A SPATIALISATION OF DAILY MOBILITY BEHAVIOUR IN FRANCE

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ABSTRACT

This study examines daily mobility behaviour given the demographic recovery of rural areas in a majority of European countries, as well as homogenising forces in lifestyles between urban and rural residents. It examines the homogeneity of behaviour in daily mobility, regardless of place of residence. An alternative approach is used to do this, drawing on data of daily mobility provided by France's National Survey of Transport and Travel (*Enquête Nationale Transports et Déplacements*). The research demonstrates the homogeneity of daily mobility and looks at possible explanations.

Keywords: daily mobility, mobility patterns, homogeneity, lifestyles, urban, rural, France

INTRODUCTION

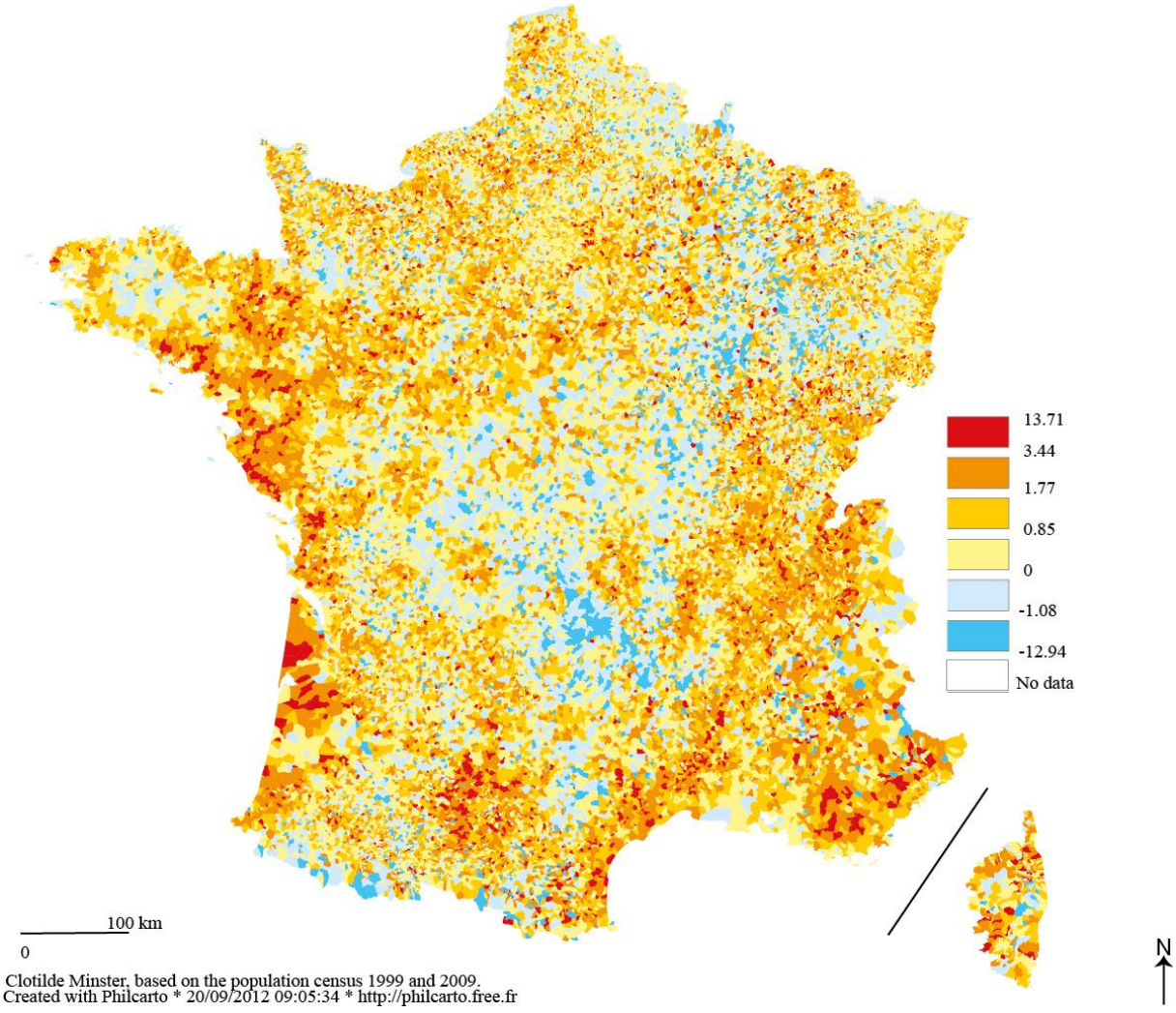
Rural areas in France have long been associated with a backward image: the rural exodus began in the late 19th century and lasted until the middle of the 20th. Between 1872 and 1968, rural areas lost more than 10 million inhabitants, the balance between exodus and return. This was about 40% of France's population (Talandier, 2007). The importance given to the countryside was summarised by the French writer, Georges Pérec, who wrote in *Espèces d'espaces* in 1974 that: "I don't have much to say about the country: it doesn't exist, it's an illusion".

The image of rural areas was first modified, however, in the 19th century with the Romantic Movement. More recently, renewed interest has come from urban (and rural) residents. Accordingly, France's rural areas have witnessed a demographic upturn since the 1975 census (Bessy-Pietri *et al.* 2000). This new demographic trend began at the end of World War II, and has also been noticed abroad since the 1970s. The dynamics of this demographic revival has been questioned, both in France and elsewhere (see in particular the case of the Scottish Highlands and Islands, the west of Ireland and even northern Sweden).[1] Whatever its causes, rural areas in mainland France have seen a rise population. At first, it seemed that this

[1] See the website of the LEADER project by the European Commission: http://ec.europa.eu/agriculture/rur/leader2/rural-en/biblio/pop/contents.htm

movement affected only rural zones close to large towns.[2] But the 1999 census revealed that there was also a positive migration balance towards isolated rural areas (Talandier, 2009). Furthermore, it may be noted that the migratory balance has compensated the natural balance since 1975 (Bessy-Pietri *et al.* 2000). As the map below shows, the annual average growth rate of the population from 1999 to 2009 was positive in a majority of communes in mainland France, and in fact concerns all communes.

Figure 1 – Annual average population growth rate in France between 1999 and 2009 (in %).



A change of paradigm is thus underway. Instead of rural areas being seen as negative, their evolution stands out positively, with the expression "rural renaissance" entering the literature (Sencébé and Lepicier 2007). Also, it is possible to observe a shift to the homogenisation of behaviour in rural and urban areas. This homogenisation of lifestyles across town and country began in the 1950s with the breakdown of traditional family structures and then through the evolution of interactions between rural and urban residents (Gervais *et al.* 1992).

[2] The increase in population in rural areas was thus a movement related to suburbanisation and residential migration in areas that were relatively close to centres of employment.

This homogenisation of behaviour was highlighted in the example of the village of Plodémet. Situated in Brittany, it was studied for five years by a team of sociologists and geographers (Morin 1984).Their study was published in 1984 and shows how increasing interactions with towns (helped among other things by car use) radically changed the lifestyle of the inhabitants of Plodémet, including: changes in eating habits and the emergence of dietary concerns, the encouragement of consumptionist behaviour, the complete transformation of the relationship to money within a generation, etc. (Morin, 1984). This homogenisation of lifestyles was made possible by the individualisation of daily practices.

The consequences of the two dynamics presented here (a demographic dynamic and a dynamic linked to lifestyles) have spatial implications. Thus, as Hervieu and Viard have noted, "urban and rural people no longer exist" (2001). Instead, individuals now live in areas which are either predominantly rural or urban. This has been made possible by increasing mobility, which allows individuals (who have the means) to belong to several spaces at the same time, which contributes to the homogeneity of lifestyles (Kaufmann 2005). The "urban" lifestyle is no longer linked to urban areas, but has spread throughout society (Kaufmann 2005). This means that the previous divides between urban and rural behaviour are outdated (Kaufmann 2005).

These two dynamics (the demographic renewal of rural areas and the homogenisation of lifestyles) are not specific to France: the changes in the relationship between rural areas and lifestyles have been identified in other countries, especially in Europe. The demographic and social change of rural areas has even been the subject of a report by the European Commission.[3]

In this context, the effects of these trends on daily mobility behaviour are examined here. This study seeks to analyse mobility behaviour in France across different types of space. The aim is to understand space by looking exclusively at data on mobility, in order to see if spatial categories can only be found thanks to the behaviour of individuals' mobility practices.

A REVIEW OF THE LITERATURE

Initial analyses based on the ENTD and relating to the average number of movements indicate that trips per working day are homogenous, whatever the density of the residential area or the household income per unit of consumption.[4] While the national average is 3.1 movements, the range runs from a minimum of 2.5 to a maximum of 3.7. These results could be particularly interesting because they are different from those obtained by Pucher and Renne (Pucher & Renne, 2005). They have also calculated the average number of movements as a function of the area of residence, drawing on a similar survey to the one used here (the National

[3] See the website of the LEADER project by the European Commission: http://ec.europa.eu/agriculture/rur/leader2/rural-en/biblio/pop/contents.htm

[4] Taking household income per unit of consumption into account helps limit bias by household size, as this indicator is calculated with reference to overall incomes of all household members as well as the number of persons in the household.

Household Travel Survey of 2001). However, their results show up important differences according to income. Accordingly, the wealthiest households (with incomes above $100,000) make 15% less trips than other households located in rural areas (Pucher and Renne, 2005). Pucher and Renne also show that the differences between households with incomes above and below $20,000 are less marked in rural than in urban areas, but that a difference does exist between urban and rural residents (2005). Poor households on average make 16% less trips than the average in rural areas, whereas poor urban households make 23% less trips than the average in urban areas (Pucher and Renne, 2005).

The results obtained here show that variations in the number of movements in France as a function of incomes and household location are small. The same is true for the average number of trips as a function of the sex of the persons interviewed. Given these results, I put forward the hypothesis that there is a homogeneity in mobility behaviour by individuals, whatever their geographic location. This hypothesis is consistent with French research work that shows a homogenisation of lifestyles between the inhabitants of dense residential areas and people living in areas with lower density (Morin 1984; Hervieu and Viard 2001; Jousseaume and David 2007). The "urban lifestyle" in the words of Kaufman has thus also spread to daily mobility behaviour throughout the country and the population, regardless of income levels (2005).

European results confirm this hypothesis, partially. Drawing only on so-called "gross" mobility (i.e., the number of daily trips), British researchers have shown that the average distance covered per day and time spent in transport varies little between residents of different geographical areas (especially the town and country). Researchers for Britain's *Commission for Rural Communities* have shown that inhabitants of rural areas make the same number of trips per year and spend as much time in transport as inhabitants of other areas. The only difference between inhabitants of rural areas and those living elsewhere is the distance covered, which is much greater for rural residents.[5] Indeed, by comparing the number of trips, time budgets and distance budgets of British residents living in different areas, researchers for the Commission showed that people living in London – using a base index of 100 – score a value of 87 for trips per year, with a distance budget value of 74 and a time budgets value of 109. The movement value for inhabitants of rural areas is 103 (almost as much as residents of greater urban areas or urban areas who scored 104 and 101 for trips, respectively). The inhabitants of rural areas have a distance budget of 142, which is far higher than the distance budget of residence in other categories. In contrast, rural time budgets score 107, which is less than time budgets for Londoners (109), but greater than time budgets for residents living in all other areas (for example, 101 for residents living in greater urban areas and 97 for residents of small towns).

I assume therefore that daily mobility behaviour is also affected by the trend to homogenisation. In other words, I put forward the hypothesis that the area in which an individual lives does not affect (or only little) his/her daily movements.

[5] See the presentation by Gordon Strokes, Rural Transport in a Wider Context, TSU, Oxford, 2008. http://www.tsu.ox.ac.uk/events/ht08_seminars/#s04

METHODOLOGY

I have used the National Survey of Transport and Travel (ENTD, or *Enquête Nationale Transports et Déplacements*) to test the hypothesis of mobility behaviour homogeneity. This survey is the only French survey of mobility of a compulsory nature, and which surveys people living throughout mainland France about their daily, regular and long distance mobility. The ENTD is the only national survey which describes all trips, regardless of their motivation, links, duration, mode of transport, the hour of departure and arrival, as well as the period in the years and the time of day. These surveys are conducted every 10 years by the Ministry responsible for transport with IFSTTAR (formerly INRETS). The last survey took place in 2007-2008, and its data is used here. For this survey, 20,178 households were interviewed. One individual was interviewed in detail about his/her mobility the previous day, in 18,632 households. These data are used in the present study.

I constructed a typology based only on the data collected from these 18,632 randomly selected individuals (56,172,951 weighted individuals). These individuals were asked to give precise information about their mobility the day before being surveyed. In other words, all their movements (duration, motivation, mode etc.) were recorded. Based on these data, an Ascending Hierarchical Classification was established, making it possible to constitute groups of individuals which are characterised by similar daily mobility behaviour. Crossing types of mobility behaviour with the spatial categories established by France's National Institute of Statistics and Economic Studies (INSEE) then made it possible to establish the spread of different types of behaviour across mainland France. If one type of mobility behaviour is not specific to a spatial category, then the homogeneity hypothesis is confirmed.

This methodology is only based on mobility data, but allows spatial considerations (and social and economic determinants) to be overcome. This is the main contribution of the method used here. Whereas most typologies concerning mobility include spatial variables (see for example (Ballas *et al.* 2003), I only use mobility variables to see if it is possible to understand spaces or areas based on mobility behaviour. This, methodological choice was done to concentrate strictly on individuals' mobility.

The variables were normalised and 97 individuals were removed from the analysis because they were considered to be outliers, being were very slow in travel.[6] In other words, they declared having time budgets equal to or greater than 400 minutes (6.6 hours), and distance budgets equal to or less than 100 km. Individuals declaring travel times greater than 275 minutes (i.e. 4.6 hours) – 0.5% of individuals making more than 17 trips per day – or 13 individuals (unweighted) were also taken out of the analysis because of doubts about the information given. The analysis is therefore based on 15,535 randomly selected individuals, who were subsequently weighted.[7] There are thus a total of 55,949,000 weighted individuals who are representative of the whole of France.

[6] These were mainly individuals on the tail of the distribution.

[7] There were altogether 18,632 randomly selected individuals in the ENTD survey. 97 were discarded here as outliers. These included individuals with very slow mobility: in other words those who declared time budgets greater than or equal to 400 minutes (6.6 hours) and a distance budget of less than 100 km. These individuals are

RESULTS

The Ascending Hierarchical Classification carried out here allows five groups of individuals to be established which have similar behaviour in terms of mobility. These mobility classes are presented below.

Types of mobility behaviour

Five classes were obtained, with the following characteristics (see the table below):

equal to 0.5% of the total, and declare having more than 275 minutes (4.6 hours) of travel time. A further 13 individuals (non-weighted) make more than 17 trips a day, and have been excluded from the analysis due to doubts about the quality of the information. A randomly selected individual is drawn randomly from all households interviewed within the survey. Any person over 6 years old and living in mainland France, whose household is included in the survey, may be designated by an algorithm formulated by INSEE as a randomly selected individual. The randomly selected individuals were interviewed in detail about their mobility behaviour and especially about their mobility the previous day. These data are used here.

Figure 2 – Characteristics of types of mobility behaviour.

Class	No of obs. (non-weighted		Minimum	Maximum	Mean	Median
1	5110	Number of trips	0	2	0.7	0
		Daily distance-budget	0	29	1.3	0
		Daily time-budget	0	45	5.2	0
2	7 042	Number of trips	1	6	3	3
		Daily distance-budget	0.3	64.5	16	13.2
		Daily time-budget	3	120	45.8	41
3	3 299	Number of trips	1	7	3.6	4
		Daily distance-budget	3	116.5	53.8	54
		Daily time-budget	39	275	108.6	104
4	2 295	Number of trips	5	17	7.1	6
		Daily distance-budget	0.8	96	29.2	26.1
		Daily time-budget	12	271	80.7	75
5	789	Number of trips	2	17	5.5	5
		Daily distance-budget	39	264.6	133.6	128 .1
		Daily time-budget	85	275	173.1	165

Field: randomly selected individuals in this analysis (see above). Source of data: ENTD 2007-2008. The distance budgets are expressed in kilometres and the daily time budgets in minutes.

The types of mobility represented in the classification are as follows (all figures are expressed in averages):

- Individuals with very little mobility, who travel little and who have small distance budgets (Class 1);

- Individuals whose movements are similar to the national average (3 trips within the group, compared to the French average of 3.14 trips daily). These individuals travel at an average speed of 32.4 km/h, covering 5.3 km per trip (Class 2);

- Individuals whose movements are similar to the national average (3.14 trips per day, compared to 3.6 in this group), at a speed of 25.4 km/h, covering an average of 14.9 km per trip (Class 3);

- Individuals with high mobility (7.1 trips per day), but covering relatively short distances, compared to the number of trips (29.2 km per day) at a speed of 21.2 km/h (Class 4). The average trip of these individuals is 4.1 km;

- And, lastly Class 5, which includes individuals with greater mobility than the national average (5.5 trips per day), but covering larger distances (distance budgets being 133.6 km), at a speed of 57.7 km/h. The average trip for this group of individuals is 24.3 km.

The time budgets, the speed and average number of trips show up different residential territories and daily mobility. Our analysis shows that by using only three variables, it is possible to show up types of mobility as well as residential areas and different organisations.

At this point, it may be supposed that socio-economic differences between individuals cause different forms of mobility behaviour. Women, for example, are over-represented in Class 4 (58.14%, compared to 51.62% for the population as a whole). This is a class in which most trips are carried out close to home. In contrast, men are over-represented in Class 5, which is characterised by relatively long and fast trips (56.2% of the class are men, compared to 48.38% of the overall population). However, apart from such expected differences, my research focuses on the spatial exclusivity (or not) of a class of mobility behaviour. To this end, I introduce spatial variables into the analysis of the results.

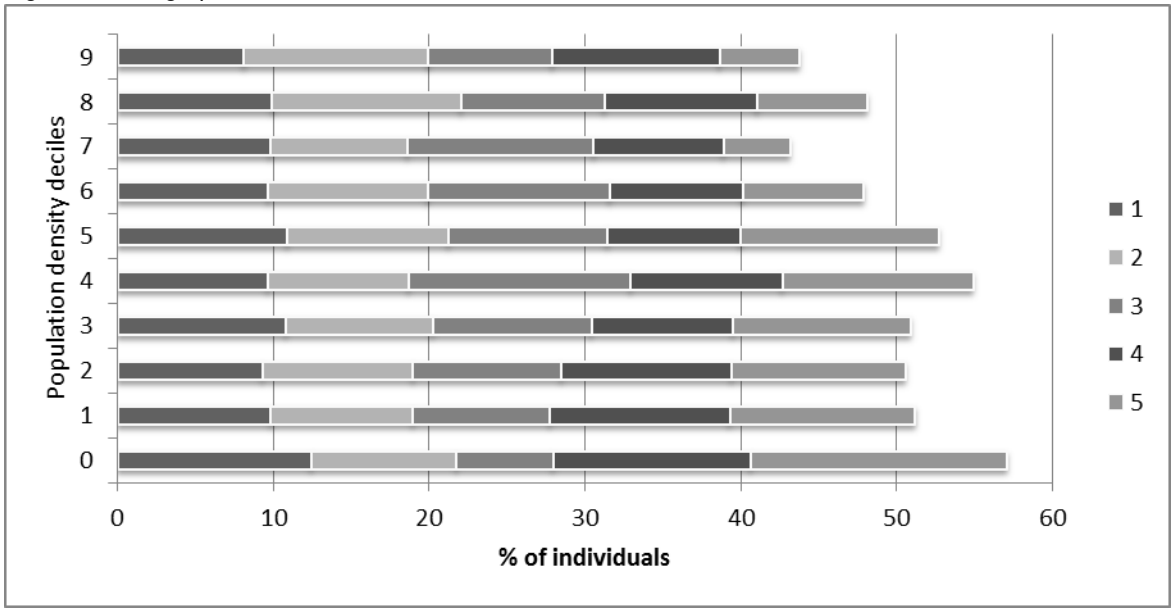
Mobility behaviour is not linked to spatial categories

It is necessary to introduce spatial variables into the analysis to examine the question of homogeneity of behaviour in mobility throughout mainland France.

Based on different geographic variables (especially area categories defined by INSEE), it is possible to observe that certain types of mobility behaviour are over-represented in particular spatial categories.[8] However, as the graph below shows, the over-representation of mobility behaviour according to spatial category is too weak to be representative.[9]

[8] In 2011, INSEE published a new breakdown or zoning of urban areas in 2010, which is not taken into account in this work as this zoning was not included in the ENTD tables.
[9] For further detail, see Table 4 in the annex which gives exact figures.

Figure 3 – Geographic distribution of individuals in classes[10] .



Field: randomly selected individuals in this analysis (see above). Source of data: ENTD 2007-2008.

This means that similar mobility behaviour (in the same class) may be found in different categories of space. This is confirmed for any territorial zoning taken into consideration.[11] The graph above (Figure 3) shows that an important proportion of inhabitants in low density areas (the 0 decile) belong to Class 5, but that membership of this class is not exclusively restricted to inhabitants of areas of little density. Indeed, an important share of inhabitants in density deciles 4 and 5 also belong to Class 5. This graph provides evidence that there is no relationship between population density levels and a type of mobility behaviour.

Drawing on another spatial categorisation by INSEE (see Table 4 in the Annex), it may be noted that inhabitants in urban centres are over-represented in Classes 2 and 3, whereas inhabitants in mono-centre communes and in multi-centre communes in rural areas are over-represented in Classes 1, 3 and 5. In classes in which a spatial category is not over-represented, this percentage is not very different to the share of the population in this category, compared to the overall population.[12]

This graph indicates that interpreting areas or spaces on the basis of mobility behaviour is far from easy. The smoothing of the distribution of types of mobility behaviour across a territory may also be observed for people living in inner Paris, who are over-represented in the difference classes: 21.44% of Parisians belong to Class 1; 47.11% to Class 2; 20.22% to Class 3; 9.79% to Class 4; and 1.45% to Class 5 (altogether, inner-city Parisians made up 3.58% of the sample).

[10] For the deciles of population density, the 0 decile represents the lowest density and the 9th decile the highest (Paris).
[11] In France, INSEE proposes different classifications of space, based on different criteria.
[12] The exception here is the quite marked over-representation of inhabitants in urban centres in Class 5.

Based on these results, identifying spaces or areas in terms of mobility behaviour is not very clear: even if certain types of behaviour would appear to be more urban than others (for example Class 2), several categories of space are always over-represented in each class. Furthermore, the share of inhabitants in each category of space for each type of mobility is quite stable, for whatever type of zoning by INSEE is used. These results therefore tend to show a homogenisation of mobility behaviour from a spatial point of view.

By indicating the heterogeneity of mobility behaviour, the typology I have established here (including in rural areas) also provides evidence of heterogeneity among rural inhabitants, which was discussed in the first part of this article by presenting mutations in rural spaces. The heterogeneity of mobility behaviour which has been highlighted here also stands out in the literature, as several studies provide similar evidence. Accordingly, such heterogeneity has been identified in urban areas (Fobker and Grotz 2006; Krakutovski and Armoogum 2007; Emond *et al.* 2009; Meloni *et al.* 2009; Lord *et al.* 2011) and periurban areas (Cailly and Dodier 2007; Hervouet 2007). This heterogeneity in lifestyles has also been found in rural areas by J. Jetzkowitz *et al.* who provide evidence of eight types of lifestyle in the rural area north of Frankfurt (Jetzkowitz *et al.* 2007). Other studies provide similar evidence (Nutley 1996; Hine *et al.* 2011; Kamruzzaman and Hine 2012; Kamruzzaman and Hine 2012).

This homogenisation tends to confirm that individuals have several mobility perimeters, even within a given area. Or, to use J. Gottmann's expression, they have several mobility equations. The results here are also coherent with studies showing the influence of individual lifestyles on mobility behaviour (Anable, 2005; Bagley and Mokhtarian, 2002; Kitumura *et al.*, 1997; Schwanen and Mokhtarian, 2005; Steg *et al.*, 2005 quoted by De Vos *et al.* 2012). In the next section, I try to put forward explanations for these results.

City centres do not polarise all individuals

Different "mobility equations", to use J. Gottmann's expression, may be found within couples living together. As has been shown by Martine Berger, as well as Cailly and Dodier (2007), one person in a couple, usually the woman, is strongly attached locally whereas the other person works in a town further away and generally visits a larger nearby town more (Cailly and Dodier, 2007). The literature does indeed show that women make more short-distance trips than men (Madden 1981; Lee and McDonald 2003). Similarly, it is shown here that women are over-represented in Class 4, which is characterised by a high number of short trips. This twofold attachment to space or areas within a couple also explains the homogenisation noted here.

The homogenisation of mobility behaviour may also be explained by socio-economic diversity in periurban areas and rural areas (Berger, 2004; Cailly and Dodier, 2007). The multiple relationships which periurban residents have to towns and their way of travelling are also linked to individuals' residential practices (Hervouet, 2007). The diversity of lifestyles in rural areas has also been observed in Great Britain, where problems arising in rural areas are the same as in the whole of society (Cloke *et al.*, 1997). The results here confirm the diversity

of periurban and rural communes, but also the diversity of lifestyles, whatever the geographic location.

My results also reflect those of G. Pouyanne who looked at aspects of urban formation which, apart from density, could influence mobility (Pouyanne, 2005). He showed that distances covered by households were independent of density for the least dense communes or those most isolated (Pouyanne, 2005). Pouyanne explains this by putting forward a hypothesis of sectorisation, according to which households live in the same geographic sector as their place of work (Pouyanne, 2010). Sectorisation, which suggests that households locate themselves close to workplace, follows from the "commuting paradox", a term first used by Gordon *et al.* (1991, quoted by Pouyanne 2005). Looking at twenty American cities, Gordon observed adjustment behaviour in the location by companies and households so that travel time does not rise, despite urban sprawl. This hypothesis spread to France for some years, notably in the Mayoux Report in 1979 entitled "Space tomorrow: individual periurban habitation" (*Demain l'espace; l'habitat individuel périurbain*: Mayoux, 1979). The authors of this report described processes at work affecting urban populations: including "precocious periurbanisation of medium-distance housing; the loosening of employment ties even at close range; the preservation of transport time budgets due to greater speed facilitated by the tighter and expanding mesh of transport capacity, especially road transport" (Chalonge and Beaucire, 2007).

To test the sectorisation hypothesis, I constructed variables indicating the place of residence and work for individuals declaring working in a fixed place (outside their homes), to which they travel at least once a week (Table 1). Indeed, the importance of home-to-work commutes has been noted in the literature (Hervouet 2007 *et al.*) and may condition given mobility behaviour.

Table 1 – Individuals' place of work as a function of their place of residence (in %).

	Class					
	1	2	3	4	5	Total
Individuals living in town centres of an urban zone						17.9
Working in town centres of an urban zone	68.1	66.7	69.3	70.4	60.4	
Working in the suburbs of an urban zone	22.4	25.6	23.1	22.8	33.1	
Working in a periurban commune	2.4	4.0	2.3	0.7	1.6	
Working in a mainly-rural commune	7.0	3.7	5.3	6.1	4.9	
Individuals living in the suburbs of an urban zone						36.2
Working in town centres of an urban zone	27.4	29.0	31.7	32.3	28.5	
Working in the suburbs of an urban zone	65.2	64.8	61.4	59.1	66.9	
Working in a periurban commune	3.2	3.1	3.7	4	1.7	
Working in a mainly-rural commune	4.2	3.0	3.2	4.6	2.9	
Individuals living in a periurban commune						8,4
Working in town centres of an urban zone	40.5	38.7	34.3	26.3	35	
Working in the suburbs of an urban zone	21.2	26.3	33.1	36.1	14.4	
Working in a periurban commune	26.7	26.5	23.5	26.3	41	
Working in a mainly-rural commune	11.9	8.5	9.1	11.2	9.6	
Individuals living in a mainly-rural commune						37.5
Working in town centres of an urban zone	33.1	33.7	32.9	31.5	28.3	
Working in the suburbs of an urban zone	18.1	16.5	14.9	16.7	16	
Working in a periurban commune	6.9	6.1	3.9	7.5	5.4	
Working in a mainly-rural commune	41.9	43.6	48.3	44.3	50.3	

Field: randomly selected individuals considered in the CAH and in work or as apprentices with contracts or in paid job-training with a fixed place of work, outside the home, to which they travel at least once a week. Source: author's calculations based on the ENTD 2007-2008.

The figures shown below seem to confirm the hypothesis of sectorisation as this phenomenon is found in all classes, apart for inhabitants of periurban communes, who are nevertheless present in several classes of mobility behaviour. The result confirms that jobs exist throughout France. Indeed, crossing population density deciles drawn from the ENTD and employment density deciles reveals similarities. The employment and population densities are relatively close everywhere in France.

This result confirms previous research. Indeed, even if centripetal movements and polarisation forces remain important, the sectorisation of places where people live and reside along with the loosening of employment has been discussed in the literature, notably by Beaucire and Chalonge (2012), as well as Andriankaja and Dablanc (2012). Thus, the model of movement from the periphery to the centre, in which all services, jobs and infrastructures are concentrated, no longer holds.

The result is that a multitude of home-to-work links exist. This is true for all spatial categories in which people reside, as is shown by the table above. This can be explained by the diversity of places in which people work, but also by socio-economic characteristics. Indeed, Susilo and Maat (2007) have shown that home-to-work distances increase with education levels

(quoted by Beige, 2012). The same is true for incomes: as these rise together with the home-to-work distance (Beige, 2012).

These factors explain urban loosening and employment loosening as ways of understanding the homogenisation of lifestyles. Yet this loosening alone does not explain mobility behaviour which the classification shows up.

Mobility behaviour which is not linked to the proximity of facilities

The location of households is sometimes presented in the literature as a determinant of household mobility, especially as far as transport choices are concerned. The literature, notably in North America, has highlighted the influence of the urban environment on mobility behaviour (see Mokhtarian and Cao, 2008, in particular). Here, I focus on individuals' "gross" mobility as a function of where their homes are.[13]

The aim is to examine the possible existence of a link between persons' homes – at a more detailed level than previously – and their mobility behaviour. I have therefore analysed the share of households living near a train station, or other public transport station as a function of the different classes (Tables 2 and 3).

Table 2 – Mobility behaviour as a function of distance from individuals' homes to a train station (in %).

Distance from home to the nearest train station	Class					Share in the overall population
	1	2	3	4	5	
Less than 300 m. (or less than 5 minutes by foot)	3.17	3.91	3.72	2.89	4.21	3.55
300 to 599 m. (between 5 and 9 minutes by foot)	4.53	4.76	4.82	4.12	5.63	4.65
600 to 999 m. (between 10 and 14 minutes by foot)	5.42	5.64	6.43	5.53	6.26	5.72
1 km or more (at least 15 minutes by foot)	86.88	85.69	85.03	87.46	83.90	86.07

Field: households with a randomly selected individual who is taken into account in the analysis and who does not reside in the département 75 (Paris). Source: author's calculations based on the ENTD 2007-2008. Interpretation 3.17% of households whose randomly selected individual is in Class 1 and lives less than 300 meters from a train station.

[13] Gross mobility here refers to the variables used in the classification: the number of daily trips, time-budgets and distance-budgets.

Table 3 – Mobility behaviour as a function of distance from individuals' homes to a public transport station (in %).

Distance from home to the nearest public transport station[14]	Class					Share in the overall population
	1	2	3	4	5	
Less than 300 m. (or less than 5 minutes by foot)	52.16	57.13	52.09	55.30	50.18	54.44
300 to 599 m. (between 5 and 9 minutes by foot)	14.13	15.76	16.41	17.44	17.30	15.72
600 to 999 m. (between 10 and 14 minutes by foot)	7.8	6.21	6.13	6.41	6.06	6.64
1 km or more (at least 15 minutes by foot)	25.91	20.9	25.37	20.85	26.46	23.19

Field: households with a randomly selected individual who is taken into account in the analysis. Source: author's calculations based on the ENTD 2007-2008. Interpretation: 52.16% of households whose randomly selected individual is in Class 1 and lives less than 300 meters from a public transport station.

Based on these tables, it is interesting to note that households with the most mobile individuals are over-represented in classes with homes close to a train station. Drawing on the literature, it maybe that living close to a station has an impact on choice of transport mode, but not on mobility behaviour. In contrast, households with a randomly selected individual belonging to Class 1 are over-represented among households whose homes are situated less than 300 metres from a public transport station. These households are also slightly over-represented among households living 1 km or more from a public transport station. In contrast, in my opinion, such a distance to public transport stations cannot explain individuals' immobility in this class. This is because the randomly selected individuals in Class 5 are also under-represented among households living less than 300 metres from a public transport station and over-represented among households living more than a kilometre from a public transport station.

The homogeneity of mobility behaviour is thus not correlated with the distance to access to public transport. The spatial inequality of access to public transport thus has little impact or at least is not the only variable determining the type of mobility behaviour. This result is in line with findings obtained in other contexts: Mackey and Hine have shown that when access to public transport is equal, differences in mobility behaviour between men and women in rural areas may still exist (2004).

The spread of car-use as the cause of mobility behaviour homogenisation

The homogenisation of mobility behaviour may have occurred due to France's road network and the spread of car-use, which has affected the whole country. Indeed, cars help connect town and country (Dupuy, 1995). Thus, G. Dupuy (1995) notes:

[14] Stations or stops taken into account include: bus, tram, coach and metro stations.

> "France's excellent network links towns and the country. But motorways were built late and as urban motorways were developed even later, in contrast to the US network which was far more urban at the outset, and to Germany's motorway system with its very dense national, forward-looking grid".

This road network has allowed new territories and areas to be constructed, as for example suburban areas which benefit from the development of new facilities and services once a certain level of urbanisation is reached (Dupuy, 1995). Car-use has provided inhabitants of rural areas, who are more dependent on public transport than city dwellers, better access to jobs, services and infrastructure. This trend supports the sectorisation hypothesis mentioned above (Pouyanne, 2005). The automobile has thus permitted ever wider periurbanisation and easy access to towns for the inhabitants of ever remoter areas.

A second element is linked to the fact that cars facilitated family transport in town and country areas as of the 1970s. The "automobile area" was created, with supermarkets as a landmark for urban and rural residents, as rural and urban catchment areas overlap (Dupuy, 1995). Cars have thus connected the town and the country tightly. The result today is a homogenisation of consumer attitudes and behaviour. Other studies have also shown up this link between the homogenisation of behaviour and greater car-use (Roux and Bauer, 1976; Bonnet, 1980, quoted by Dupuy, 1995).

DISCUSSION

Analyses as the one carried out here make it possible to highlight trends which have appeared in rural areas. My results show that behaviour by inhabitants of rural areas are not homogenous, as all types of behaviour can be found sprinkled throughout mainland France. This work emphasises the homogeneity of daily mobility behaviour, and this is a new result.

These results show that behaviour in rural areas is not static nor of a single type. There is a diversity of mobility behaviour in rural areas. There appears to be no spatial determinism, which in similar territories or areas, would lead to a particular type of mobility behaviour. This diversity could be linked to the scale of the study: the statistical analysis here is national, and is likely to hide disparities which are only visible on a larger (and hence more detailed) scale. The importance of zones and their characteristics on mobility behaviour have been highlighted by Hine, Kamruzzaman and Blair, when working on a very large scale (2011). Studies made of small spaces confirm heterogeneous behaviour (Chapuis *et al.* 2007; McGrath *et al.* 2007). However, it is possible to examine heterogeneity for the scale used here, for example by communes, in order to render the present results robust. Future developments in the study of mobility behaviour could then lead to an analysis (possibly qualitative) of daily mobility in a particular space.

Another interpretation of the results here is linked to the diversity of socio-economic characteristics throughout France. This diversity has been made possible by the renewed population growth of rural areas in mainland France, even in the most isolated. The literature

has provided evidence of the influence of socio-economic variables on daily mobility behaviour. This hypothesis has been supported in the literature (see for example (Hoggart *et al.* 1995) and could constitute a future area of research. It would be based on the construction of logistic models that could help determine which spatial and socio-economic characteristics have the most influence on the class of mobility behaviour individuals belong to.

CONCLUSIONS

The present analysis shows that a homogeneity of mobility behaviour may be observed nationally, based on gross mobility criteria. Neither urban nor rural residents are homogenous populations in terms of their daily mobility behaviour. This homogenisation of mobility behaviour, however, does not mean homogenisation of modes of transport, because average speeds vary significantly depending on population groups, as was shown above. One of the possible applications of the present findings would be their use to meet the new challenges and various demands for transport. These results offer new perspectives, especially for the implementation of public transport policies in rural areas.

To refine the results here, future research could examine the motivations for travel, the uses of time and accessibility, as a function not of the spatial characteristics of places of residence, but as a function of groups of individuals (children, women, senior citizens, etc.).

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APPENDIX

Table 4 – The spatial composition of classes of mobility behaviour (in %).

	1	**2**	**3**	**4**	**5**	Share in the overall population
Urban centres urban	54.63	63.15	56.41	63.13	45.27	59
Mono-centre communes	17.54	15.7	20.56	15.88	22.73	17.3
Multi-centre communes	6.09	5.42	5.94	4.83	8.98	5.75
Employment centres in rural areas	5.93	4.35	3.62	5.78	5.34	4.89
Surroundings of employment centres in rural areas	0.45	0.27	0.87	0.54	0.85	0.48
Rural areas	15.36	11.11	12.6	9.84	16.84	12.57

Field: randomly selected individuals in the present analysis. Data source: ENTD 2007-2008. Reading: Class 1 is made up to 54.63 % of individuals living in an urban centre.