Developing a Travel Scheduling and Resource Allocation Model

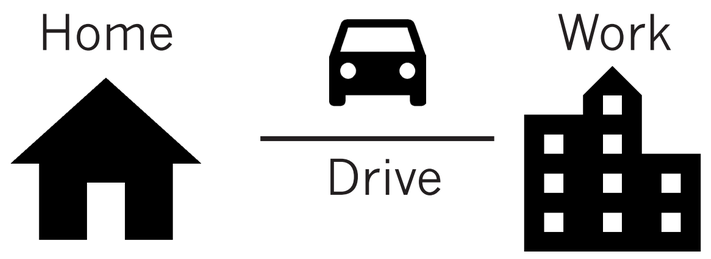
How does a household with many people, with many places to go, make their travel choices? - Kevin Yeung, 2015

Introduction

Yeung surveyed 14 Kitchener-Waterloo residents about their travel behaviours, daily schedule, and balance of mandatory activities (work or school that must be done that day) and discretionary activities (service, shopping, recreation or social that could be done another day). He created a model of how households make trip decisions and when they may need to postpone or cancel activities due to household resource limitations, from a lack of adult to accompany a dependent, to poor transit service or lack of a car.

What is a trip?

A trip is individual travel from one place to another place.



Resource Sharing

The household has a set of **shared resources** for travel to activities such as **money, time, vehicles, dependents and independents.** The household must choose an appropriate transportation mode using the available resources:

What is a tour?

A tour is a sequence of trips chained together to best use available resources

The model requires two inputs:

Travel Demand

Travel demand is influenced by the **number and type of people** in the household, the number of **mandatory and discretionary trips** that they need to take, and the **locations** of their home and trip destinations.

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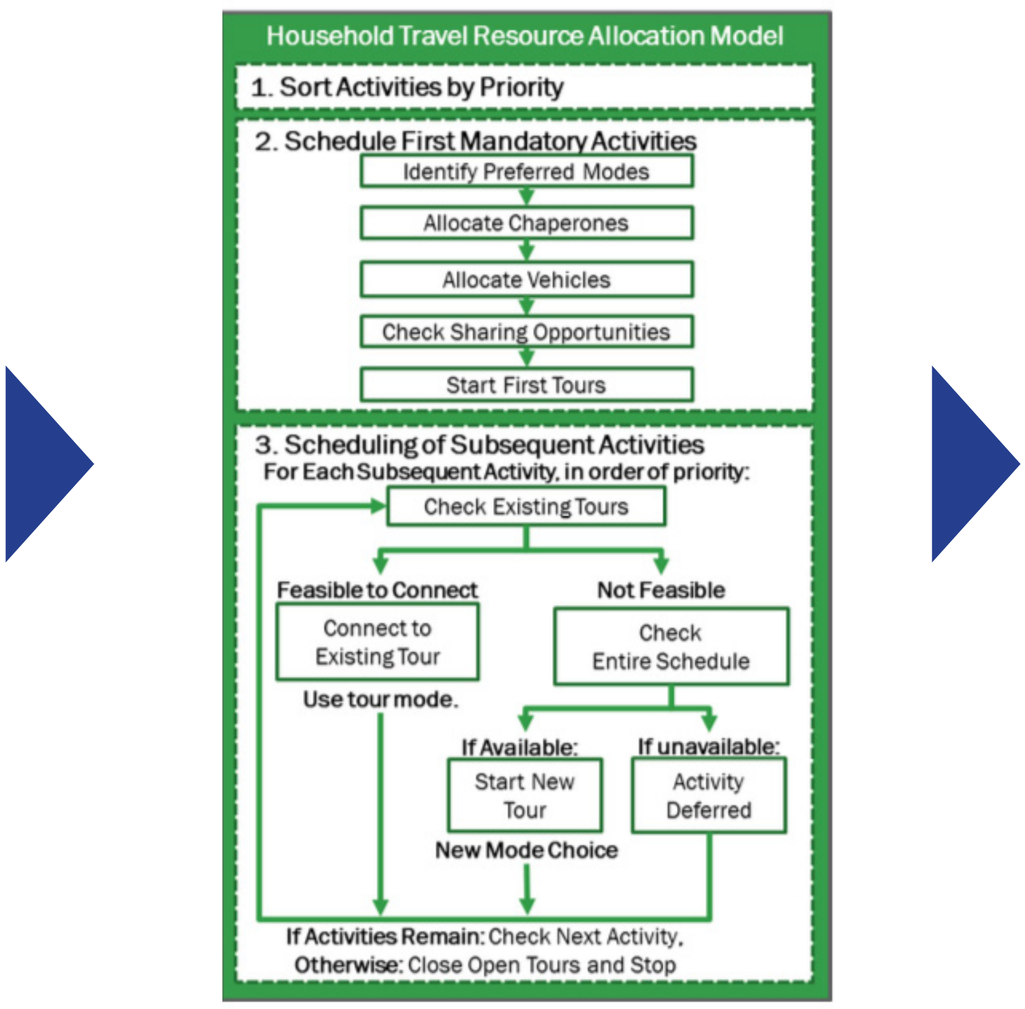
Travel Resources

Travel resources are the types of **transportation available to a household** to use - auto, transit, cycling, walking. They also include the individual members' **ability to travel** on their own, and the **time constraints** to reach destinations.

Resource Allocation Process



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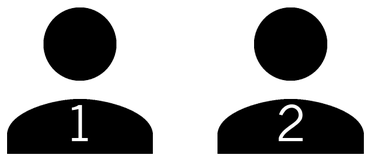
An example...

A household has two adult members:

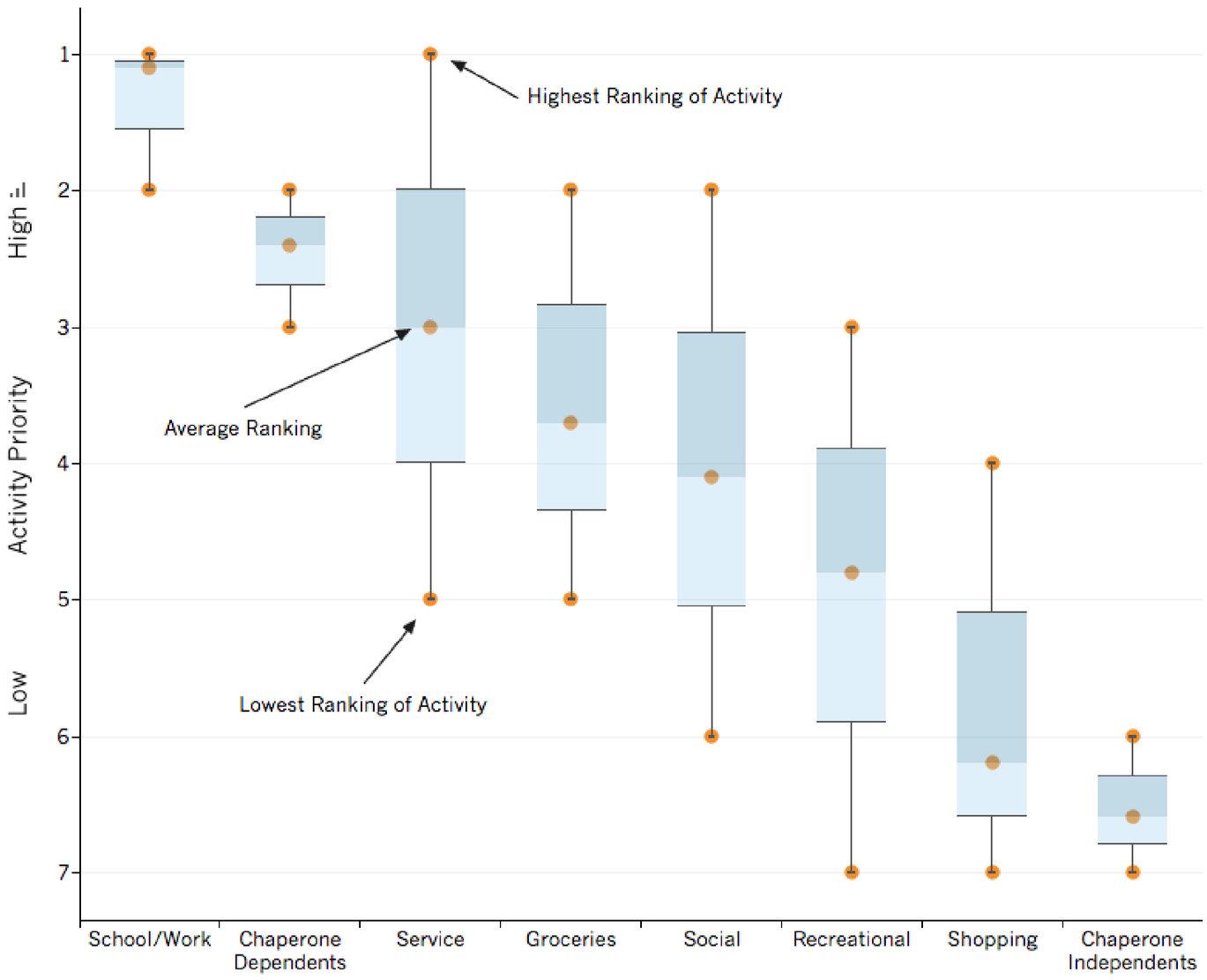


And access to one vehicle, and transit passes for both members:

Person 1 has a mandatory activity and three discretionary activities, and **Person 2** has one mandatory and two discretionary activities:

The model then calculates the most cost effective and time efficient modes of travel, schedules the trips to reach destinations within the allowable times, and then looks to chain together trips into a tour. For example, Person 2 drives Person 1 to their job, and then continues to their own workplace location.

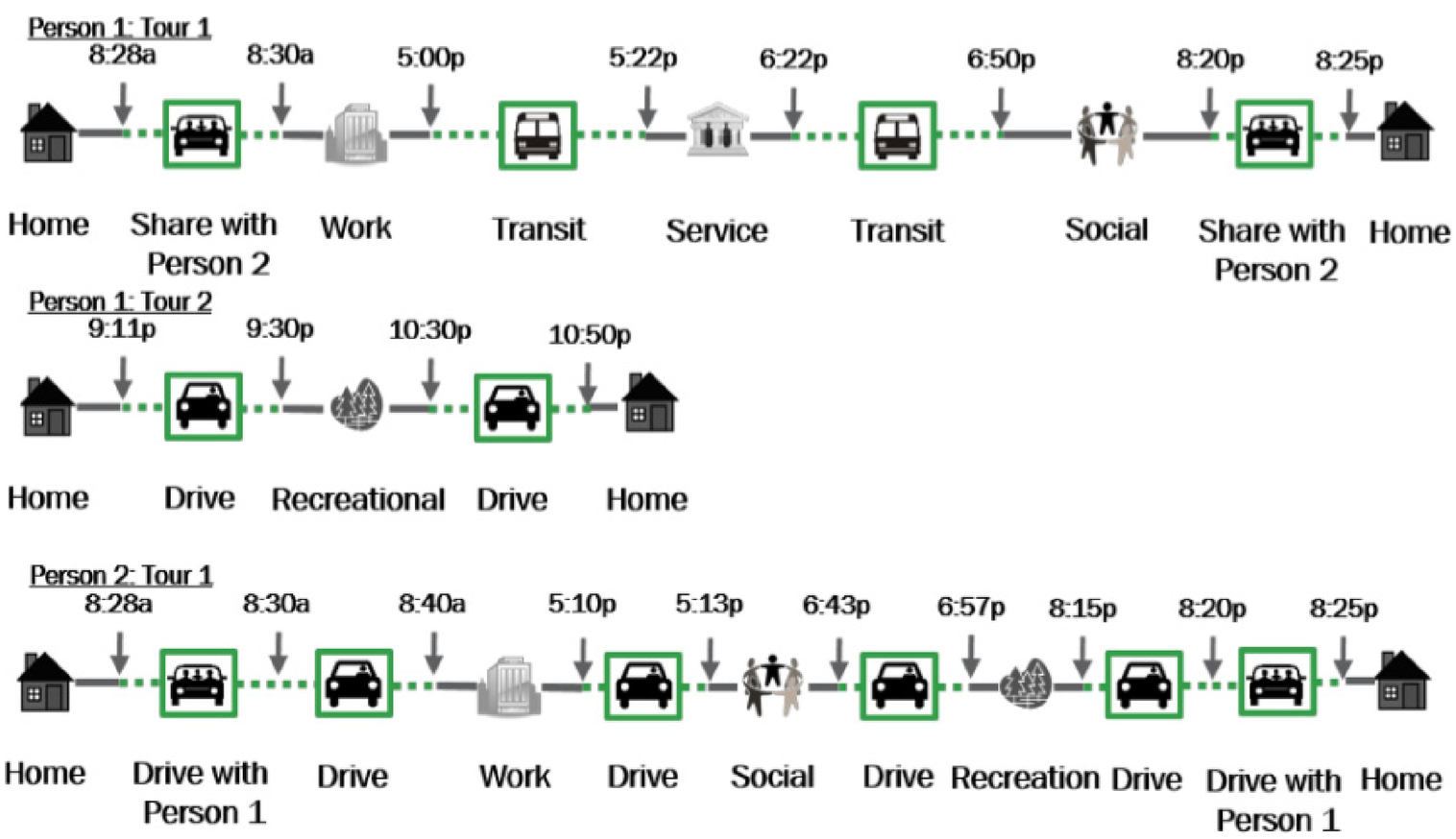
What activities do people prioritize?



Detailed Activity Schedule

Person	Activity	Type	Priority	Flexibility	Start Time	Order
1	1	Work	1	30 min	9:00am	1
2	1	Work	1	30 min	9:00am	2
1	2	Service	2	9 hr	7:00pm	3
1	3	Social	4	6 hr	8:00pm	4
2	3	Social	4	6 hr	10:00pm	5
1	4	Recreation	5	30 min	10:00pm	6
2	2	Recreation	5	10 hr	10:00pm	7

Model Output: Trips and Tours



How is this useful?

This model can be applied to diverse household structures. The enhancement of public transport - the Region's iXpress and LRT systems - could provide new options so that households can take more discretionary trips that improve quality of life and lower transportation cost. As cities grow, a better understanding of travel behaviour will help planners and engineers make more informed decisions for land use plans and infrastructure investments.

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