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# A Psycho-Social Exploration of Cross-Border Mobilities

## A Mixed-Method among Franco-Luxembourgish Commuters

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## **Abstract**

The application of the psycho-social paradigm of social representations in geographical studies is rather recent. However, this approach is considered to complement the work conducted in social geography where non-directive interview methods are often used. The main hypothesis of this paper is that mobility practice is not only influenced by the accessibility to transport infrastructures, but also structured by social representations about mobility, housing, and job. Based on a corpus of semi-structured interviews with 69 Franco-Luxembourgish cross-border commuters, the *Multiple Correspondence Analysis* (MCA) is employed to explore relations between different types of social representations and mobility practice. This mixed method allows to integrate both quantitative statistical data and qualitative discursive data. It is concluded that social representations can be envisaged as a theoretical approach to understanding mobility practice, and that the daily mobility practice is socially structured depending on various social representations of individuals which are also shaped by their social positions or social trajectories. Challenges related to the use of mixed methods in the research are also addressed in the methodological discussion.

### **Key words**

social representations, mobility practice, daily mobility, cross-border commuters, discursive data, multiple correspondence analysis, mixed method

# Introduction

Since its development, the theory of social representations (Moscovici, 1961) has become increasingly prominent across a range of disciplines in the social and human sciences, though its application in geographical studies is relatively recent. Environmental psychologists leverage geographic space as their direct object of study: through spatial representations, they shed light on how individuals construct and evaluate places in relation to the socio-cognitive differences of subjects, socio-spatial dynamics of objects and social logics of groups (De Alba, 2011; de Rosa et al., 2019; Dias & Ramadier, 2015, 2018). Urban geographers employ social representations as a medium to study spatial mobilities, namely daily mobilities and residential mobilities (Carpentier, 2007; Chen, 2021; Enaux & Gerber, 2014; Lord et al., 2011; Ramadier et al., 2007; Schiebel, 2018). These studies contribute to a better understanding of how the system of attitudes, values and beliefs relates to the behavioural interaction of social groups with their surroundings. This paper proposes an analysis of the social representation of commuting to supplement studies on the representation of daily mobility. Considering commuting as a spatial practice which contributes, like any other form of travel, to forming the representation of the daily mobility, the present study does not intend to isolate this type of mobility as it is commonly approached by researchers following the paradigm of activity-based travel behaviour. Instead, it aims to showcase the relationship between representations shared by social groups of three objects: daily mobility, housing and job.

This approach requires, on the one hand, a clarification of the notion of social representation and, on the other, the consideration of mobility as a socially constructed behaviour (a *practice* in sociological terms) rather than acts conducted by individuals who are constrained in specific social conditions. *Practice* rather than *behaviour* also because a social representation is defined as "*a form of knowledge, socially elaborated and shared, with a practical aim and contributing to the construction of a reality common to a social group*" (Jodelet, 2003, p. 53). Three consequences occur from this approach of social construction of knowledge: first, representations of an object are multiplied both in numbers and in forms; second, representations can be distinguished according to the social characteristics of an individual (a *subject* in psychological terms or an *actor* in sociological terms); third, conflicts can be identified among these representations (Moscovici, 1961). Our hypothesis is that mobility practice is not only influenced by the accessibility to transport infrastructures, but also by individuals' social representations about the mobility, their residential attachment and their relation with the job, which constitute main aspects of people's everyday life. As social representations can be socially shared or opposed, mobility practice can also be structured by social representations.

When it comes to studying social representations, one of the most commonly collected forms is through verbatim (often verbal) expressions, given the tight connection between social

representations and the everyday life discourse (Wagner & Hayes, 2017), and the role played by the sharing of knowledge and communication of meanings within each social group (Jodelet, 2003). Therefore, verbalised social representations are often used in studies that examine general categories of geographical objects such as spatial mobilities (Debroux, 2015; Frétnigny, 2015). In this context, the technique of *spontaneous association* (or *free association*) developed by Di Giacomo (1981) is considered as a pertinent method for data collection due to its efficiency. This technique, which can be used in either an interview or a self-reported questionnaire, as well as in both individual and collective settings (Caillaud & Kalampalikis, 2013), involves instructing participants to “*Tell (or write down) the first several words or expressions that spontaneously come to mind when thinking of X*” (X is the inductive word, which can be a geographical object, see *e.g.* Enaux & Gerber, 2014). Participant responses are then used to constitute the corpus for subsequent analyses.

Once the data on social representations has been collected, the analytical strategies vary depending on the form of the representations and the research objective. In some of social representations studies, the analysis is rather qualitative and aims at gaining insights into the construction of generalised items in everyday communications, shared within social groups or unshared between social groups. Examples include the pioneer work of Serge Moscovici on the dissemination of *psychoanalysis* in the post-war society in Paris (Moscovici, 1961) and the research of Denise Jodelet on the social construct of madness (Jodelet, 1991). In these studies, thematic analysis of discourses often plays a central role.

Thereafter, the “*Aix school*” of social psychology proposed a structural solution known as *prototypical analysis* (Abric, 1976; Dany et al., 2015). This leximetric approach, which can be applied to both qualitative and quantitative analysis, aims to understand the meaning of an object through the convergences among representations, by highlighting the centrality of the representation, often known as *Central Nucleus* or *Central Core* (Abric, 2001; Lo Monaco et al., 2017; Moliner, 1995). In contrast, social psychologist from the “*Geneva school*” focus rather on the divergences in social representations and have developed the organising-principles approach (or *dynamic approach*) (Clemence et al., 2014; Doise, 2003; Staerklé et al., 2011), which underpins the direct connections between social representations and individual position in the social space (Bourdieu, 1984). Therefore, the Bourdieusian manner of analysis is also inherited into this dynamic approach for its utilisation of relational quantitative method (or *geometric data analysis*, known as *GDA*) namely the correspondences analysis (Le Roux & Rouanet, 2010; Lebaron, 2009, 2018).

As a result, recent studies on social representations tend to adopt an integrated approach by using multiple data collection methods and various types of analysis (Flick et al., 2015). The integration of multiple data collection methods and analysis techniques has significantly contributed to the growing popularity of research on social representations, but also presents new challenges. The difficulties of

conducting mixed methods research involve multiple facets, such as defining the appropriate use of quantitative and qualitative methods in specific situations (Crosswell, 2009), combining both methods effectively (Granikov et al., 2020), managing the compatibility of quantitative and qualitative data (Pluye et al., 2018) and considering pragmatic factors like the skills of researchers. Therefore, the methodological objective of this study is to illustrate the benefits of integrating both quantitative statistical data and qualitative interpretive data to understand the relationship between social representations of commuting, housing and job, as well as to demonstrate that these social representations are interconnected through socio-economic, socio-demographic and socio-geographical factors.

## **Methodology**

To meet the methodological objective of this paper, a detailed explanation of methods employed will be provided in this section. Part of the results is based on our previous work that involved reducing the temporal dimension of longitudinal statistical data by creating *socio-spatial categories* (see Chen et al., 2021, 2023, more detailed information about socio-spatial categories will be summarised later in this paper). This section will also present how discursive data are analysed and integrated with the statistical quantitative data in the geometric data analysis.

### **Context of the study and source of data**

Luxembourg has been an international financial centre since the 1970s. Today, more than 212,229 people commute to work in the Grand Duchy (*Statec*, 2022), the massive practice of daily mobilities makes Luxembourg the largest cross-border labour market within the European Union. Previous studies have explored different mobility behaviours through socio-demographic, socio-economic and socio-geographical perspectives (See especially Carpentier-Postel et al., 2022; Gerber, 2012; Gerber et al., 2017, 2018, 2020), while authors of this paper adopt a psycho-social approach to examine the connection between various mobility practices such as daily mobility and residential

mobility, by studying social representations of cross-border commuters working in Luxembourg and living in a neighbouring country (thereafter referred to as *commuters*).

Two datasets are mobilised in the study, encompassing primary and secondary data sources. The secondary dataset is quantitative statistical in nature, derived from the French population census database spanning 1990 to 2013, with geographical precision at the level of commune (French administrative unit). The primary data were collected from 69 semi-structured interviews with commuters, recruited via hard-copy leaflets and mass media platforms frequently consulted by commuters. The interview includes questions of spontaneous association for collecting commuters' representations on daily cross-border travel, residence and job in Luxembourg, as well as questions on their life-course including residential mobilities and professional evolutions.

## **Sample**

As over 50% of commuters reside in France, the study focuses on the French Department of Lorraine as the reservoir of the sample. A total of 1,801 individuals responded to an online self-reported questionnaire, with 1,005 of them meeting the geographical identification criteria of residing in France. Out of these eligible candidates, 350 expressed interest in participating in the interview, resulting in a final sample of 69 participants who completed the interview. The interviewees have an average age of 41 years. An over-representation of females was observed (41 individuals). Despite the intention to diversify the socio-economic profiles of the sample, the majority of interviewees (51 individuals) hold a managerial position in their work. Half of the participants commute to Luxembourg by car, while the other half use public transport such as the bus or train.

## **Semi-structured interview**

A typical interview conducted in the study is structured around three themes: cross-border commuting for back and forth, residential relocation history and professional trajectory. Before each thematic section of the interview, a question of spontaneous association was posed to collect the verbalised social representations of the three mentioned objects. For the cross-border commuting, interviewees are usually asked to reconstitute a typical door-to-door trip for going to work in Luxembourg and coming back. Then, we ask interviewees to recount their biographic trajectory to gain an in-depth understanding of the general evolution of their life and underlying reasons or causes for these changes, including their history of residential mobilities and career development. During the

interview, special attention is paid to capturing how the three types of mobilities are triangulated. For instance, commuters might relocate for familial motivation (*e.g.*, enlarging the living space following a childbirth), or they may move their residence to relieve themselves from the burdensome daily commuting.

### **Analytical strategies**

In social sciences, macro-level statistical data are commonly utilized to capture the structural changes in people's behaviour, while micro-level data contribute to understanding relationships between phenomena. This paper employs a mixed method integrating macro- and micro-level data at a meso-level interface through the use of several Multiple Correspondence Analyses (MCA). Our analytical strategies are presented in the following schema (Figure 1) to illustrate how data of diverse nature and from different levels of measurement are integrated and analysed:



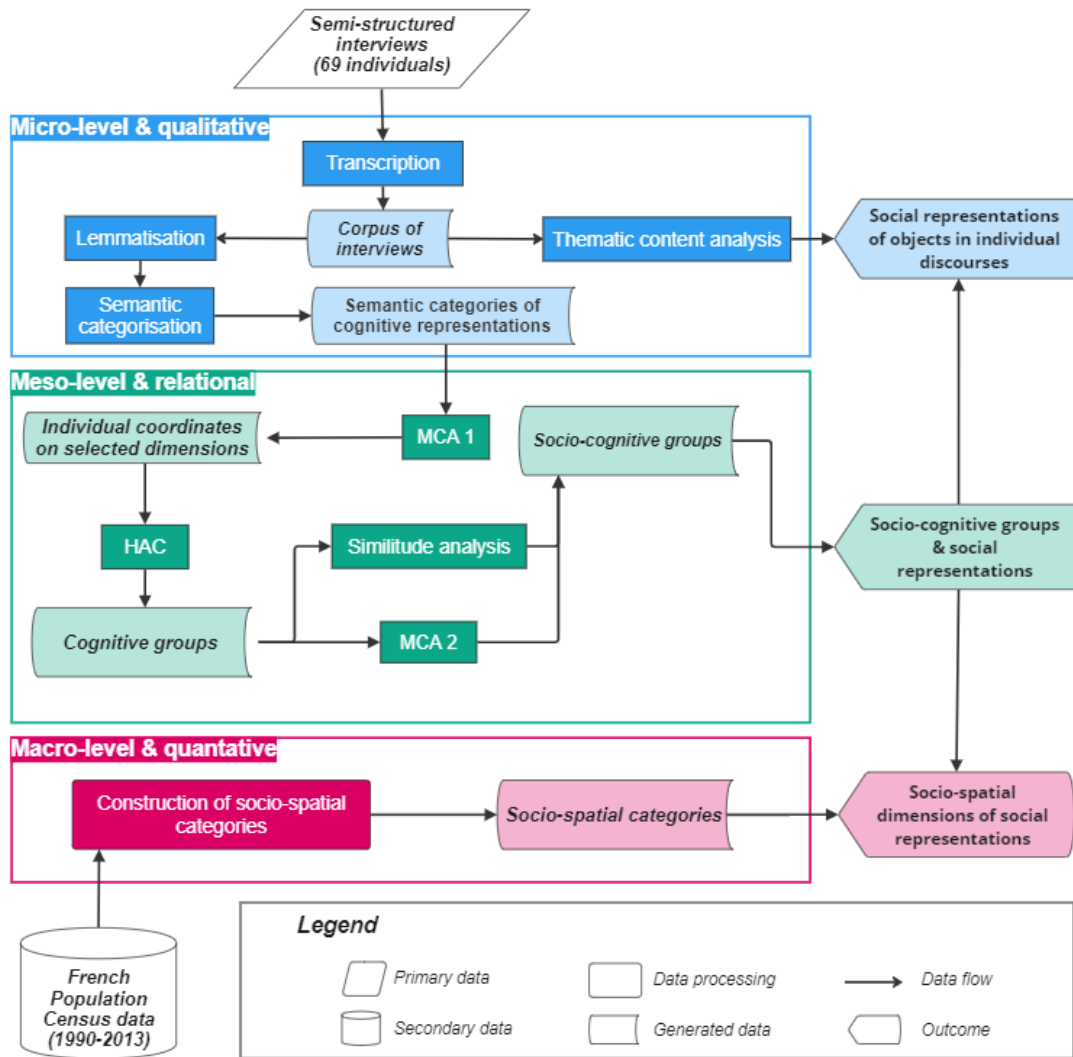


Figure 1. Analytical strategies of data of diverse nature and from different levels of measurement

At the macro-level, statistical data are used to capture the structural change of commuters' residential mobility over time. Socio-spatial categories are therefore created to map the static image of the residential evolutions. At the micro-level, social representations are classified into semantic categories to eliminate the hapaxes of verbalised social representations. To reduce data dimensions, a contingency table containing individuals and semantic categories is used to generate individual coordinates within the factorial space in MCA1. Only coordinates on salient factorial dimensions are selected for the subsequent *Hierarchical Agglomerative Clustering (HAC)* through which commuters with different types of social representations are classified into cognitive groups. Then, the similitude analysis (Flament, 1962) is employed to identify the cognitive features of each group. In the MCA2, cognitive groups are projected onto the factorial plane constructed by socio-economic, socio-demographic and socio-spatial variables, thereby revealing the consistency between representations and

mobility practice. Finally, guided by the results from MCA2, illustrative cases of commuters are provided to better apprehend the relation between daily mobility, residential mobility and social mobility.

## Main results

In this section, the key findings of the study are presented, which include socio-spatial categories, characteristics of the cognitive groups, their position on the factorial plane of MCA2 and illustrative cases from each group based on the thematic analysis of the corpus.

### *Socio-spatial categories*

While longitudinal data might be suitable for understanding residential changes over time, they are nevertheless challenging to be directly used in the correspondence analysis because of their multi-dimensional temporality. To reduce the temporal dimension of the data, three socio-spatial categories are created based on the French population census dataset from 1990 to 2013. This specific period covers the process of the Luxembourg metropolisation process, characterised by a massive influx of cross-border labour force since the 1990s. Three urban agglomerations in Lorraine (Metz, Thionville and Longwy) stand out as a separated socio-spatial category. They are independent from the general categorising dynamics, as previous studies already demonstrated that principal Lorrain urban areas are dominated by different residential dynamics than suburban or rural areas (Gingembre, 2016, 2018). A time-iterative method is then used to observe the change of residential mobilities in the rest of the region to determine the categorisation procedure (for the map of categories, see Figure 2 below):

1. *The Urban Agglomerations*, including Metz, Thionville and Longwy, serve as the primary residential repository for commuters in Lorraine. This category is primarily occupied by mid-upper managers, particularly in the case of Metz.
2. The *Constant Living Area (CLA)* for commuters is created from non-interrupted residential locations for commuters across various waves of population census. It means that commuters have constantly resided in these communes from 1990 to 2013. This socio-spatial category is mainly comprised of rural communes located in close proximity to the Franco-Luxembourgish border, with a mixed population of routine/skilled workers, employees and mid-upper managers.
3. The *Inconstant Living Area (ILA)* includes communes with fluctuating commuter populations, as evidenced by their intermittent residential patterns in the census data. In

contrast to the CLA, the ILA encompasses areas inhabited by commuters in a discontinuous manner, marked by at least two periods without commuter presence among the four waves of census data between 1990-2013. This category consists predominantly of rural communes scattered throughout Lorraine, often situated away from the border. Additionally, communes in the ILA have more recently been inhabited by commuters, typically employees with higher education degrees.

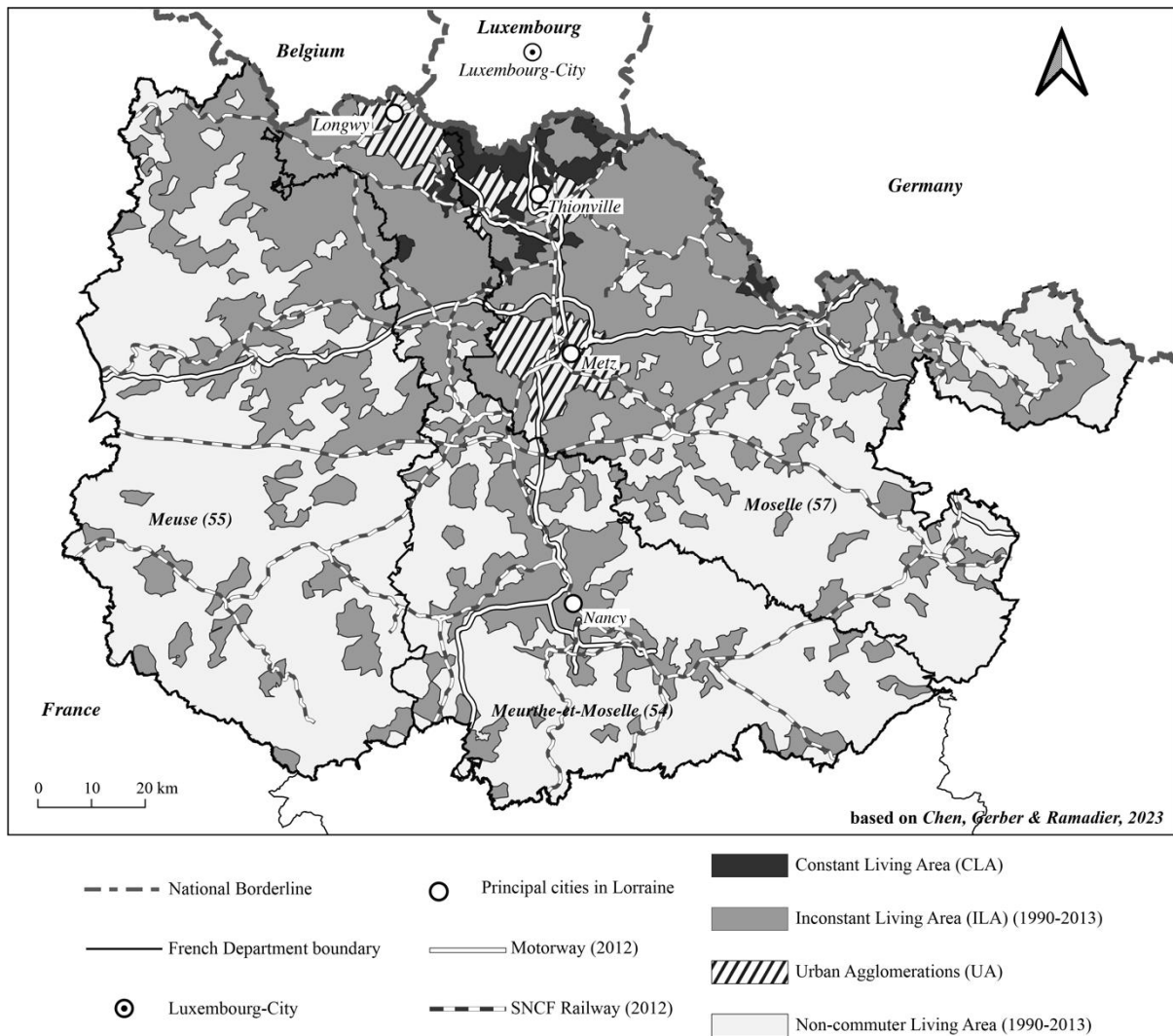


Figure 2. Map of socio-spatial categories for commuters (based on Chen et al., 2023)

### Semantic categories of cognitive representations

To analyse representations collected in the semi-structured interviews, the initial step is to transform the verbatim data from spontaneous word associations into categorical data for each object

(travel, residence and job). The purpose of this process is to reduce the diversity of representations and to eliminate hapaxes, which constitute a large portion of the verbatim data (as indicated in Table 1).

<i>Verbalised cognitive representations about</i>			
	<i>Commute (CRC)</i>	<i>Housing (CRH)</i>	<i>Job (CRJ)</i>
<b>Total frequency of words</b>	209	215	208
<b>Frequency of words <i>per capita</i></b>	3	3.1	3
<b>Total number of linguistic forms</b>	116	124	144
<b>Number of linguistic forms <i>per capita</i></b>	1.7	1.8	2.1
<b>Total number of hapaxes</b>	87	91	117
<b>% of hapaxes</b>	75.0%	73.4%	81.3%

<i>Semantic categories of cognitive representations about</i>			
<b>Category number</b>	<i>Commute (CRC)</i>	<i>Housing (CRH)</i>	<i>Job (CRJ)</i>
<b>1</b>	long	bad	diversity
<b>2</b>	frustration	comfort	good salary
<b>3</b>	relax	convenient	dissatisfaction
<b>4</b>	tiredness	distance	interesting
<b>5</b>	transport	family	international
<b>6</b>	uncertainty	home	passion
<b>7</b>		not expensive	project
<b>8</b>		pleasure	promising
<b>9</b>		small	stress

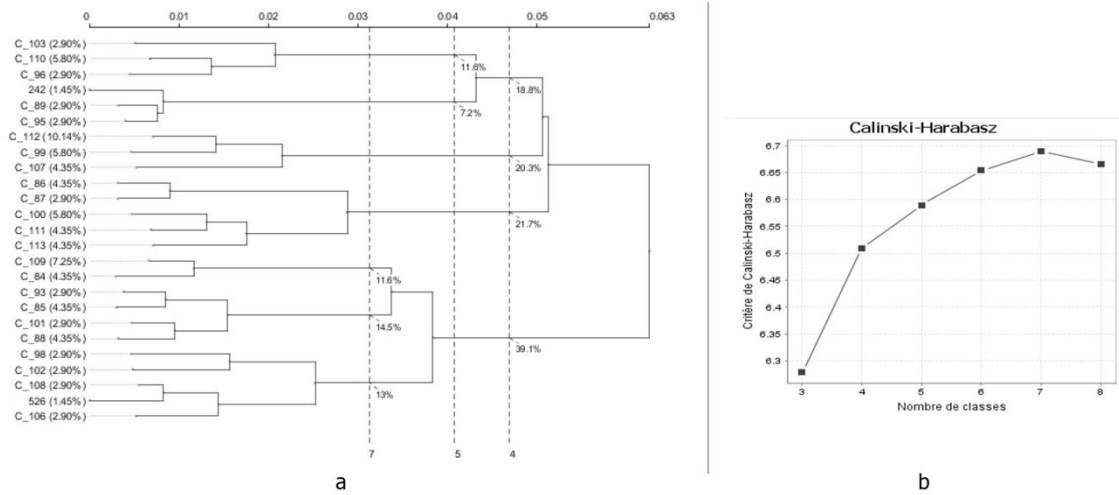
Table 1. Cognitive representations before and after semantic categorisation

To minimize the occurrence of hapaxes, dictionary-based linguistic processing is employed in the *IraMuTeQ* software. All verbatim representations are lemmatised to ensure the non-declensional format of words. Any remaining hapaxes are then reassigned into semantic categories based on the meaning of the words in the context of the interview. This process of semantic categorisation is carried out subjectively by the researchers, considering the context of the conversation.

### ***Cognitive groups***

The following step in data processing involves the formation of cognitive groups based on the semantic categories assigned to each object. For clustering purposes, a table for MCA1 is constructed, with individuals in rows and semantic categories in columns. In this first MCA, individuals are positioned within a multi-dimensional factorial space according to their shared or unshared semantic categories of representations. A contingency table is obtained including individual coordinates in the factorial space; however, only dimensions of statistical salience are retained (as indicated by the eigenvalue of each dimension). This table, detailing individual coordinates across the chosen

dimensions, is then utilised for conducting HAC. The selection of an optimal clustering into four groups is confirmed by the Calinski-Harabasz index plot, employing the "elbow" method, as depicted in Figure 3.

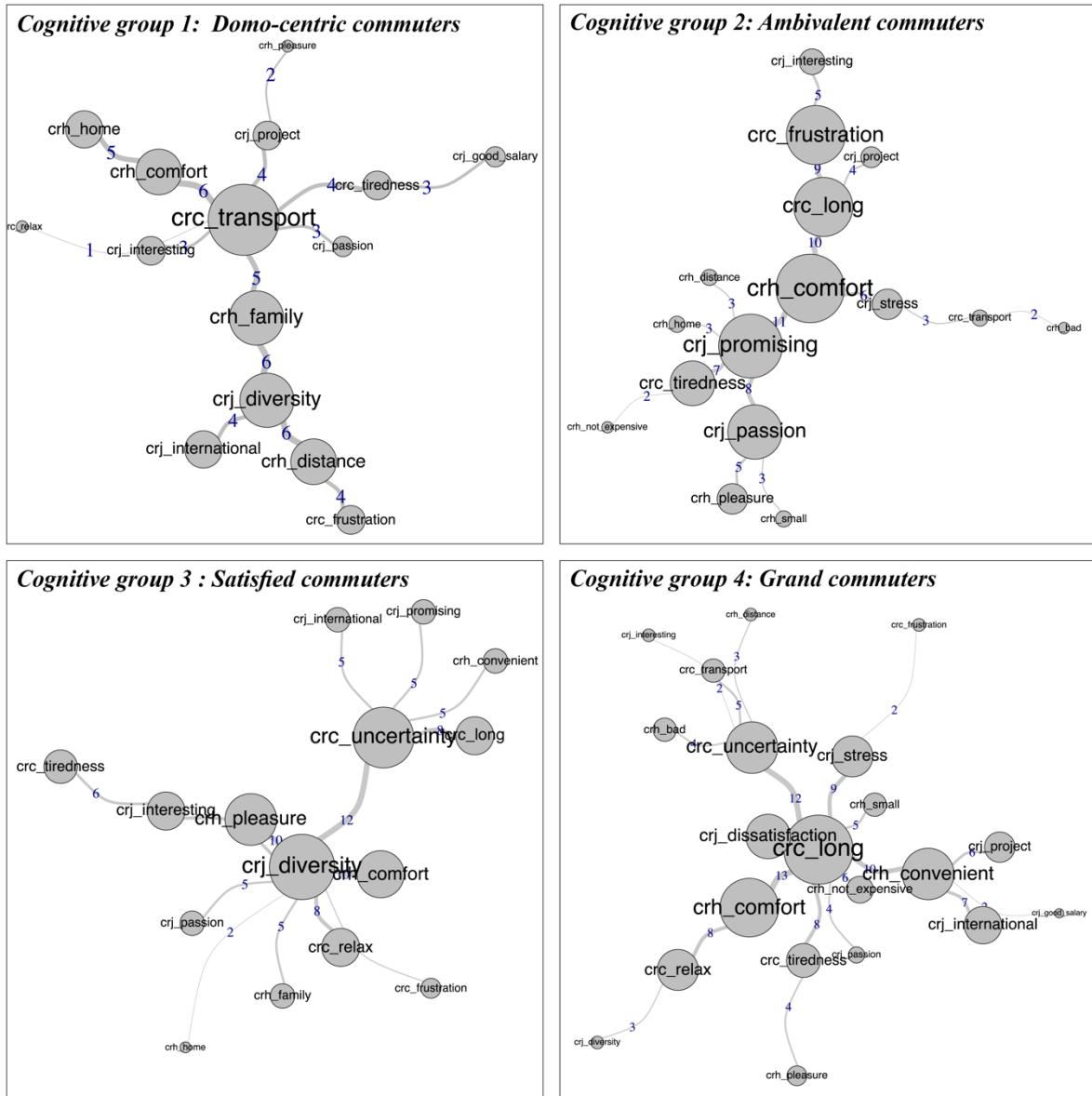


Dendrogram of the hierarchical clustering based on cognitive representations (a) - Calinski-Harabasz index for optimal number of classification (b) based on (Chen, 2021) Software : SPAD

Figure 3. Dendrogram of HAC (a) and index for clustering options (b)

### Characterising cognitive groups

The HAC procedure elucidates the cognitive distance between groups, facilitating statistical differentiation. It, however, does not reveal the distinct configurations among them. To further understand the cognitive differences between each group, the *similitude analysis* is employed using the co-occurrence method, the results are presented as following (Figure 4).



Representations of commuters belonging to different cognitive groups based on (Chen, 2021) Similitude analysis - cooccurrence method Software: IraMuTeQ

Figure 4. Similitude graph for cognitive groups (based on Chen, 2021)

1. *Domo-centric commuters*: the 11 commuters in this first cognitive group exhibit a functional representation of their daily commute, with the mode of transportation being the most frequently mentioned semantic category. Additionally, a key distinguishing feature of this group is their association (both in terms of frequency and importance) between the functional commuting and their representations of residence, such as “*comfort*”, “*home*” and “*family*”

which are seldom mentioned by other cognitive groups. Therefore, the term *domo-centric* underpins the significant role of familial network in their residential practices.

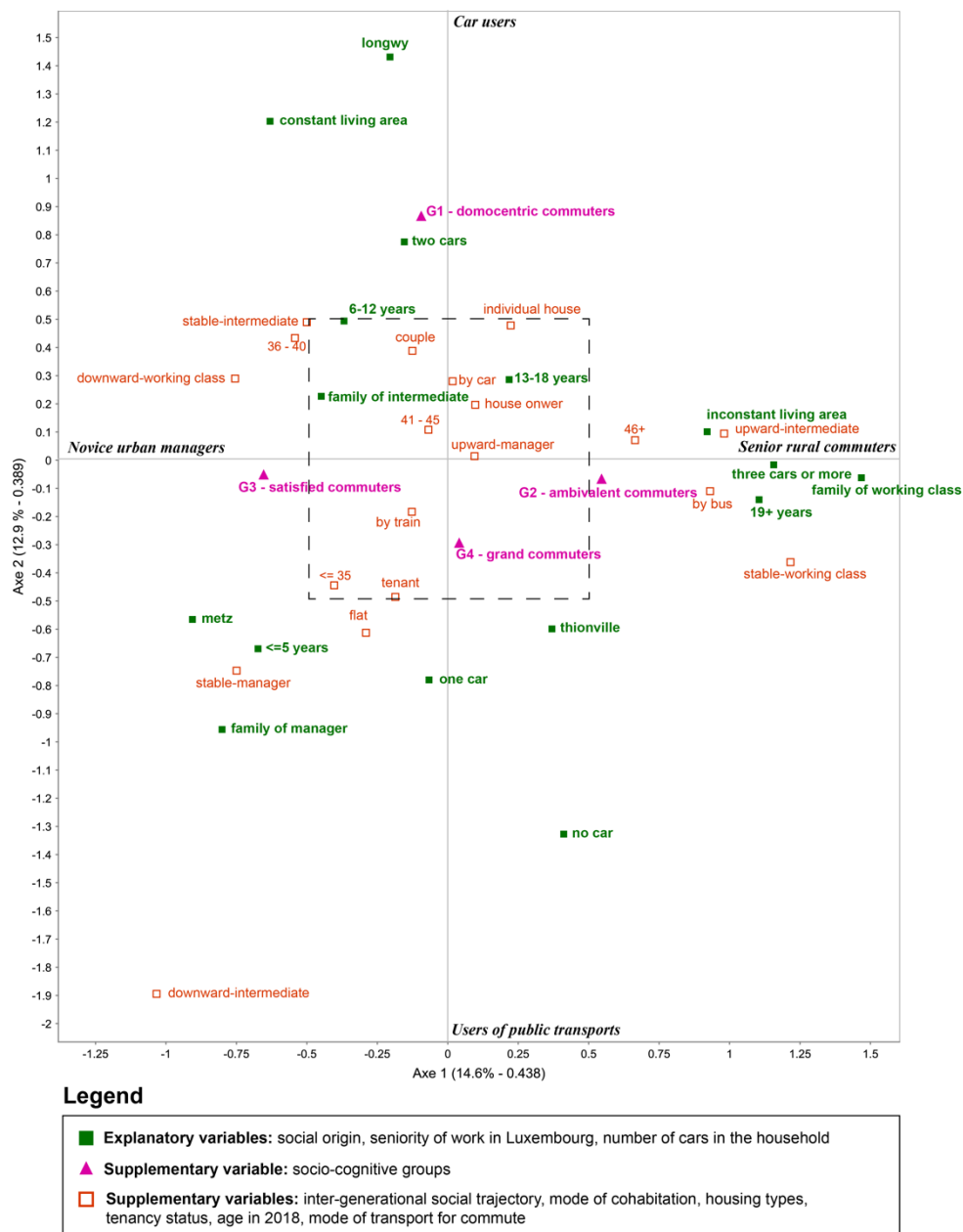
2. *Ambivalent commuters*: The 18 commuters in the second cognitive group display contrasting attitudes toward their job and daily travel. While they view their job very positively, describing it as “*promising*” and driven by “*passion*”, their daily commuting is a source of “*frustration*”, as they describe it as “*long*” and “*tiring*.” This ambivalence in their attitudes toward their cross-border mobility highlights the complexity of their practice and attitude. The central representation element is the comfort of the residence which seems to play a conciliant role between the ambivalent values of their commuting and work.
3. *Satisfied commuters*: this cognitive group comprises 15 individuals who are characterised by the fewest negative evaluations across various aspects of their everyday life, except for the “*uncertain*” daily travel, their representation on the residence is rather “*pleasurable*” and “*comfortable*”, and even the long commuting is sometimes “*relaxing*”. Additionally, they find their job “*interesting*” with much “*diversity*”.
4. *Grand commuters*: the last group of 25 commuters is referred to as *Grand commuters*. This name reflects their greater suffering across all aspects of their cross-border daily life, including “*long*” and “*uncertain*” commutes, work-related “*dissatisfaction*” and “*stress*”, and unappreciated residential environments. The key characteristic of this group is the centrality of “*long*” commute in the central place. However, the term “*long-distance commuters*” is intentionally avoided, as it can impose arbitrary thresholds on defining Grand commuters merely by the physical distance or time-distance of the travel.

## **Factorial plane of MCA2: evidence of socio-spatial and socio-cognitive groups**

Once the four contrived groups are clearly featured, the interpretative qualitative data are ready to be integrated in a relational quantitative analysis (geometric data analysis). The study of the relationship between representations and mobility practice is conducted through the MCA2. The factorial plane is then created depending on previous explorations of influencing factors most likely to distinguish sampled individuals in terms of their socio-economic variety (Luxembourgish classification of socio-professional categories, sociological origin, seniority of working in Luxembourg), socio-geographic distribution (socio-spatial categories) and daily mobility practice (number of car(s) available within a household) (see Figure 5). These explanatory variables contribute to the construction of the factorial plane. Supplementary variables are then projected onto the plane, such as socio-demographic variables (age), socio-economic evolution (intergenerational social trajectory), mobility practice (mode of transport), residential practice (cohabiting status in a household, type of housing, tenancy status) and the four cognitive groups.

The reduction of dimensions, based on the two factor axes, accounts for 27.5% of variance from all explanatory modalities, with 14.6% and 12.9% of variance respectively. This represents a relatively low capacity of explanation in MCA. However, given the complexity of the relations between social representations and socio-spatial practice, this relational modelling can still aid in better understanding the interactions of variables implicated.

### MCA factorial plane of socio-spatial practice for socio-cognitive groups



(Chen, 2021)  
Software: SPAD

Figure 5. MCA factorial plane of socio-spatial practice for socio-cognitive groups (translated from Chen, 2021)



As depicted in Figure 5, modalities of explanatory variables are homogeneously distributed on the factorial plane, with 3 to 4 values in each quadrant. Explanatory modalities like social origins and socio-spatial categories are opposed on the axis 1. On the left side of axis 1, we identify the residential location in Metz, the social origin of a family of managers or intermediate jobs, and a duration of work in Luxembourg of less than 5 years or 6-12 years. On the right side of the axis 1, we find modalities such as *Inconstant living area* and urban agglomeration of Thionville, the origin of a modest social class, and a work seniority of more than 19 years in Luxembourg. Consequently, *novice urban managers* are opposed to *senior rural commuters* on this first axis. In terms of mobility practice, in contrast to novice urban cross-border managers, senior rural workers are characterized by the possession of three cars or more, while the former is associated with households having 1-2 cars.

Regarding the second factor axis, two opposing situations are observed in terms of cross-border daily mobility, which is defined by both geographical proximity to the France-Luxembourg border and the availability of cars. Commuters residing in the *Constant living area* or the urban agglomeration of Longwy and possessing two cars in the household are more likely to be *car users*. On the other hand, individuals living in urban agglomerations of Metz and Thionville and without a car are *users of public transport*.

In the factorial plane, the four cognitive groups are projected as supplementary variables. The analysis reveals that these groups are positioned on either side of the two factor axes, with the exception of the group 4, the *Grand commuters*, which is located more in the central area. The positioning of the cognitive groups indicates the existence of cognitive configurations with social practice of mobility. As a result, the *cognitive groups* are termed *socio-cognitive groups*. The relative positioning of the socio-cognitive groups underscores the potential to understand the distinct characteristics of commuters, despite the relatively low effectiveness of variance explained. Additionally, six other supplementary variables are plotted on the factorial plane: individual's intergenerational socio-professional trajectory, cohabitation mode, type of housing occupied, tenure status, age in 2018, and the main mode of transport for cross-border commuting. These variables further elucidate the socio-spatial practice of individuals in each socio-cognitive group.

## **Mobilities in discourses**

Results from the MCA2 offer a visual representation of the relative positioning of the different socio-cognitive groups in the *social space* (Bourdieu, 1989). Nevertheless, these results do not provide insights into how individuals incorporate and reconcile various dispositions in their everyday life or

how their mobility practice is shaped by their social position. To gain a better understanding of the articulation between different mobility practices, semi-structured interviews and thematic analysis are used to identify specificities that illustrate the positioning of the socio-cognitive groups.

### **Domo-centric commuters**

In the similitude analysis of socio-cognitive groups (as depicted above in Figure 4), socio-cognitive group 1 was identified as *domo-centric commuters*, who place a strong emphasis on the importance of their familial relationships in their social representations of residence and hold a functional interpretation of their daily mobility. Furthermore, according to the results of MCA2, domo-centric commuters are characterised as individuals with intermediate working seniority in Luxembourg (6-12 years), typically car users who often own two vehicles and reside in the *Constant living area* near Luxembourg or in Longwy. They tend to come from families of intermediate professions and exhibit stable or upward social trajectories, often occupying intermediate or upper managerial positions.

As a representative of this group, the profile of Caroline is presented: a commuter living in a rural commune in the south of Longwy. Caroline was raised in a family where both parents were teachers at a secondary school in the city of Nancy. After earning her master's degree in political sciences in 1990s, she was recruited as an employee in the cross-border coordinating association where she currently works, thanks to her knowledge on the local socio-geographic situation and her multi-linguistic capacity nurtured in the region. With over 20 years working experience, Caroline has received several professional promotions and currently serves as the director of the association.

In general, Caroline benefits from the stability of her career, having worked in the same place for a long time, and experiences a very stable residential trajectory with only one relocation after starting her job in Luxembourg. This move occurred when she established a family with her partner and had three children. The only uncertain part in her current life seems to be her daily mobility: her commuting is largely influenced by the varied nature of her workplace. To accommodate this, she and her husband keep two private vehicles. However, Caroline commutes to work in Luxembourg either by train or car, depending on her schedule of the day:

*“So, whenever I can, I always opt for the train. But on days when I have meetings outside of the office, I have to hit the road. I mean, it comes with the job - we have to travel a lot. I had meetings in Trier, Saarbrücken, and Metz last week, and I think I was only in Esch (-sur-Alzette) once! But yeah, that's just the nature of the job. On days when I don't have any meetings, [...] I'm at my desk and I prefer taking the train. It's more cost-effective in terms of fuel, vehicle expenses, and parking. Plus, we're lucky to have a train station close by. I think most of my colleagues here take the train.” (Caroline)*

Caroline's family lives now in a rural commune in the far south of Longwy for almost two decades, with successive arrivals of her three children. The only one residential relocation the family has had was due to the birth of their first child. Despite being further from the border, being in this rural commune allows them to acquire property at a lower price with larger living space for their enlarging household. Today, Caroline and her family are deeply rooted in their community, with strong social ties. They have no intention for upcoming residential mobility due to these social connections as well and the rising cost of property in the border region:

*“[Our residence] is all about family, our circle of friends, and our commitments. [...] It's definitely in a rural area, but that's just part of what makes it special. [...] No, we have no plans to move - we have three kids, and they wouldn't let us even if we wanted to! Plus, we're super active in our community and have so many commitments - we're involved in local associations and on school councils. We have a lot of friends here, and it just wouldn't make sense to leave everything behind. I think we'll stay here for at least the next five to ten years. Moving would just be too much of a hassle and we can't see ourselves leaving all that we've built here.” (Caroline)*

Caroline's current position in both her residence and profession reflects her preference of stability. Her successful career progression in Luxembourg gives her no reason to change her job. However, when asked in an imaginary situation about her intention to work back in France to reduce commuting, Caroline's main concern is the reduction of wages and the waste of her relevant working experience:

*“At the moment, I don't see myself leaving for somewhere else. From time to time, I think that I would like some positions [in France], but then again, there is a wage differential for equal skills that is such that I'm not sure that... Now, I'm starting to have a number of years of seniority, I don't want to start over at SMIC (French minimum living wage), you know! Because I see a lot of great job descriptions that are really interesting, but paid very little, so there comes a point where I wouldn't take it! So, given the state of the job market in France, let's say for equal skills, for now, I'm not sure about coming to France.” (Caroline)*

From the case of Caroline, it is observed that domo-centric commuters tend to prioritize stability and security in both their habitation and their profession. They avoid residential and professional mobility as it can obstruct their sense of stability and disrupt their social ties in their place of residence. Additionally, it seems that, from their perspective, any form of professional or spatial change (changing jobs or residential relocation) can lead to economic downgrading and social isolation. Despite this, domo-centric commuters express relative satisfaction with their daily mobility, with fewer complaints

voiced. Between their representations and practice of daily mobility, a mutual reflective relation is witnessed one on the other: the daily mobility is considered and practiced as a functional consilience to ensure the certainty of the career and to maintain the social network already weaved in their residential stability. In this way, daily mobility represents the only compromise that domo-centric commuters are willing to make to maintain a good work-life balance.

### **Ambivalent commuters**

The second socio-cognitive group is situated in close proximity to a series of explanatory variables, which profile individuals of this group as residents in either *Inconstant living areas* or within the urban agglomeration of Thionville. These commuters generally hail from modest socio-economic backgrounds, have been working in Luxembourg for over 19 years, and often possess multiple vehicles within their household. Their socio-professional profiles are rather mixed with both upper-mid level managers and routine working classes identified. This end of axis 1 has thus been designated as presenting *senior rural commuters*. Furthermore, in the similitude analysis of socio-cognitive groups, group 2 is referred to as *ambivalent*, given their conflicting representations of daily mobility (very negative) and employment (very positive). In this group, a contrast is also observed between mode of transport, while they tend to possess the largest number of vehicles in the household, individuals tend to use public transport for commuting.

Elodie is an example of such an ambivalent commuter, although her comparatively recent entry into the Luxembourgish job market may slightly reduce her representativeness of this group as a “senior commuter”. However, her situation in constant change is considered as a pertinent showcase to illustrate the dynamics of the socio-spatial change among commuters.

Like most of individuals in this socio-cognitive group 2, Elodie has experienced an inter-generational upward social trajectory by working in Luxembourg. She is the daughter of a blue-collar worker and a homemaker, with neither parent having received any higher education. Nevertheless, university studies do not necessarily guarantee Elodie good professional prospects. After earning her university degree, Elodie faced challenges in securing stable employment in France, managing to land only a series of short-term positions, each lasting no more than a year. After struggling for several years, Elodie started searching for employment in Luxembourg, and she was overjoyed to receive a permanent contract on her first attempt. Years of dedicated work and extensive commuting have yielded fruitful results for Elodie’s career as an instructor in a nursery:

*“I’ve been a part of the nursery since day one and have witnessed all the improvements first hand! [...] Exciting news, I’ll be taking over as the head of the nursery*

*next week. [...] I haven't had any big plan, but apparently there are exciting perspectives for the future. And to think, I've only been here for five short years!" (Elodie)*

Despite the job satisfaction she experiences, the cross-border commute to Luxembourg presents a challenge for Elodie. She feels obliged to change her mode of transport and residential location to better adapt herself to the cross-border work. Initially, during her first three-month trial period as a cross-border commuter, she resided in Metz and commuted by train to Luxembourg. The daily mobility with public transport evoked strong negative feelings in her, and she described the train journey as “horrible”, “unbearable”, and “hellish”. This is due to the absence of a direct train service to her workplace, necessitating multiple transfers:

*“But at that time, we lived in Metz, [...] I took the train from Woippy station. I lived in Metz, but actually, I was closer to Woippy station. [...] I travelled from Woippy to Thionville, we stopped at Bettembourg in Luxembourg. In Luxembourg, I generally had five, ten minutes and then I took another train. They were Belgian trains, going all the way to my nursery. I didn't have much time, I caught the second train in just ten, fifteen minutes, that's it! And then I arrived, I still had a fifteen-minute walk to get there. If ever the first train was delayed, the real issue was the connection. Sometimes there were only five minutes, so I've got to run through the station to catch the second train. And then, I arrived at my workplace sometimes half an hour early, because the schedules [between the train and my work] didn't match up. And if I took the next train, I would arrive half an hour late. [...] It is not possible for me anymore! Now I see people coming from Metz to work in Luxembourg by train, frankly speaking, they are courageous.” (Elodie)*

To manage the demanding pace of Elodie's cross-border commute, she and her partner implemented two coping strategies. The first strategy involved relocating their residence to a location nearer to Luxembourg. Two years ago, they moved from Metz to Yutz (a suburb district of Thionville) for two rationales. First, the lengthy commute from Metz to Luxembourg had become a burden for Elodie. To alleviate this issue, the couple chose to find a more midpoint location between their respective workplace (the husband works in Metz). Second, with the arrival of their first child, they sought to be closer to Yutz (where Elodie's family resides) to ensure better care for the child. Despite having acquired an apartment in Yutz, Elodie is still considering relocation in the future to further reduce the commute time while maintaining proximity to their child's education.

*“If I had the choice, I'd love to move to [...] Veymerange (a suburban district near Thionville). [...] Because] The traffic in Thionville can be a nightmare, especially during rush hour. Moving to Veymerange would help avoid that. [...] But the downside is that my family wouldn't be nearby for my little one. That's another problem. [...] Buying a house*

*there is so expensive that it makes it hard to consider moving. But, if we did move, it would save me time not being stuck in Thionville traffic, which can take up to 25 minutes during rush hour.” (Elodie)*

The couple’s second coping strategy entails allowing Elodie to commute by car, although the journey remains “*awful*” and “*tiring*”, but it is “*faster*” compared to her previous experience.

*“It’s true that the [journey by] train can be a moment for yourself, a moment of relax. [...And] Taking the car is more stressful, there are traffic jams, you never know what time you’ll be back, you never know where you are if you use the app to divert you from the traffic. [...] However, the upside of driving is that it saves me two hours a day, which is crucial because I already spend ten hours a week behind the wheel, plus my 40-hour work week. If I switch back to taking the train, I’ll lose an additional ten hours. I just can’t afford that!” (Elodie)*

At the end of the interview, Elodie was asked if the commute to Luxembourg would motivate her to look for a job in France. She responded negatively:

*“Having a job close to home, just a 5-minute drive or even a 15-minute walk away, would be the ultimate dream! But the reality is, in France, it’s just not financially feasible. Couples with two French salaries struggle to even afford to live in the suburbs (here in the region). [... They] have to venture out to rural areas and commute for half an hour just to do their grocery shopping. [...] Luxembourg may seem like a blessing, but it’s also a curse because the real estate prices are skyrocketing.” (Elodie)*

The examination of Elodie's experiences highlights the challenging dilemma faced by cross-border commuters. On the one hand, the allure of job opportunities and potential career advancements in the thriving economy of Luxembourg attracts these individuals. On the other hand, the daily commute poses significant difficulties. This dilemma constitutes a main source of ambivalent representations of commuters toward their daily mobility and cross-border work. Nevertheless, if environmental constraints have shaped commuters' representational ambivalence, it is also the perspective on the spatial mobilities that shapes the coping strategies in their mobility practice. For these commuters, residential mobility is envisaged as a possible field of struggle which provides a margin of manoeuvre to face the necessary commute in their career development on the other side of the border. Leaving behind social connections (especially friendship) formed in different residential locations does not seem to be problematic at their various stage of life and career.

### **Satisfied commuters**

The socio-cognitive group 3 consists of cross-border commuters who exhibit high levels of overall life satisfaction, despite the occasional unpredictability of daily travel, indicated by references to “*randomness*”. The MCA2 suggests that they predominantly reside in the urban agglomeration of Metz. A family background in the managerial classes and shorter work time in Luxembourg are characteristic socio-economic features of this group. Moreover, in terms of their mobility practice, they tend to be public transport users as they are less probable to possess a car.

Raphael, a member of the socio-cognitive group 3, serves as a representative example of a satisfied cross-border commuter. Born to a well-established family, with a father in business and a mother in academia, Raphael pursued a master's degree in management and subsequently entered then the Luxembourgish labour market. He currently holds a lead position in the administrative service at a university and values both the intrinsic and extrinsic rewards of his job:

*“It's true that we are in the community of knowledge, so it's intellectually stimulating. [...] In fact, people who do not work in Luxembourg, they think that working in Luxembourg is like in France, like in Lorraine, but only with higher salaries! It's not true, it's not true at all! We really are in another country! The first thing already is that everyone speaks three, four, five, six languages! While in France, it is difficult to speak two or three languages, that's the first thing! The second thing, which is somewhat the counterpart, is the truly multicultural side. Here, there are people of all nationalities, who come from all over the world to Luxembourg. It is a country that is really very welcoming! [...]*

*And then, we also have very good working conditions! [...] I find that they really give us what we need in the work! Well, see here! The beautiful buildings we have, we have computers of the latest generation [...]. And finally, obviously, yes, the salaries are higher and decent...Or even sometimes it's not high, just because it's not decent any more in France, that's it! I would rather say that French salaries are not very decent!" (Raphael).*

Raphael commutes daily between Esch-sur-Alzette (L) and Metz (F) via train and finds the cross-border mobility to be a relaxing experience, despite the occasional “randomness” of the punctuality in public transport. Since entering the workforce, he has lived in Metz and has relocated only within the city centre for family reasons, such as the need for more living space or property acquisition. His general satisfaction contributes to his ongoing stability in his current situation:

*“I would say 'relaxing', because I'm seated, I listen to music, and even sometimes when I'm with friends. I would say 'friendly' and that's it! I'm with colleagues, we say silly things, we talk about vacations, that's it! [... In terms of] The neighbourhood we are in, Metz Sainte-Thérèse, is a hot spot for cross-border commuters. My wife and I, we are city people through and through, no interest in living in the countryside or an isolated house. We love Metz, it's our home and a great place to be. My wife works in the city centre and can walk there in just ten minutes, while our daughter goes to a nearby school. Moving to Thionville, it's just not worth it!” (Raphael).*

The strong attachment of Raphael to his place of residence and the lack of economic incentives to reduce his cross-border commute mean that he has no intention of relocating:

*“To be honest, today, I have every reason to stay where I am, because it also corresponds to my values, to my culture! [...] Well, it's not fashionable to say that, but you have to 'look for meaning'. Being here, for me, it makes sense! It gives meaning to be in a university where we train people, where we transmit knowledge, where we do research. [...] I couldn't be anywhere else [to work...] If I were to leave here, I don't know where else, because I would be very unhappy. [...] I'm doing the best I can, that's it! Because I think it's worth it, it's worth the investment!” (Raphael).*

For satisfied Franco-Luxembourgish commuters, our findings reveal consistency in their social representations and mobility practice. Similar to domo-centric commuters, satisfied commuters value stability. However, for the latter, the cross-border commute is not necessarily disruptive, as satisfied commuters view it as a result of their voluntary decision rather than comprise imposed by social constraints, a reasonable price to pay for being able to stay in a satisfied residential situation without excessive financial burden. In other words, for satisfied commuters, the mobility practice is viewed as



socially valued: cross-border daily mobility leads to promising career development, and their residential (im)mobility is viewed as a choice within their field of possibilities. Consequently, daily commuting to the metropolitan area serves as a medium to fulfil their social aspirations while ensuring their residential stability in Lorraine, thereby facilitating upward social mobility.

### **Grand commuters**

The results of the MCA2 reveal that the socio-cognitive group 4 is the least distinct among all groups on the factor map, as depicted in Figure 5. This proximity to the origin of the coordinate system poses challenge in characterising the group based on the MCA results. This difficulty may be attributed to the lack of sufficient quantitative representation in the sample or a disconnection between the socio-cognitive characteristics of participants and their actual practice.

However, analysis of nearby explanatory variables in the factor space can assist in qualitative identification of the *Grand Commuters*. They are characterised by the use of public transport, potentially owning only one car or no car at all, residing in the urban agglomeration of Thionville, experiencing negative daily commuting experiences, and having general dissatisfaction with their employment. As an example from the interview, Nadia serves as a representative illustration of a typical Grand Commuter.

Nadia, who is 51 years old, has roots in Algeria as her parents immigrated to Lorraine when the steel industry was thriving. She was born in a suburban area near Thionville, where her father worked as a factory labourer until a health condition forced him to retire early. Due to her family's financial difficulties, Nadia had to shift her focus to professional training courses, but her unexpected pregnancy interrupted her studies. In 1999, she started working as a cleaner in Luxembourg:

*“I had to work because I was on my own with my kid. [... This job is] tough, not much appreciation, and it is just routine, the same thing day in and day out. We come in, grab our carts, and it's always the same thing, over and over, it's repetitive and boring! I sometimes feel trapped in this job, there's no coming back! What makes it even worse, I have no person to socialise, I'm all by myself most of the day. [...] I don't even see anyone for four hours during my work, except for my [cleaner] co-workers. [... All I'm asking for] is a little recognition, some respect, and to be valued for the work I do. [...] It's a lot to ask for, but it would mean a lot to me. And, when I do get a bonus or recognition for a job well done, for coming in even when I'm sick, it's a great feeling. [...] It's not about the money, just some appreciation for the hard work. [...] It seems like the ones who work the hardest don't always get the recognition they deserve.” (Nadia)*

Today, Nadia primarily relies on the bus from Thionville to Luxembourg for her daily commute. Although she considers herself “*lucky*” to have access to public transport, the journey remains full of “*difficulties*” and “*weariness*”:

*“Two hours, that's too much! You see, today I have a private client in Neudorf (in Luxembourg), so I got to head to work. And lucky me, I'm starting my journey from Thionville today. So, I'll explain my journey to you: I take the bus 301. This bus arrives in Howald, I switch to the bus 16 and go to the train station [of Luxembourg-city]. And from there, I take another bus to reach [the bus stop of] my final destination. I still got about 15 minutes of walk to finish the whole journey!” (Nadia)*

Nadia encountered challenges in her commute due to her late working hours. As a cleaner, she typically finished her work after public transport had ceased operations for the day. This prompted her to relocate to Thionville, as there was no bus line available for her to return to her family home in the suburbs during night-time hours. This move allowed Nadia to maintain her employment in Luxembourg and effectively manage her daily commute independently:

*“I had to move! Because I don't have a car, I only travel by bus or public transport. Because I had late work hours, I didn't have a means of transport to come back home. At a time, we were carpooling [with my co-workers]. But then people stopped, one person left, one worked elsewhere. [...] Then the destiny helped me, they (the city council) put in place the bus line 300, it was eight years ago [...]. So, I was happy, I started taking the bus. But then they stopped the bus! [...] At the beginning [of this interruption], it was a friend, or it was my daughter took me home [with their car]. I just asked the mayor, I had to see the mayor to ask to put in place buses to try to have a connection after 10pm, so that people can go back home, because not everyone necessarily has the means to buy a car! And well, I was faced against the walls, I was even told, ‘Well, if we put buses after 10pm, it would almost be a taxi!’ That's what the deputy mayor told me [...]. So, by grace, let's say, again, God helped me, I had the luck of having an apartment not far from the city centre in Thionville. So, I was able to keep my job and go to work and come back home at night without depending on anyone.” (Nadia)*

For those cross-border commuters who are typically referred to as *Grand commuters*, they are individuals undertaking long journeys to work in Luxembourg, often having unfavourable job evaluations and working in lower socio-professional classifications. From a socio-economic perspective, they come from modest origin and may not experience upward social mobility while still working as routine or manual workers in the metropolis of Luxembourg. Their work serves as an instrument to avoid socio-economic downgrading, as they face difficulties in finding employment in France.

Mobilities are perceived distinctly by Grand Commuters compared to commuters belonging to other groups: professional mobility does not reflect any form of upward social mobility but often entails job changes in an already precarious position. Spatial mobility is also indicated by constant professional changes such as switching to a different workplace due to their outsourced contract (this type of spatial mobility related to workplace can also be observed among workers in different construction sites or security guards). Daily mobility poses obstacles, yet fewer solutions are available for them, including limited transport services, inadequate infrastructure, the lack of personal vehicles, or the absence of a driver's license. Moreover, their financial constraints hinder the possibility of residential mobility as a solution to daily commuting. In short, for Grand Commuters, mobility equates to enforced instability.

While Nadia may be considered a representative of Grand commuters, it is challenging to accurately define their profile due to the limited availability of data. Therefore, this last analysis has limitations in fully understanding the social representations and mobility practice of these *Grand commuters*, but future studies could potentially address these gaps.

## **Methodological discussion**

Current methodologies applied in social and human sciences are confronted with two conflicting challenges in terms of discursive analysis. First, there is an increasing criticism of the non-systematic and potential for over-inference in corpus analysis (Braun & Clarke, 2006; Madill et al., 2000). Second, there is a reinvigoration of the phenomenological approach, which values the subjective perspective, often elucidated through discourse interpretation (Neubauer et al., 2019; Williams, 2021).

Addressing these issues while leveraging the distinct explanatory power offered by different data types, this paper proposes a novel articulation of various analytical techniques for studying social representations and their interconnections with mobility practice and social positions. This framework stands in contrast to the existing analytical strategies that prioritise qualitative data in developing typologies of representations. Instead, our methodology utilises qualitative data to enhance and contextualize the typologies that arise from a quantitative analysis: quantitative data is used to depict the underlying structure of representations, whereas qualitative data is used to explore intricate relationships among various phenomena. Within this integrative model, geometric data analysis acts as an interface, facilitating the synthesis of heterogeneous data across multiple analytical levels and of diverse nature.

This proposed method proves to be an efficient way to reduce data dimensions and facilitate analysis. However, the difficulties of this mixed methodology must be addressed, including the range of skills required for different analytical procedures and the need for further exploration of mixed-methodology strategies,

## Conclusion

In the contemporary society, the *Mobility*, once considered as the result of societal transformation (Harvey, 2001; Sheller & Urry, 2006; Urry, 2001), has now become a dominant social practice (Bacqué & Fol, 2007; Fritsch, 2013), manifesting both in political actions and individual behaviours. Research on mobility equity and equality has evolved from a simple supply-demand relationship to a socio-economic focus on providing more equal access to all groups and a more homogeneous distribution across all spaces. Although mobility is often equated with potentials, possibilities or even competences (Kaufmann et al., 2018), the *immobile* aspect of mobility should also be acknowledged in mobility studies, particularly in cases of frequent and long-distance daily mobility, where residential sedentariness provides not only pragmatical conveniences, but also a sense of security, territorial attachment, and potential for weaving social ties. However, mobility should not only be seen as a *right*, but also as a *norm* that differentiates those who conform and those who are marginalised (Le Breton, 2008). The psycho-sociological perspective can provide a more inclusive understanding of the social practice of mobility.

Our study found that mobility practice is influenced not only by socio-economic conditions, but also by individuals' representations of daily mobility, their residence attachment and their relation to the job. Additionally, there is consistency between individuals' socio-economic conditions (or trajectories) and their representations. Both the representations and the practice of daily mobility are socially structured. On the one hand, in our case study, for individuals from advantageous groups, cross-border daily mobility is a means of achieving stable or upward social trajectories and maintaining socio-economic benefits. On the other hand, for those from disadvantaged social classes, long-distance daily mobility is simply a means of avoiding social downgrading or deep poverty. The lived experience of cross-border daily mobility also varies depending on occupation, with labourers having more restrictions on punctuality and physical presence, while managerial classes have more autonomy in their time management. Moreover, virtual mobility may partially replace physical movement for advantageous groups (Kenyon et al., 2002).

Our study provides a point of view for using social representations as a theoretical approach to understanding mobility practice. Nevertheless, the explanation capacity of the chosen variables and survey data needs to be strengthened in future research. For example, upcoming research should pay more attention to place-based analysis, such as how the socio-spatial representations of Luxembourg might influence individuals' spatial practice beyond commuting.

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