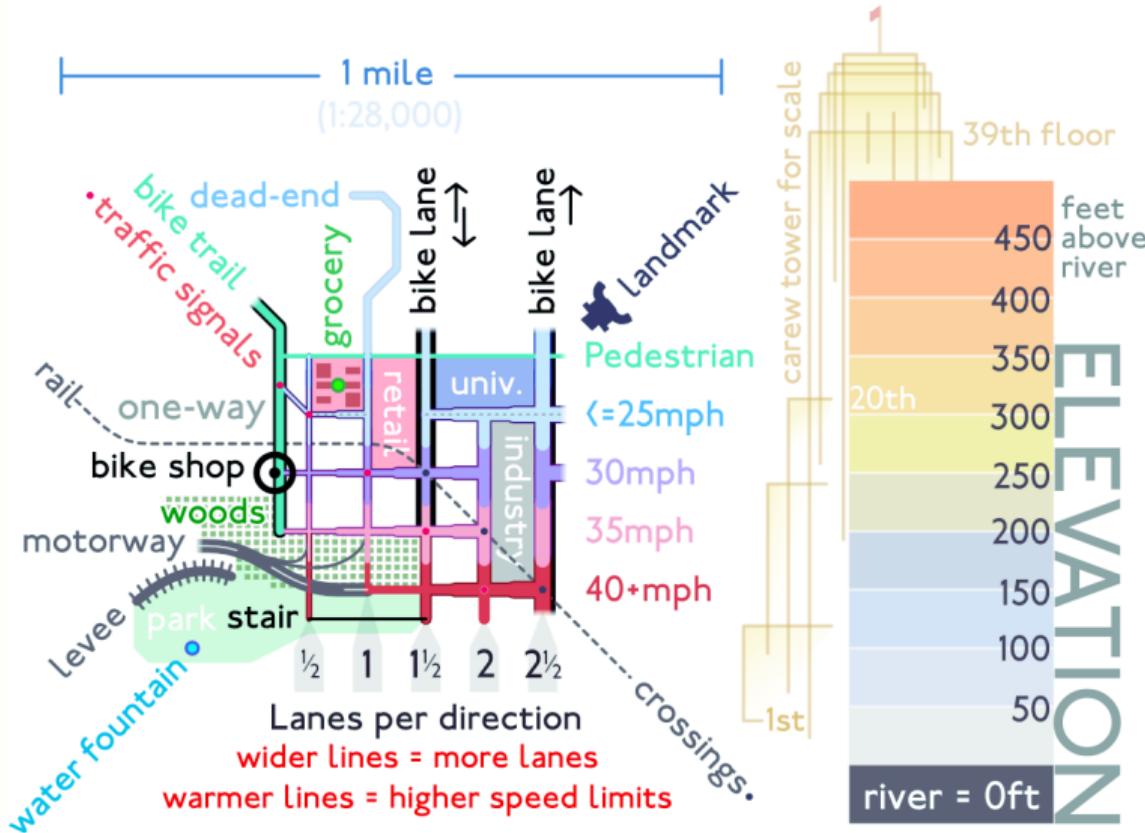


e.g. Bike Map in Cincinnati

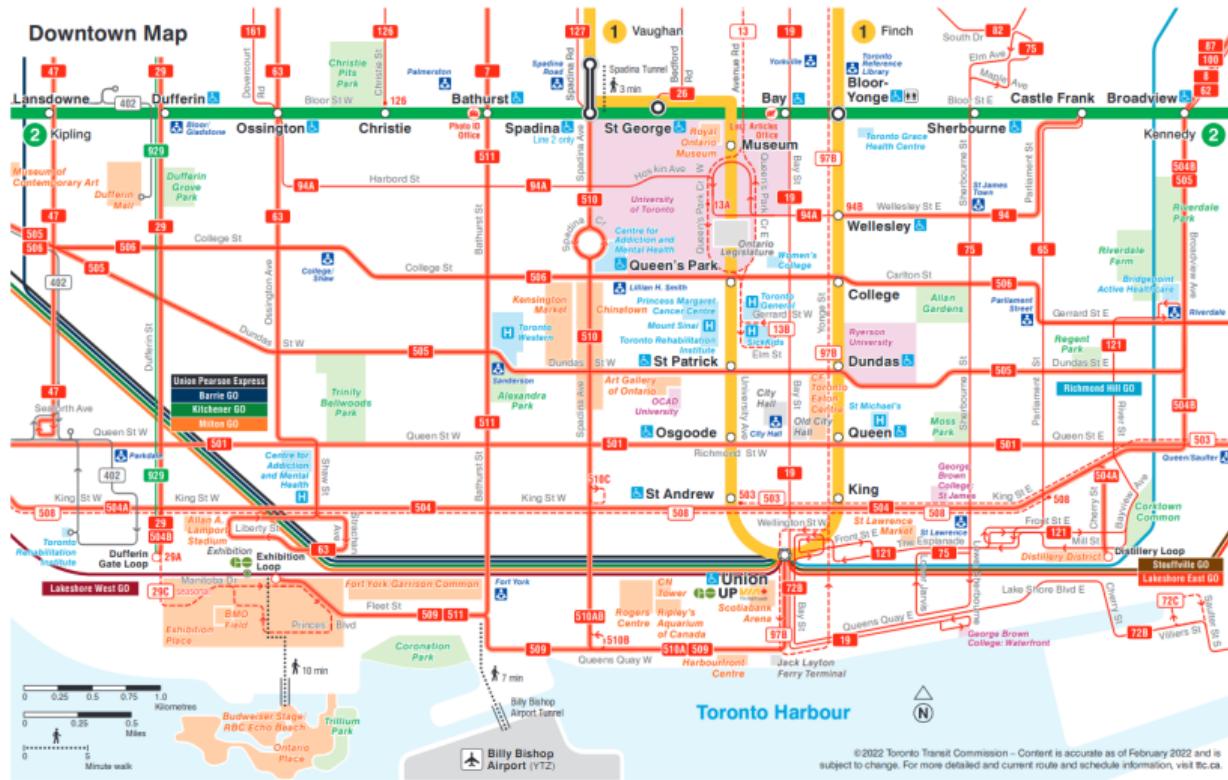


<https://www.cincymap.org/cbm/>

e.g. Bike Map in Cincinnati



It's challenging to add data density, but without compromising legibility
e.g. Frequency on transit maps



<https://www.ttc.ca/routes-and-schedules>

Mind the map! The impact of transit maps on path choice in public transit

Zhan Guo *

Robert F. Wagner Graduate School of Public Service, Rudin Center for Transportation Policy and Management, New York University, 295 Lafayette St., Room 3038, New York, NY 10012, USA

ARTICLE INFO

Article history:

Received 5 March 2010

Received in revised form 3 March 2011

Accepted 16 April 2011

Keywords:

Transit map

Cognitive map

Path choice

Tube map

London Underground

ABSTRACT

This paper investigates the impact of schematic transit maps on passengers' travel decisions. It does two things: First, it proposes an analysis framework that defines four types of information delivered from a transit map: distortion, restoration, codification, and cognition. It then considers the potential impact of this information on three types of travel decisions: location, mode, and path choices.¹ Second, it conducts an empirical analysis to explore the impact of the famous London tube map on passengers' path choice in the London Underground (LUL). Using data collected by LUL from 1998 to 2005, the paper develops a path choice model and compares the influence between the distorted tube map (map distance) and reality (travel time) on passengers' path choice behavior. Results show that the elasticity of the map distance is twice that of the travel time, which suggests that passengers often trust the tube map more than their own travel experience on deciding the "best" travel path. This is true even for the most experienced passengers using the system. The codification of transfer connections on the tube map, either as a simple dot or as an extended link, could affect passengers' transfer decisions. The implications to transit operation and planning, such as trip assignments, overcrowding mitigation, and the deployment of Advanced Transit Information System (ATIS), are also discussed.

Transportation improvement plan

For the final project in this class, you will propose an intervention, solution, or improvement to a transportation problem

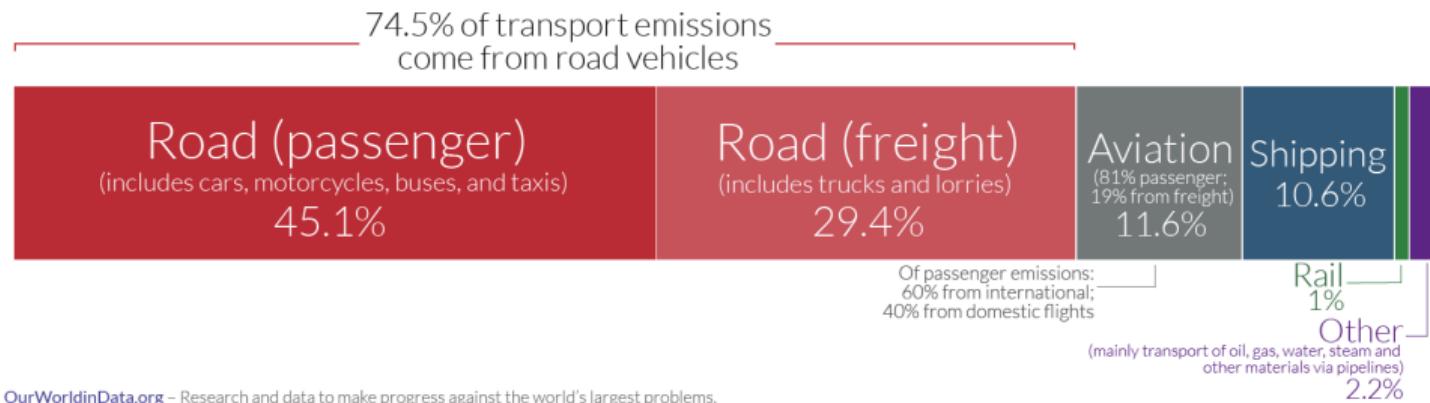
- ▶ (5%) Project Proposal due March 10
- ▶ (5%) Presentations March 28 and April 4
- ▶ (25%) Final Report due April 8

Transport and the 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.



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).

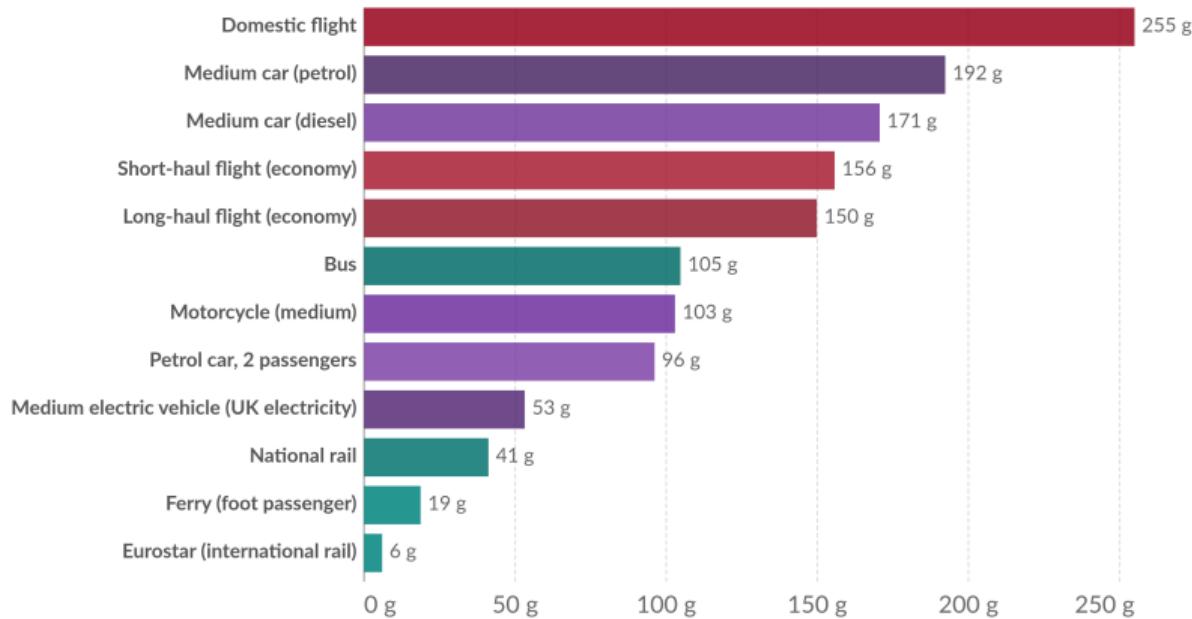
Licensed under CC-BY by the author Hannah Ritchie.

Transport and the Environment:

Carbon footprint of travel per kilometer, 2018

Our World
in Data

The carbon footprint of travel is measured in grams of carbon dioxide equivalents per passenger kilometer. This includes carbon dioxide, but also other greenhouse gases, and increased warming from aviation emissions at altitude.



Source: UK Department for Business, Energy & Industrial Strategy, Greenhouse gas reporting: conversion factors 2019.

Note: Data is based on official conversion factors used in UK reporting. These factors may vary slightly depending on the country, and assumed occupancy of public transport such as buses and trains.

CC BY

How can we make urban transport more sustainable?

Avoid

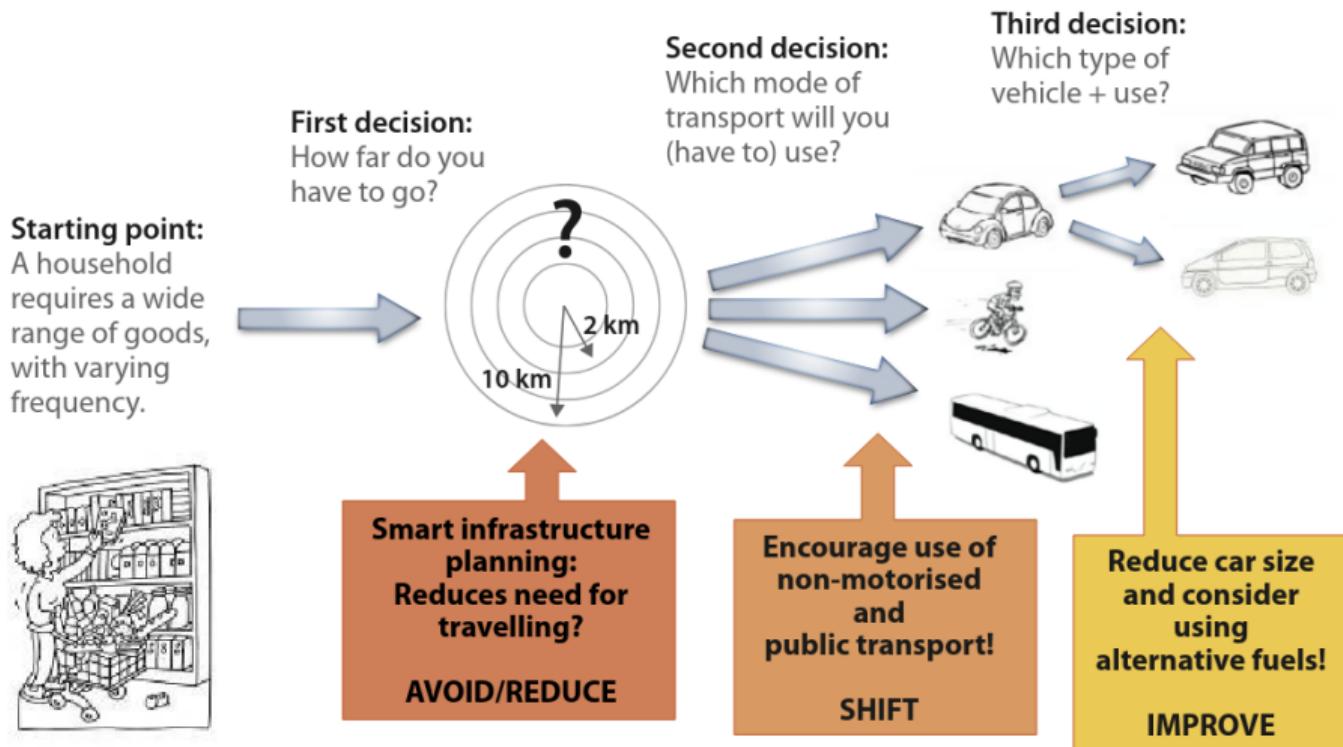
- ▶ Avoiding (long distance) trips (by car)
- ▶ Banister (2011) Section 5.1 and 5.3
- ▶ i.e. system efficiency

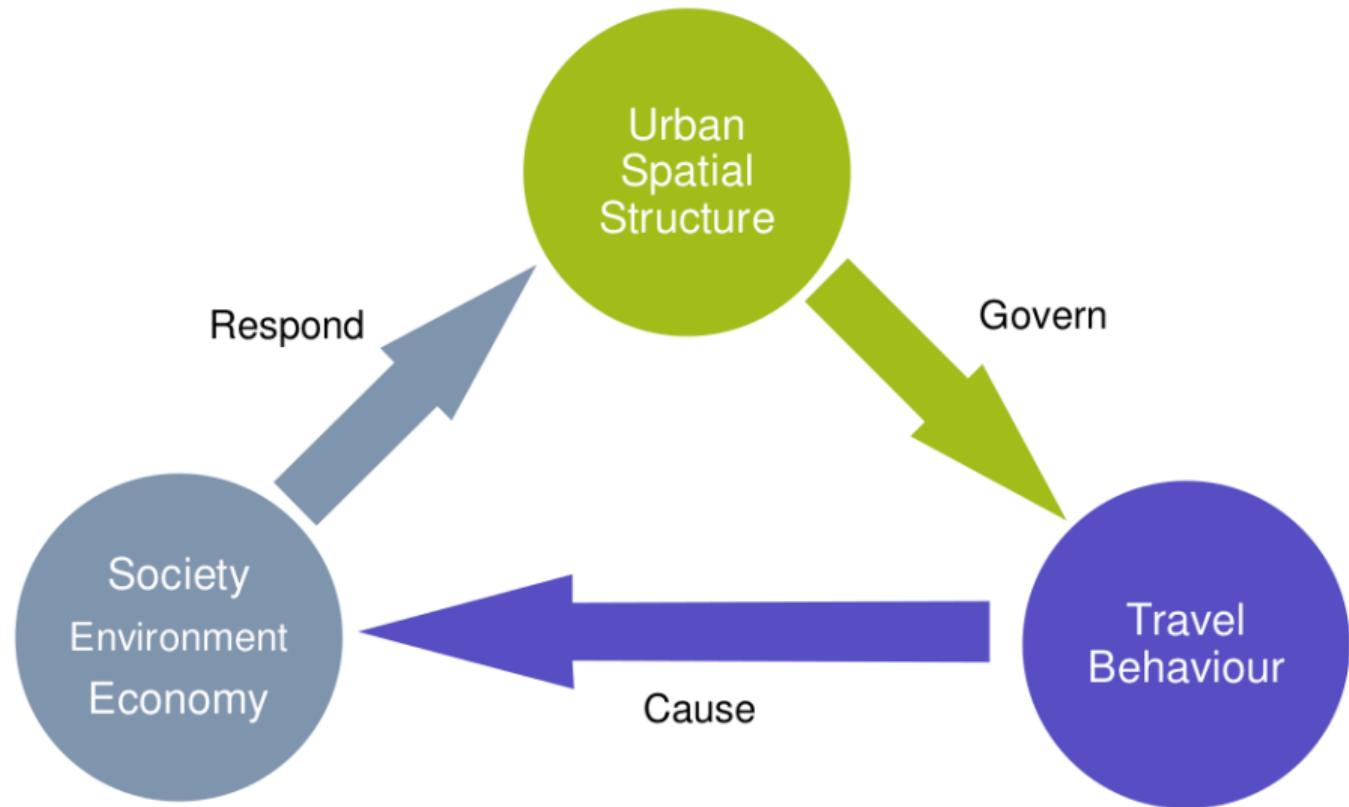
Shift

- ▶ Shifting trips to more sustainable modes
- ▶ Banister (2011) Section 5.2
- ▶ i.e. trip efficiency

Improve

- ▶ Improving the efficiency (i.e. reducing the impacts) of existing transport options
- ▶ Banister (2011) Section 5.4
- ▶ i.e. vehicle efficiency





e.g. Milton, ON

Single-occupancy KM travelled per person per day

- ▶ Milton = 29.4km
- ▶ GGH = 19.6km

Mode Share

	Milton	GGH
Car	87.0%	77.6%
Transit	4.2%	12.3%
Active	5.8%	7.9%
Other	3.0%	2.1%



What about urban freight and deliveries?



https://www.thestar.com/news/city_hall/2020/10/09/

[everyone-is-getting-everything-delivered-these-days-but-that-can-cause-chaos-on-city-streets-and-toronto-officials-are-trying-to-fix-it.html?rf](https://www.thestar.com/news/city_hall/2020/10/09/everyone-is-getting-everything-delivered-these-days-but-that-can-cause-chaos-on-city-streets-and-toronto-officials-are-trying-to-fix-it.html?rf)

Office Hours

- ▶ Monday 3:30pm to 5:00pm (in-person SS5060 and Zoom)
- ▶ Friday 2:30pm to 3:30pm (only on Zoom)

Next week

- ▶ Health & Equity
- ▶ How the costs and benefits of transportation are (in)equitably distributed
- ▶ Health impacts of transportation (e.g. pollution, noise)