"Trip Chaining and Men and Women Drivers in Canada"

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Introduction

Trip chaining is the practice of stopping at intermediate points during a journey. Leaving home in one's car and stopping for a coffee, to drop children off at school, picking up dry-cleaning, all on the trip to work would be an example of trip chaining. It is encouraged as a good driving behaviour from an energy consumption perspective. It can complicate the life of engineers planning commuter travel patterns. Do men and women have different trip chaining behaviour? This paper uses data from the 2005 Canadian Vehicle Survey (CVS) to examine trip chaining behaviour from a gender perspective. This is a voluntary vehicle-based survey started in 1999, conducted by Statistics Canada with funding from Transport Canada and Natural Resources Canada.[1]

Trip Chaining

In the example given above of leaving home, stopping for a coffee, to drop children off at school, picking up dry-cleaning, and finally driving to one's place of work, there are:

- Four trip stages (home to coffee shop, coffee shop to school, school to dry cleaners, dry cleaners to work);

- Three stops—coffee shop, school and dry cleaners;
- One tour—home to work.[2]

The Canadian Vehicle Survey defines a trip as a driver's travel from one location to another. Respondents are asked to report a new and separate trip each time the driver gets in the vehicle and travels or each time any passenger (or group of passengers) gets in or out of the vehicle. The data used in this study were extracted from the Canadian Vehicle Survey. To qualify as a chained trip for this study, the following conditions had to be met:

- Only trips made by light vehicle types were analyzed (i.e. those weighing less than 4,500 kg[a]). This was done to exclude travel in heavier truck and transport type vehicles that tend to be used for work purposes.
- Trips were made on the same day.
- Trips were consecutive, made by the same driver as identified by age and gender.
- A chain of trips was excluded if even one was made as part of the driver's job (i.e. while they were at work).
- The trip chain was considered ended once the driver returned home (if they ventured out again later on the same day, then this would begin a new trip chain).

It is possible that some vehicle destinations may not be reflected in a trip chain. A driver can go somewhere without actually getting out of the car, for example, full service gas stations, fast food drive-thrus, drives in the country. Even though the driver travelled somewhere, by our definition, it is not considered a finished trip until they leave the vehicle or a passenger gets in or out.

[a] Light vehicles includes most passenger cars, mini-vans, light duty pick-up trucks and SUVs.

With the exception of requiring all trips in a chain to be completed within the same calendar day, there was no other time period requirement for the completion of a trip chain in this analysis.

Trends Found in the Canadian Vehicle Survey

For the purpose of this study, reported trips were examined for trip chaining from the 2005 Canadian Vehicle Survey. This yielded some interesting results. While male drivers predominated in the simplest of trips with one "stage" in the trip (see Table 1) with 45% of their trips of this type as opposed to 39% for women drivers, they showed the same propensity to two stage trips. For trips with three, four or five and more stages in the trip chain, women drivers led men drivers in every group.

Table 1 – Per Cent of Trips in Trip Chain by Gender of Driver, 2005

Number of trips in the trip chain	Men drivers— per cent of trips	Women drivers— per cent of trips
1	**45.5**	39.4
2	39.9	40.1
3	8.3	**11.4**
4	3.6	**5.5**
5 or greater	2.7	**3.6**
Total	100	100

Source: Statistics Canada, Canadian Vehicle Survey—Annual 2005, special tabulations. This table is based on 121 thousand reported trips.

In the United States, it has been found in national data that "working-age women make more trips but travel fewer miles and minutes" than men, and that "during their commutes, women make more short stops for different reasons than men".[3] These results were echoed in the 1996 Bay Area Travel Survey which found "females are more likely to participate in shorter duration trips than males".[4]

If one examines trips by time of day, more differences become apparent. The comparison of men and women drivers for trips starting at home during the morning commute (from 6:00 am to 9:59 am) is shown in Table 2.[5] These data suggest that:

- A slightly higher percentage of men than women drive directly to work;
- A higher percentage of women drive to school/daycare and retail establishments as their next stop after leaving home during morning rush hour.

Table 2 – Per Cent of Trips Showing Next Stage Destination for Morning Commute Trips Starting at Home, 2005

Next Stage Destination	**Men drivers—per cent of trips**	**Women drivers—per cent of trips**
Someone else's home	5.9	**7.0**
Driver's regular workplace	**51.2**	49.9
Another workplace	**8.0**	7.1
School/daycare	5.9	**8.1**
Shopping Centre, bank, other place of personal business	8.6	**10.6**
Medical/dental	3.4	**3.6**
Leisure, entertainment, recreational, restaurant	**7.4**	6.3
Gas station	**2.8**	2.0
Other	**6.9**	5.4
Total	100	100

Source: Statistics Canada, Canadian Vehicle Survey—Annual 2005, special tabulations. Note: home to home trips were eliminated before percentages were calculated.

Another way to look at the data is shown in Table 3 by examining the proportion of men and women drivers, leaving their home between 6:00 am to 9:59 am. If grouped by destination of the stage, men drivers comprise the majority in all destinations. Of those drivers headed directly to work, 58.7% were men drivers as opposed to 41.3% for women. Men also lead in those heading to another workplace (possibly involved in car pooling) by 61.1% to 38.9%. The proportions are closest when driving from home to school/daycare where men drivers lead by only 50.4% to 49.6%.

In trips where the first destination in the trip chain after leaving home was to a leisure, entertainment, recreational facility or restaurant men drivers lead 62.0% to 38.0%. Some studies in the United States have attributed the growth in trip chaining for men to "stops to get a meal or a coffee on the way to work, called the Starbucks effect".[6]

It must be remembered when one looks at the proportions shown in Table 3, that men have reported doing the majority of driving in the Canadian Vehicle Survey. In 2005, men driving light vehicles accounted for 67.6% of the vehicle-kilometres driven and women drivers for only 32.4% of the vehicle-kilometres.[7]

Table 3 – Proportion of Men and Women Drivers, Starting at Home During the Morning Commute, Showing Next Stage Destination, 2005

Next Stage Destination	Men drivers—per cent of trips	Women drivers—per cent of trips	Total
Someone else's home	**53.8**	46.2	100.0
Driver's regular workplace	**58.7**	41.3	100.0
Another workplace	**61.1**	38.9	100.0
School/daycare	**50.4**	49.6	100.0
Shopping centre, bank, other place of personal business	**53.0**	47.0	100.0
Medical/dental	**56.3**	43.7	100.0
Leisure, entertainment, recreational, restaurant	**62.0**	38.0	100.0
Gas station	**65.3**	34.7	100.0
Other	**63.8**	36.2	100.0

Source: Statistics Canada, Canadian Vehicle Survey—Annual 2005, special tabulations

If one examines the evening commute (trips starting between 2:00 and 7:59 pm), some very different patterns emerge. The comparison of men and women drivers for trips starting at work is shown in Table 4. These data suggest that:

- A higher percentage of men than women drive directly to home;

- A higher percentage of women drive to shopping centres, banks and other places of personal business, as their next stop after leaving work.

Table 4 – Per Cent of Trips Showing Next Stage Destination for Trips Starting at Regular Workplace During the Evening Commute, 2005

Next Stage Destination	Men drivers—per cent of trips	Women drivers—per cent of trips
Home	**79.8**	71.5
Someone else's home	3.0	**4.6**
Another workplace	1.6	**1.8**
School/daycare	1.0	**2.3**
Shopping centre, bank, other place of personal business	6.8	**11.5**
Medical/dental	**0.7**	0.6
Leisure, entertainment, recreational, restaurant	**3.3**	2.8
Gas station	2.2	**3.0**
Other	1.6	**2.0**
Total	100	100

Source: Statistics Canada, Canadian Vehicle Survey—Annual 2005, special tabulations. Note: trips from the regular workplace to the regular workplace were eliminated before percentages were calculated.

Another way to look at the data is shown in Table 5 by examining the proportion of men and women drivers, leaving their regular place between 2:00 pm and 7:59 pm. If grouped by destination of the stage, men drivers comprise 60.1% of those headed directly home as opposed to only 39.9% for women. Men also lead in those heading to another workplace (possibly for another job, possibly involved in car

pooling) by 54.4% to 45.6%. Men drivers predominate in driving to medical/dental establishments by 62.5% to 37.5%. They also lead in heading for leisure, entertainment, recreational facilities and restaurants by 61.2% to 38.8%.

Table 5 – Proportion of Men and Women Drivers, Starting at Regular Workplace During the Evening Commute, by next destination, 2005

Next Stage Destination	Men drivers—per cent of trips	Women drivers—per cent of trips	Total
Home	**60.1**	39.9	100.0
Someone else's home	46.9	**53.1**	100.0
Another workplace	**54.4**	45.6	100.0
School/daycare	37.2	**62.8**	100.0
Shopping centre, bank, other place of personal business	44.4	**55.6**	100.0
Medical/dental	**62.5**	37.5	100.0
Leisure, entertainment, recreational, restaurant	**61.2**	38.8	100.0
Gas station	**50.2**	49.8	100.0
Other	**52.3**	47.7	100.0

Source: Statistics Canada, Canadian Vehicle Survey—Annual 2005, special tabulations

Women drivers, leaving work in the evening lead in the drive to school/daycare by 62.8% to 37.2%. They also lead 55.6% to 44.4% in driving to shopping centres, banks and other places of personal business. Driving to someone else's home also was dominated by women drivers 53.1% to 46.9%. This could possibly indicate car

pooling or care-giving services in a private home as opposed to a daycare. This is especially noteworthy when compared to the morning commute (see Table 3) where men drivers led in every category. Also as indicated earlier, men have reported driving two-thirds of the vehicle-kilometres in light vehicles in the Canadian Vehicle Survey.[8]

Driving to a gas station from work in the evening was more balanced with men drivers narrowly leading 50.2% to 49.8%.

This greater amount of trip chaining for women drivers when coming home from work in the evening found in Canada is similar to results found in the United States. A study on Kansas City found that "trip chaining for these working women in the Kansas City metropolitan region is most likely to occur on the way home from work".[9]

Conclusion

While men drivers predominated in terms of trips and vehicle-kilometres in light vehicles in Canada in 2005, there were differences between men and women drivers in their trip chaining.

The longer the trip chain, that is the greater number of trip stages involved in a complete tour, the greater the likelihood that the driver was female.

During the morning commute, a higher percentage of women drive to school/daycare and retail establishments as their next stop after leaving home.

During the evening commute, a higher percentage of men than women drive directly to home. A higher percentage of women drive to shopping centres, banks and other places of personal business, as their next stop after leaving work.

Why does this matter? Understanding the differences can help when planning transit routes, when analyzing traffic patterns, when trying

to plan traffic calming measures, when trying to plan retail locations, when trying to plan no stopping or no parking time periods. Designing a roadway system to facilitate flow from point A to B is more complex if a large sub-set of the users requires intermediate stops at points C, D and E.

Note

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Endnotes

[1] http://www.statcan.ca/bsolc/english/bsolc?catno=53-223-X. The CVS is a voluntary vehicle-based survey that provides quarterly and annual estimates of road vehicle activity (vehicle-kilometres and passenger-kilometres) of vehicles registered in Canada. A quarterly sample of vehicles is drawn from vehicle registration lists provided by the provincial and territorial governments.

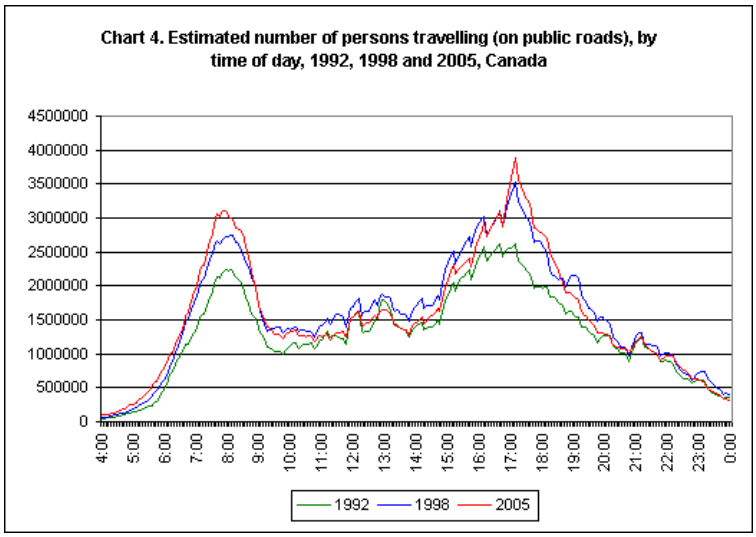
The provincial component of the survey consists of two steps. The first step is a computer assisted telephone interview (CATI) with the registered owners of the sampled vehicles. This interview is used to collect some general information on the usage of the vehicle as well as to ask the respondent to complete a trip log specific to his/her vehicle type. The trip log is then mailed out as a second step. If respondents cannot be contacted by phone, the trip log is mailed out with a short questionnaire to collect some of the information normally collected during the CATI. For 2005, a total sample of 21,915 vehicles was drawn for the ten provinces.

[2] Nancy McGuckin and Elaine Murakami, "Examining Trip-Chaining Behavior—A Comparison of Travel by Men and Women", page 4, 1995 Nationwide Personal Transportation Survey website: http://npts.ornl.gov/npts/1995/Doc/Chain2.pdf.

[3] Nancy McGuckin and Yukiko Nakamoto, "Differences in Trip Chaining by Men and Women", page 49, Research on Women's Issues in Transportation—Volume 2: Technical Papers, Transportation Research Board 2005.

[4] Karthik K Srinivasan and Sudhakar Reddy Athuru, "Analysis of Within-Household Effects and Between-Household Differences in Maintenance Activity Allocation", page 12, paper 05-2132, Transportation Research Board 2005 Annual Meeting CD-ROM.

[5] The morning commute is a shorter period of time than the evening commute. For this reason we have used a four hour period for the morning commute and a six hour period for the evening commute.



Catherine Allan, Heather Dryburgh, Dave Horlor, "Canada's General Social Survey on Time Use: Challenges and Potential, 2005", Statistics Canada catalogue 89-622-XIE no. 3, chart 4.

[6] Nancy McGuckin and Yukiko Nakamoto, op cit, page 49.

[7] Statistics Canada, Canadian Vehicle Survey: Annual 2005 (revised), catalogue no. 53-223-XIE, Table 6-2, page 21.

[8] Statistics Canada, Ibid.

[9] Stacey Bricka, Analyzing Women's Trip-Chaining Patterns to identify Potential TOD Retail Activity Mixes, page 6, paper 05-0502, Transportation Research Board 2005 Annual Meeting CD-ROM.