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Abstract. Parking spaces are becoming strategic commodities in central urban areas. Nevertheless, few datasets allow to precisely measuring the use of these spaces in terms of population segments, activity types and duration. In order to document this issue, this paper proposes some empirical measures and methods regarding the use of parking spaces in a strategic urban area. This analysis is conducted with specific data collected during two recent large scale travel surveys held in the Greater Montreal Area. The Montreal Region has a long experience in conducting travel surveys with large samples of people. Actually, phone surveys on daily travel behaviours have been held for more than thirty years, approximately every five years, since 1970. Collected sample represent 5% of the population (app. 70 000 households in 2003).

In the two latest surveys (1998 and 2003), a new question was added to gather data regarding the use of parking spaces in central urban areas. Car drivers heading towards these areas were enquired regarding the type of parking space used. Parking spaces were classified according to their jurisdiction (private/public), location (indoor/on the street/outdoor) and rates (free/fee-charging/subsidized by the employer). Using these data, statistics describing the use of these spaces are developed. On the one hand, people benefiting from the various types of parking spaces are described in terms of residence location, demographic attributes and type of activity. On the other hand, parking accumulation profiles are developed and summarised by key indicators.

Keywords. Parking spaces, travel survey, Montreal area, parking accumulation profile.

Acknowledgements. The authors wish to acknowledge the technical committee on travel surveys of the Greater Montreal Area that conducts these recurrent data acquisition processes. They also wish to acknowledge the AMT which supports various research topics namely the study of parking use in central areas. Finally, the authors wish to acknowledge the transportation professionals of the Plateau Mont-Royal borough for their dynamical approach on transport planning.

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1 Introduction

The study of parking spaces in urban areas, specifically in areas where cars compete for the available spaces and share the streets with walkers and transit, is a critical issue for planners. This type of analysis generally relies on datasets collected specifically for this purpose that do not contain details regarding the attributes of the users and activity at the destination place.

This paper makes use of travel data from Origin-Destination surveys to study the use of parking spaces in strategic urban areas. It also takes advantage of newly available data to describe the users of these infrastructures. As noted by Shiftan and Bud-Eden (2001), parking policy is one of the most powerful means urban planners and policy makers can use to manage travel demand and traffic in city centers. Yet, it has received comparatively little study upon which to ground the development of policies for the future (Marsden, 2006, Ison and Rye, 2006). One of the explanation for this is that few datasets allow to measure how and when the parking spaces are used during a typical weekday and, above all, who are the people benefiting from this service. This is quite relevant when one wants to evaluate the impacts of a parking policy, both in terms of travel behaviours and social equity (Kelly and Clinch, 2006).

In this regard, empirical measures of the use of parking spaces in a critical urban area of the Greater Montreal Area (GMA) are proposed using Origin-Destination travel data. Variables such as age, gender, residence location and activity type are examined with respect to parking events and duration.

The paper is organized as follow. First, a review of some discussions regarding parking policy is done. Then, a description of the available datasets, from the two latest Origin-Destination (OD) surveys held in the GMA is made. This section gives the details of the information collected regarding parking spaces. Measures and analyses are then presented. These focus on the evaluation of indicators such as parking accumulation profiles and average parking duration for the various types of parking spaces and key population segments.

2 Background

Researches regarding parking spaces address various aspects, namely data collection issues and parking policies as a travel demand management strategy.

Bonsall (1991) presents various data collection methods that are used to gather information on parking spaces. He also discusses the role of technology in the advancement of these methods as well as the availability of data to assess the use and impacts of parking spaces.

Tong et al. (2004) present a method, based on cluster analysis, to construct aggregate parking accumulation profiles at car parks to increase the efficiency of survey data collected for this purpose. Accumulation profiles reveal the number of cars parked at various locations throughout the day. These authors state that such profiles assist transport professionals in the decision process. Actually, they can validate parking demand models, assist the development of real time parking information systems or be used to evaluate various traffic management strategies.

In a recent paper, Marsden (2006) provides an interesting review of the literature relating to the behavioural response of drivers to a series of real or hypothetical parking policies. He concludes that the assumption that parking constraint makes center less attractive and discourage economic development is not confirmed and needs to be challenged.

Alberta and Mahalel (2006) present a study aimed at evaluating the differences in attitudes towards congestion tolls and parking fees in order to predict the impact of each of these policies on demand for trips and on travel behaviour. They use data from a stated preference survey. They show that congestion tolls have a greater impact on travel behaviour than parking fees and suggest that this is due to the fact that the latest are more accepted and that it is more appealing to chose another time for the journey (and avoid tolls) than to change destination.

Axhausen and Polak (1991) use stated preferences data to model travellers response to changes in parking attributes and show that journey purposes has a strong impact on the value of time and consequent parking choices.

Shiftan and Burd-Eden (2001) also use stated preference survey data to model the likely response of drivers to parking policy alternative (increase in parking costs and decrease in parking availability). They found that workers are more likely to change mode or time of travel than to change destination or activity. They also found that non-workers are more sensible to policies than workers.

Kelly and Clinch (2006) discuss the variance of price impacts on different trip purposes, initially, and as tariffs increase progressively. As they say, "*with much of the research examining how parking policy will affect cars and congestion in the network, clearly there is an individual impact which must also be investigate*". They use on-street survey data to measure such impacts.

3 Information system

3.1 Origin-Destination surveys and area

The GMA has a long tradition of conducting large scale travel Origin-Destination (OD) surveys. Actually, OD surveys have been conducted regularly in the region since the early seventies. These surveys sample approximately 5% of the residing population and gather data regarding a weekday of urban travel. The interviews are conducted by phone and are assisted by a CATI system since 1998. Information on households (size, car ownership, home location, mobility), people (age, gender, driving license, main occupation) and trips (time of departure, purpose, mode sequence, transit path, highways/bridges, type of parking spaces, …) are gathered.

As a consequence of urban sprawl, the survey area has expanded during this period: it was 1 190 km^2 in 1970 and now covers a 5 500 km^2 area (2003 survey). The residing population was 3.605 millions of people in 2003 compared to 2.484 in 1970.

3.2 Questions on parking spaces

In the last two travel surveys (1998 and 2003), a new question regarding the type of parking space used at the destination place was added. The purpose of this new question is to better understand the use of these critical infrastructures in areas where a mode shift towards more sustainable modes such as transit could be welcomed. For all car driver trips heading towards a subset of the survey area, the following question was asked "*In what type of parking space have you parked your car?*". The next table shows the set of possible answers as well as the classifications defined for analysis purposes (classification by location and classification by type of rate).

Choice	Definition	Class. location	Class. rate
1	Street / free	1	1
2	Street / parking meter	1	2
3	Street / parking sticker for residents	1	4
4	Private residential parking or garage (home location)	1	4
5	Outside / free	2	1
6	Outside / fee-charging	2	2
7	Outside paid / subsidized by employer	2	3
8	Interior / free	3	1
9	Interior / fee-charging	3	2
10	Interior paid/ subsidized by employer	3	3
11	Park and ride lot	4	5
12	Kiss and ride (ridesharing trips)	4	5

The next figure shows the areas of the 1998 and 2003 OD surveys as well as the subset of the area for which the question on parking spaces was asked. It was widened for the 2003 survey.

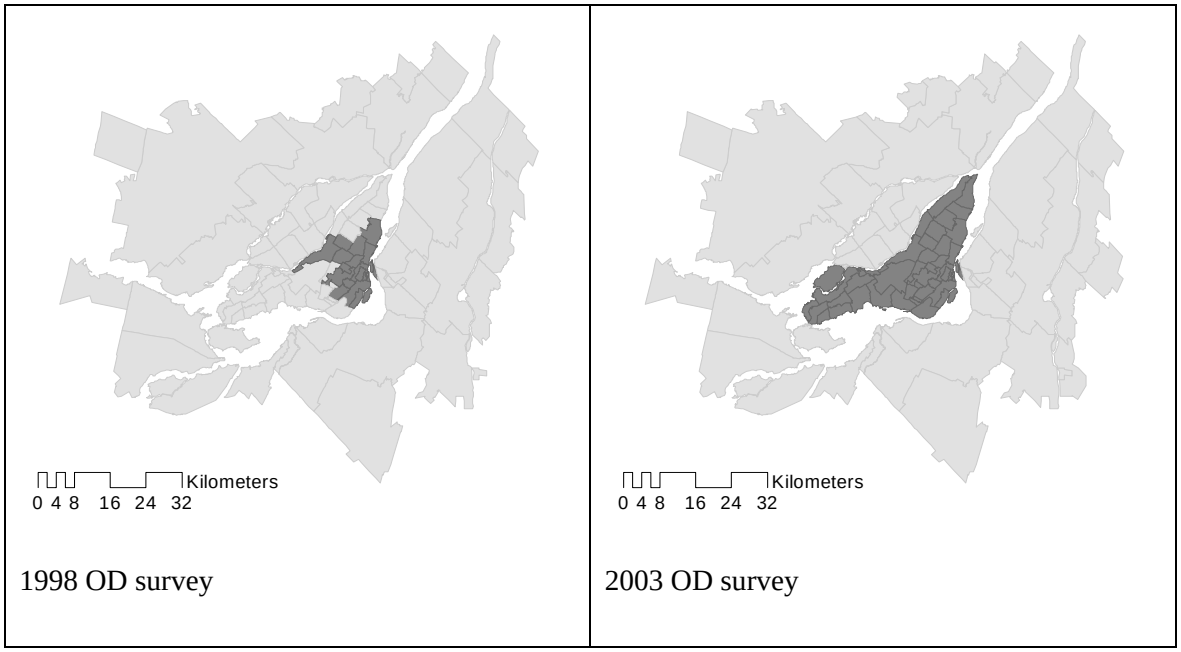


Figure 1. Survey areas and subset of the area for which question regarding the type of parking space used at the destination point was asked (1998 and 2003 surveys)

3.3 Sample

For the purpose of this study, a subset of data was selected in order to observe the use and attributes of parking spaces in a critical urban area. A borough of the Montreal City was selected due to its important urban life and traffic issues, the PMR (Plateau Mont-Royal) (see Figure 2). Planners from this borough are in the process of refining the Montreal transportation plan. They seek to identify specific strategies for their area; issues such as enhancing safety, reducing negative impacts of

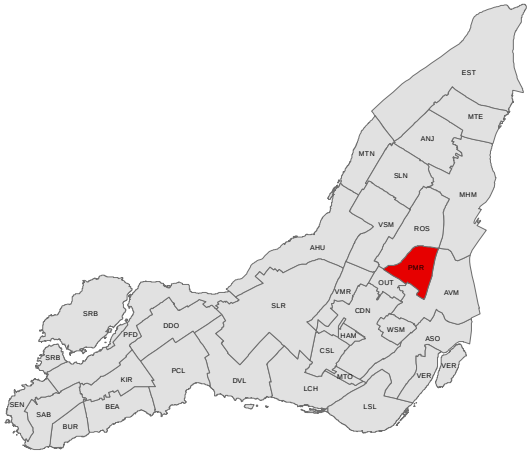


Figure 2. PMR borough

traffic on the residents or facilitating accessibility to the local stores are discussed. Parking spaces are viewed as one way to manage travel demand in the area.

According to the 2001 Canadian census (data available in Ville de Montréal, 2005), the PMR borough has 101 000 inhabitants and 56 800 households from which 53% are single-person households. It is a quite dense area since its average density is 13 096 inhabitants/km^2 compared to an average density of 3625 inhabitants/km^2 for the City of Montreal. The average annual income of households is lower than the one for Montreal City: 41 716$ compared to 49 429$. Approximately 78% of the people are tenants of their dwelling. The borough is mostly residential, with some commercial streets and few industries.

In 2003, around 10 000 trip ends were observed in this borough during a typical weekday, from which 3 400 (34%) due to car driving. These observations represent 256 200 trips and 83 800 car driver trips when the data are weighed.

4 Concepts, analysis and results

Origin-destination (OD) survey data are not the usual data source to study parking spaces. However, they have the ability to reveal the use of space simply by following people or cars, in space and time, during a typical weekday. For areas regularly conducting travel surveys, it gives a portrait of the parking space use in time. In our case, the new question added regarding the type of parking space at the destination place allows characterising the use (duration, activity) and the users (age, gender, home location) of these infrastructures. It gives the opportunity to evaluate how these parking spaces are used on a typical weekday of fall. This type of information helps planners assess the impacts of parking policies both in terms of infrastructure usage and population segments.

We borrow the definition of a concept regarding parking space presented by Tong et al. (2004): a parking accumulation profile (PAP) shows the variation of parking accumulation (number of vehicles staying

within a parking facility at a specified time) of a parking facility or a group of parking facilities within a specified period. OD survey data can be used to construct these profiles. To do so, car driver trips heading towards the PMR borough are retrieved from the trip file and simulated on the detailed road network to estimate an arrival time at the destination place. Cars are monitored in their spatio-temporal movements and cumulated when stationary within the study area. Since attributes of the drivers « travel » with the car, it is possible to describe, in every point in space and time, the cars according the various features of their drivers.

The available data are hence used to evaluate supply, demand and performance indicators in the selected areas :

- Supply: Since no inventory of the number of parking spaces is available, a theoretical supply of parking spaces of various types (street, outside, inside / free, fee-charging, subsidised) is evaluated. The follow-up of the cars in space and time makes it possible the construct accumulation profiles. We can also observe the maximum number of cars simultaneously parked in the areas. From this is derived the observed capacity.

- Demand: The demand for parking spaces is directly obtained with the accumulation profiles. Hence, in addition to summing up the number of cars in an area, we also classify the cars according to politic-relevant attributes such as home location of the driver (for fiscal issues), age and gender (for equity issues) and activity type (for economical and transport planning issues).

- Performance: The description of the parking events allows appreciating to the quality of parking supply in to borough. Performance is evaluated by the duration of the parking events, for the various parking space types.

4.1 Parking events in the PMR borough

A first description of parking use in the PMR borough is given by the number of parking events observed. A parking event occurs when a car driver parks his car in order to perform an activity. It does not take into account the duration of the event.

Table 1 presents the distribution of parking events according to the type of parking space, as observed in the two surveys. The first surprising fact is that the number of parking events has decreased in time. Hence, the distribution of these events in the various types of parking space has also changed: the proportion of street and free parking has decreased mainly to the advantage of outside paid / subsidized by employer.

Distribution of parking events by parking type	1998	2003
Street / free	48.0%	43.8%
Street / parking meter	9.8%	8.7%
Street / parking sticker for residents	5.5%	5.9%
Private residential parking or garage (home location)	9.8%	10.7%
Outside / free	8.3%	9.1%
Outside / fee-charging	4.1%	3.6%
Outside paid / subsidized by employer	4.7%	7.9%
Interior / free	0.9%	0.8%
Interior / fee-charging	1.1%	1.2%
Interior paid / subsidized by employer	1.4%	0.9%
Park and ride lot	0.3%	0.4%
Kiss and ride (ridesharing trips)	6.1%	7.3%
Parking events / day	88 900	80 500

Table 1. Distribution of the daily parking events in the PMR by parking type (1998 and 2003)

The Table 2 summarises similar results but for the subset of the parking events occurring at activity location (excluding private parking spaces, spaces requiring a resident stickers as well as park-and-ride lots and kiss-and-ride). Parking events are also classified by location and rate. We see that:

- The proportion of street parking events has declined; still it accounts for almost 70% of the parking events.
- The proportion of parking events in free spaces has declined but the proportion subsidized by the employers has increased.
- Interior parking account for less than 5% of the daily parking events in the area.

Parking events 1998	Free	Fee-charging	Subsidized by employer	Total
Street	61.3%	12.5%	0.0%	73.8%
Outside	10.6%	5.2%	6.0%	21.9%
Interior	1.2%	1.4%	1.8%	4.4%
Total	73.1%	19.1%	7.8%	69 700

Parking events 2003	Free	Fee-charging	Subsidized by employer	Total
Street	57.8%	11.4%	0.0%	69.2%
Outside	12.0%	4.7%	10.4%	27.1%
Interior	1.1%	1.5%	1.2%	3.7%
Total	70.8%	17.7%	11.5%	61 000

Table 2. Evolution of daily parking events according to rate and location (1998 and 2003), excluding private parking spaces, spaces requiring a resident stickers, park-and-ride lots and kiss-and-ride

4.2 Description of the demand for parking spaces

OD survey data also allows describing the attributes of the users of the various parking spaces available in the borough. We focus on three aspects: home location, demography and activity type.

4.2.1 Home location

Home location of parking space users is relevant when one wants to measure the part of the local services used by non-residents and apply relevant fee-charging politics. For this purpose, home location of users is segmented in geopolitical significant classes: residents of the borough (20 400 people),

residents of the Montreal Island excluding the borough (1 792 000 people), residents of near suburbs (691 000 people), residents of outer suburbs (1 101 000 people).

In 2003, 40.0 % of the parking events in the PMR borough are performed by residents of the borough while 41.3% are due to residents of the rest of the Montreal Island. The remainder of the parking operations are done by near suburb residents (10.1%) and outer suburbs residents (8.5%). The figures from 1998 are quite similar. A small decrease in the proportion due to residents of the borough is observed: it was 42.2% in 1998.

Using the same classification as in Table 2, for the subset of parking spaces used at activity locations (excluding private parking spaces, spaces requiring a resident stickers as well as park-and-ride lots and kiss-and-ride), we observe that (Table 3):

- Approximately 16.6% of the parking events in free spots are done by people residing outside of the Montreal Island (near and outer suburbs);
- Up to 41.4% of the parking events in subsidized spots are done by people also residing outside of the Montreal Island, 20.1% of which by people residing in outer suburbs;
- Street parking events are done, at a 84% level, by residents of the Island;
- Up to 44.6% of free parking events on the street are done by resident of the borough.

2003 daily parking events		Free	Fee-charging	Subsidized by employer	Total
PMR resident	Street	44.6%	18.5%		**40.3%**
	Outside	24.5%	7.0%	7.9%	**15.2%**
	Interior	27.4%	11.7%	4.8%	**14.1%**
	Total	**41.0%**	**14.9%**	**7.6%**	**32.6%**
Montreal Island	Street	40.0%	61.7%		**43.6%**
	Outside	54.1%	47.9%	50.5%	**51.7%**
	Interior	45.2%	48.5%	55.4%	**49.7%**
	Total	**42.5%**	**56.9%**	**51.0%**	**46.0%**
Near Suburbs	Street	9.1%	13.5%		**9.8%**
	Outside	9.7%	17.0%	20.5%	**15.1%**
	Interior	20.8%	26.7%	28.4%	**25.6%**
	Total	**9.4%**	**15.5%**	**21.3%**	**11.8%**
Outer suburbs	Street	6.3%	6.4%		**6.3%**
	Outside	11.7%	28.1%	21.1%	**18.1%**
	Interior	6.7%	13.1%	11.4%	**10.7%**
	Total	**7.2%**	**12.7%**	**20.1%**	**9.7%**
GLOBAL	Street	**35 100**	**6 900**	**0**	**42 100**
	Outside	**7 300**	**2 800**	**6 200**	**16 300**
	Interior	**700**	**900**	**700**	**2 300**
	Total	**43 000**	**10 700**	**6 900**	**60 600**

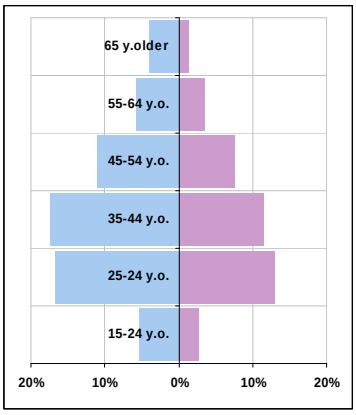
Table 3. Use of parking events according to home location of car drivers as well as rate and location of parking spaces (2003 OD survey)

4.2.2 Demography

The study of parking events in the PMR by cohort and gender reveals various things:

- The average age of the drivers parking their car in this borough is 42.2 years old in 2003, a 1.7 years increase comparatively to 1998. Hence, average age of women is lower than the one of men (42.8 vs 41.3 years old in 2003). Finally, the average age is lower for street and free parking as well as for parking for residents (stickers). Highest average ages are observed for interior free parking lots.
- The proportion of men using the parking spaces his higher for all types of parking spaces except for outside and fee charging lots. In average, 59.5% of the parking events in this area are done by men and this represents a light decrease in proportion with comparison to 1998 where men where responsible for 61.8% of the daily parking events.

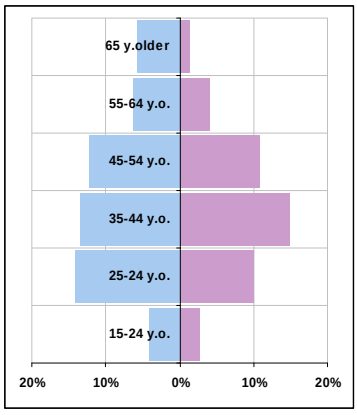
The Figure 3 summarises the age patterns of the parking events. Each age pattern graphic expresses the proportion of the parking events due to a specific group of people. The figure also shows the average age of people using the parking spaces and the men/women ratio. It confirms that free parking spaces are used by younger people, that paid or subsidised parking spaces are mainly available to men and that interior lots are the one where women are in highest proportion.



Free

Average age: 40.47 y.o.

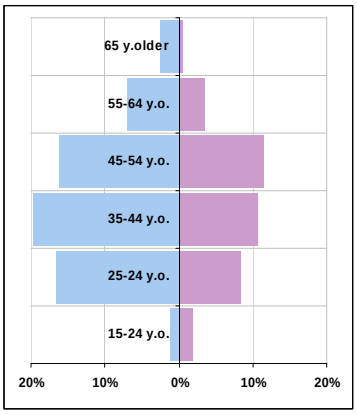
Men/Women ratio: 1.507



Fee-charging

Average age: 42.39 y.o.

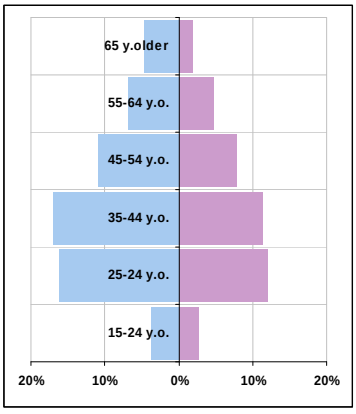
Men/Women ratio: 1.262



Paid / subsidized by employer

Average age: 42.40 y.o.

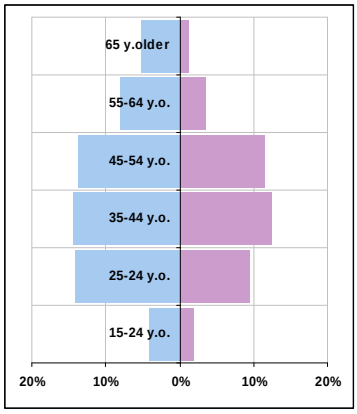
Men/Women ratio: 1.727



Street parking

Average age: 41.75 y.o.

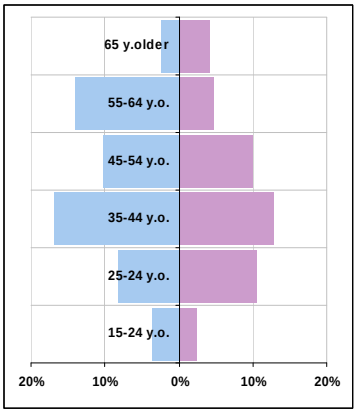
Men/Women ratio: 1.462



Outside lot

Average age: 42.93 y.o.

Men/Women ratio: 1.480



Interior lot

Average age: 44.36 y.o.

Men/Women ratio: 1.231

Figure 3. Demographic structure of the parking events

4.2.3 Activity type

The type of activity at the destination place also influences the type of parking space used. In this case, the activity type is related to the purpose of the trip that is related to the parking event, according to the OD survey declaration.

Figure 4 shows that app. 37% of the parking events observed by OD travel data relate to return to home location by residents. We also observe that the proportion of parking events for leisure activities have decreased in the recent years and now account for less that 16% of the events. Parking for shopping events remains stable.

Figure 5 presents which type of parking spaces are used for the main activities. It first confirms that the data gathered during the travel surveys are consistent and valid. We observe, for instance, that subsidized parking spaces are mainly used during work activities, that shopping activities rely on free (street / outside / interior) and street parking-meter and that residents use street or private garage when the return home.

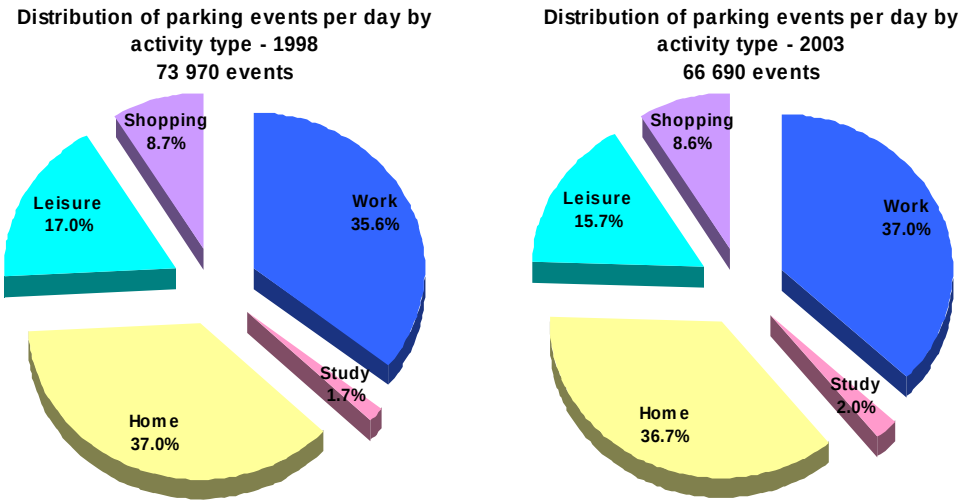


Figure 4. Distribution of daily parking events by activity type at the destination (for the main activities), for 1998 and 2003

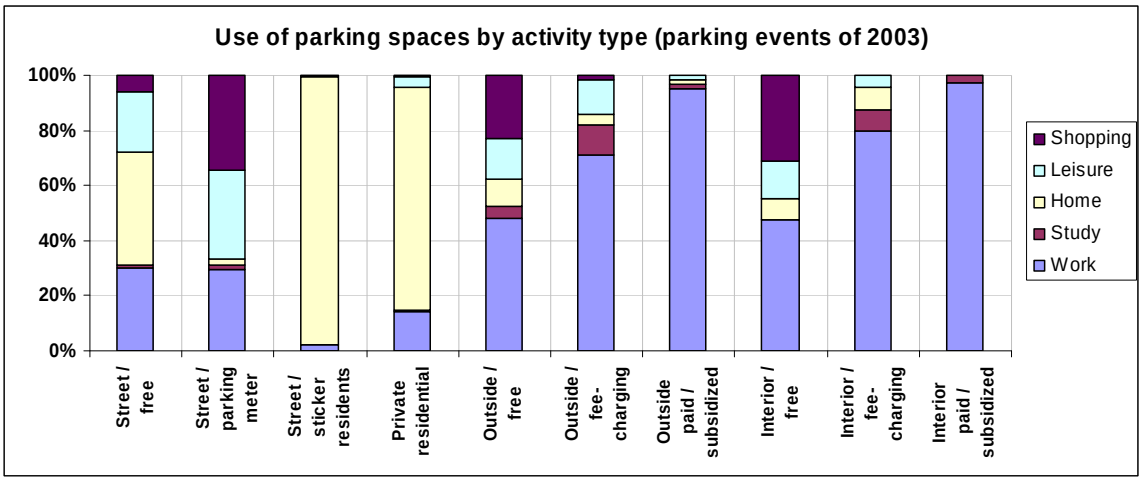


Figure 5. Use of parking spaces by activity type (2003)

4.3 Parking accumulation profiles and duration

In order to go beyond the previous figures, parking accumulation profiles (PAP) are constructed using the travel survey data. The average duration of parking events is also estimated. Because PAPs are derived from individual trip data collected in urban OD surveys, they can be constructed for various population segments to see if all have similar patterns of use as well as for activity and parking types.

First, the observed capacity for the various parking types are estimated using the two datasets (1998 and 2003) (Table 4). The observed capacity is the maximum number of cars simultaneously parked in the area. According to these data, the overall capacity has increased by 1000 cars from 1998 to 2003. "*Sleeping cars*" are cars that were not used at any moment during the average weekday related to the OD survey. An imputation method was used to assign a parking type for the cars located in the borough at the beginning of the day (before their first trip).

Observed capacity of parking supply in the PMR borough	Observed capacity	
	1998	2003
Street / free	15 720	13 750
Street / parking meter	2 740	2 110
Street / parking sticker for residents	3 340	3 450
Private residential parking or garage (home location)	5 170	5 570
Outside / free	3 400	3 800
Outside / fee-charging	2 620	2 100
Outside paid / subsidized by employer	3 210	5 110
Interior / free	410	360
Interior / fee-charging	650	800
Interior paid / subsidized by employer	1 080	650
Park and ride lot	160	200
Kiss and ride (ridesharing trips)	770	1 340
Unknown	6 780	6 910
Sleeping cars	700	530
Total	**33 900**	**34 700**

Table 4. Observed capacity of parking supply in the PMR in 1998 and 2003

4.3.1 Parking type

The average weekday PAP for the PMR borough in 2003 is presented in Figure 6. The maximum number of cars simultaneously parked in the borough is 34 700 and occurs at 15h00. From 6h00 am to 24h00 pm, we count more than 552 000 hours of parking in the borough. Figure 7 spatially represents the number of cars parked in the borough at four different periods of the way (all types of parking spaces). It allows identifying the main parking lots as well as the use of local streets for home parking at night.

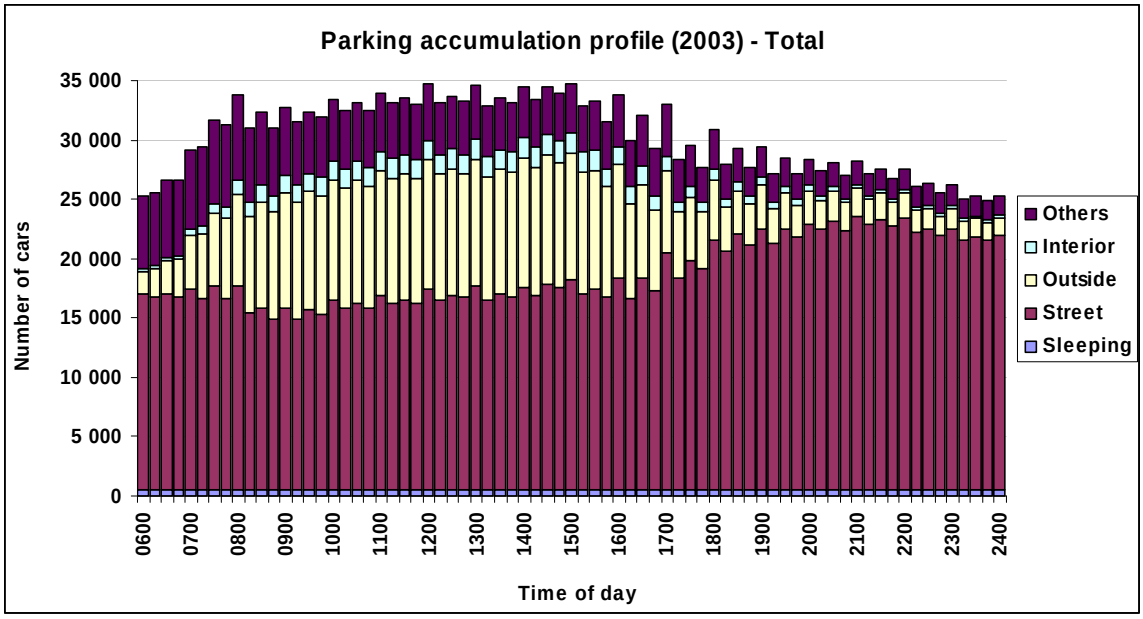
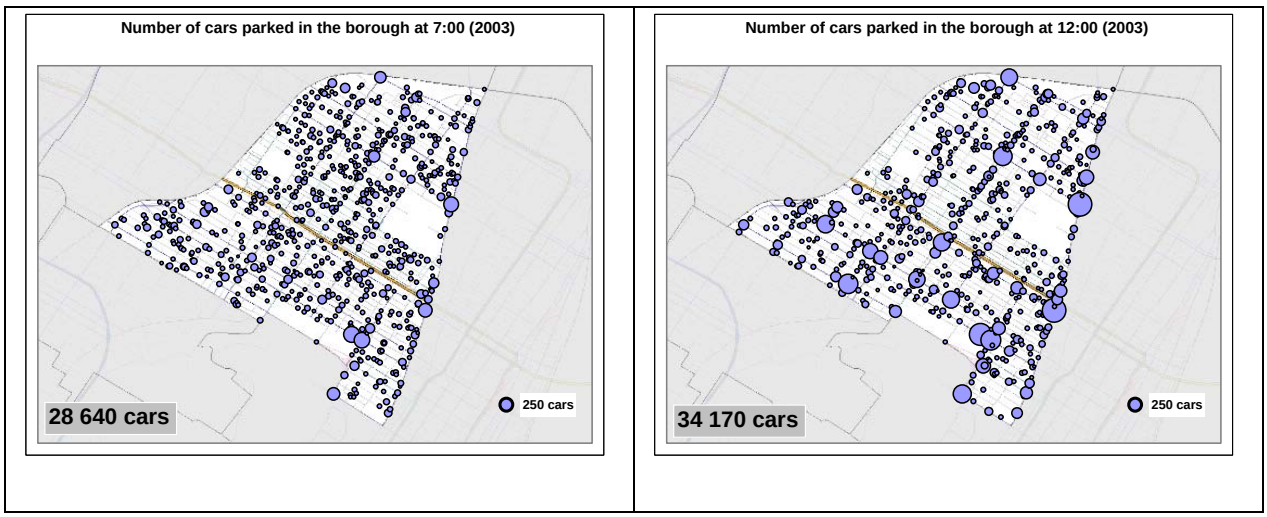


Figure 6. 2003 Parking accumulation profile (PAP) by parking type (location)



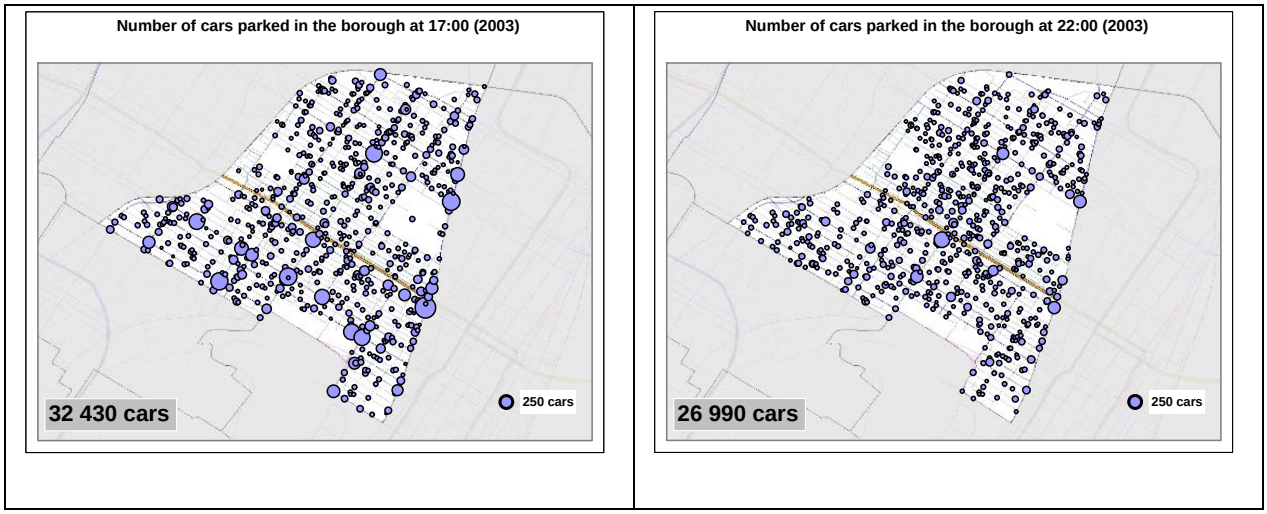


Figure 7. 2003 Parking accumulation profile (PAP) by parking type (location)

Figure 8 also shows a parking accumulation profile but with the accumulation of cars done separately for the various classes of parking space (location and rate classes). It allows observing their temporal structure of use. For instance, we see that outside and interior parking spaces are used during the day period (8h00-16h00) while the street parking support more cars in the evening (after 17h00).

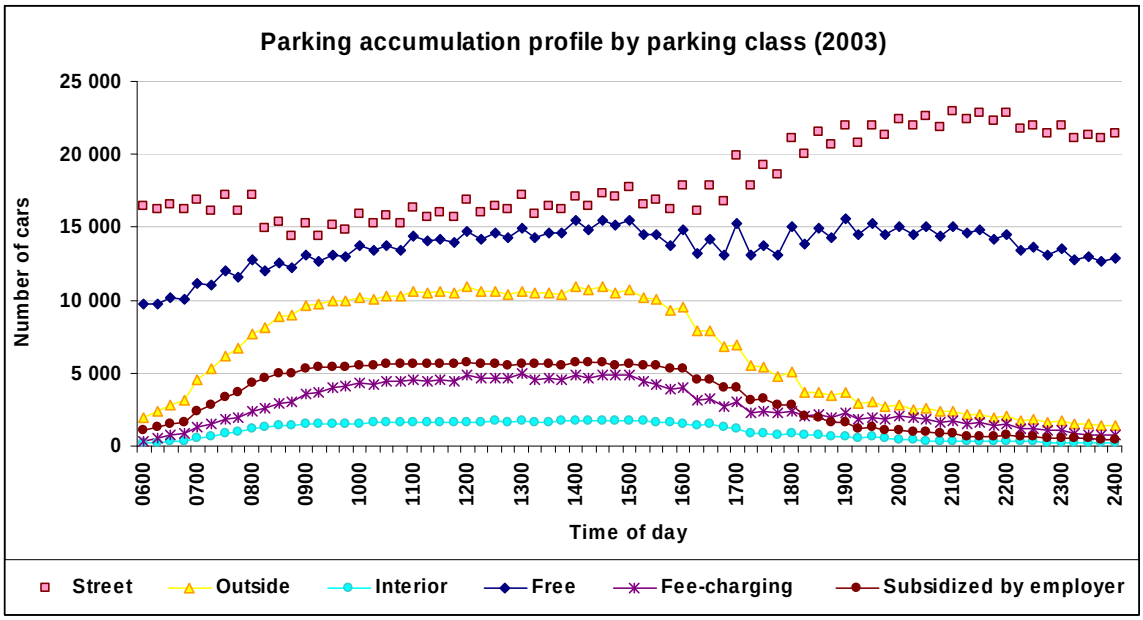


Figure 8. 2003 Parking accumulation profile (PAP) by parking type (location)

The PAP, combined to the numbers regarding parking events, allows estimating average duration of parking events in the borough. Table 5 shows these average durations for parking events occurring in

spaces at activity locations (cross-classification by location and rate). We see that the average parking event duration has increased and is now near 7 hours. We also observe that subsidised parking spaces have the longest duration of use.

Average duration of events 1998	Free	Fee-charging	Subsidized by employer	Total
Street	6.54 h	3.21 h		5.97 h
Outside	6.06 h	7.82 h	8.44 h	7.14 h
Interior	8.86 h	7.62 h	8.83 h	8.45 h
Total	6.50 h	4.80 h	8.53 h	6.34 h

Average duration of events 2003	Free	Fee-charging	Subsidized by employer	Total
Street	7.30 h	3.27 h		6.64 h
Outside	6.01 h	7.60 h	9.25 h	7.53 h
Interior	6.88 h	9.21 h	9.11 h	8.52 h
Total	7.08 h	4.94 h	9.24 h	6.95 h

Table 5. Average duration of parking event for various types of parking space in 1998 and 2003, excluding parking at home location

4.3.2 Home location

A PAP was also constructed by home location. It is shown in Figure 9 and reveals the migration patterns of non-residents that come to the borough during the day period to perform various activities. This graphic also shows the number of resident cars that are in the area at the beginning of the day, that leave the area to perform activities elsewhere and that come back, at the end of the day. Near and Outer suburbs bring a maximum of around 5000 cars each daily in the PMR borough. The distribution of total hours of parking (from 6h00 to 24h00) in the borough according to home location reveals that non-residents of the borough are responsible for more than 40% of this daily consumption (25% consumed by resident of the rest of the Montreal Island, 7.8 % by near suburbs residents and 8.6% by outer suburbs residents).

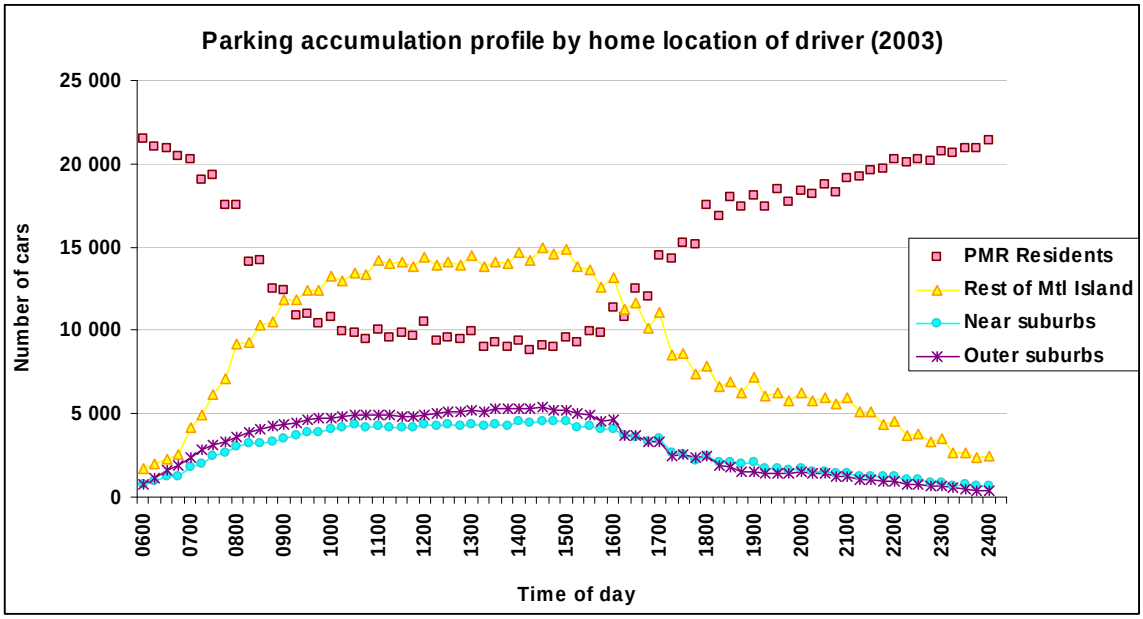


Figure 9. 2003 Parking accumulation profile (PAP) by home location of car driver

4.3.3 Activity type

Finally, PAPs are constructed for cars according to the purpose of the trip at the destination place (Figure 10).

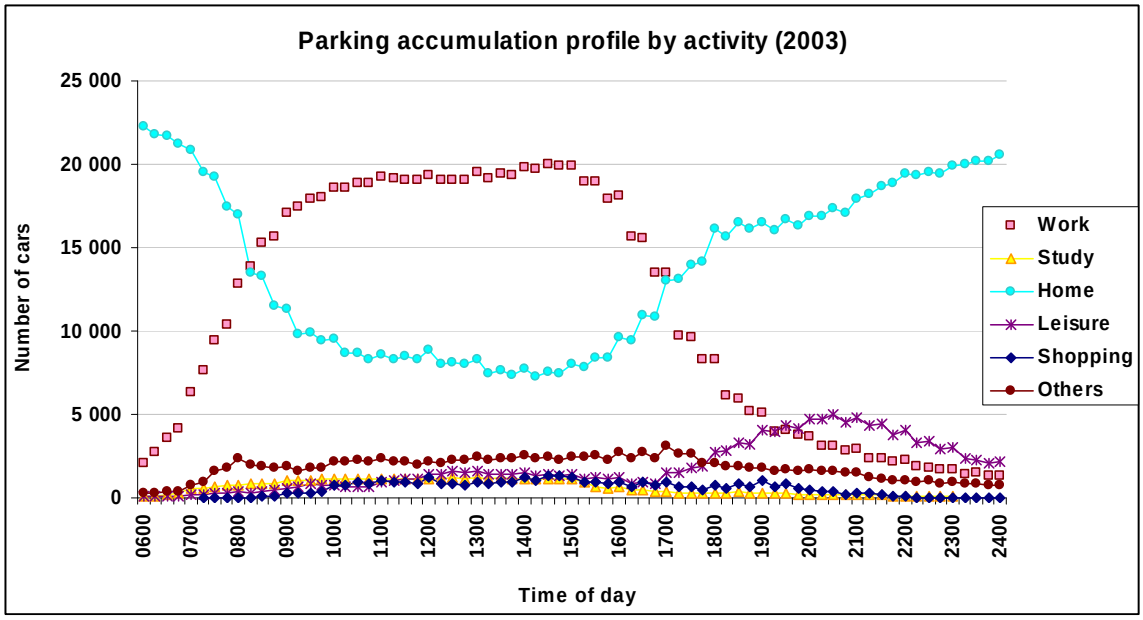


Figure 10. 2003 Parking accumulation profile (PAP) by home location of car driver

The observed temporal patterns are quite straightforward. The number of cars parked in the borough for work purpose peaks during the day while the number of cars parked at home locations declines inversely. Work is the main activity bringing cars in the borough. Leisure is responsible for the use of parking spaces in the evening.

Average duration of parking events at activity locations is presented in Table 5. It seems like work and study activity duration have increased in the recent years. Shopping activities are the shortest ones.

Average duration of parking events by activity type		
	1998	**2003**
Work	7.72 h	8.37 h
Study	7.20 h	8.32 h
Leisure	3.35 h	3.46 h
Shopping	1.64 h	1.71 h

Table 6. Average duration of parking event for main activities in 1998 and 2003

5 Conclusion

Despite the fact that almost every private car trip involves two parking acts and that cars spend over 80% of the week parked (RAC Foundation, 2004), the transport research community has, for the most part, concentrated on the study of the problems of congestion, safety and the environment caused by vehicles in motion (Marsden, 2006). In addition, we believe there is a need to study the immobile cars.

This paper has shown the potentialities of using large household origin-destination surveys to better characterize the use of parking spaces in a given area. The “Plateau Mont-Royal”, in Montreal, is a densely populated borough, mostly residential. The study finds some facts about the area: subsidized parking is mostly used by men, free parking is used by younger people, and interior parking is mostly used by women. These kind of analysis could help to plan building future parking spaces (or removing

some), with a better knowledge of the impacts on car users. The parking accumulation profile also brings new ways of looking to daytime population of cars in a given area. The research adds a new application of household survey data in the Greater Montreal area, thanks to the new question on parking events.

Further researches are to consider. Looking at the controversial issues on parking's harmful effects on local residents can benefit form this kind of study. It is critical in central areas where residents pay additional home taxes to maintain infrastructures while not always being totally responsible for their deterioration. However, with the approach developed in this paper, we can identify the beneficiaries of the parking spaces of a borough. With other components of the household data, it could be possible to evaluate the road (and possibly transit) network use prior to the parking events. The parking fare policy could also be evaluated on several aspects. Unfortunately, data on fees for the related parking spaces are not available and it precludes us from investigating further on the issue of mode choice

It is our belief that Origine-Destination travel surveys, enriched with few questions on parking use at the destination points, can be used to gather relevant information on parking. It is quite relevant since it also allows describing the people which uses the various parking spaces. It could replace current data collection method or fill information holes for authorities with no information on the subject.

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