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## **BORDERS IN PERSPECTIVE**

UniGR-CBS Thematic Issue 3/2020

# **BORDERS AND CROSS-BORDER LABOR MARKETS: Opportunities and Challenges**

UNIVERSITY OF LORRAINE & UNIVERSITY OF LUXEMBOURG  
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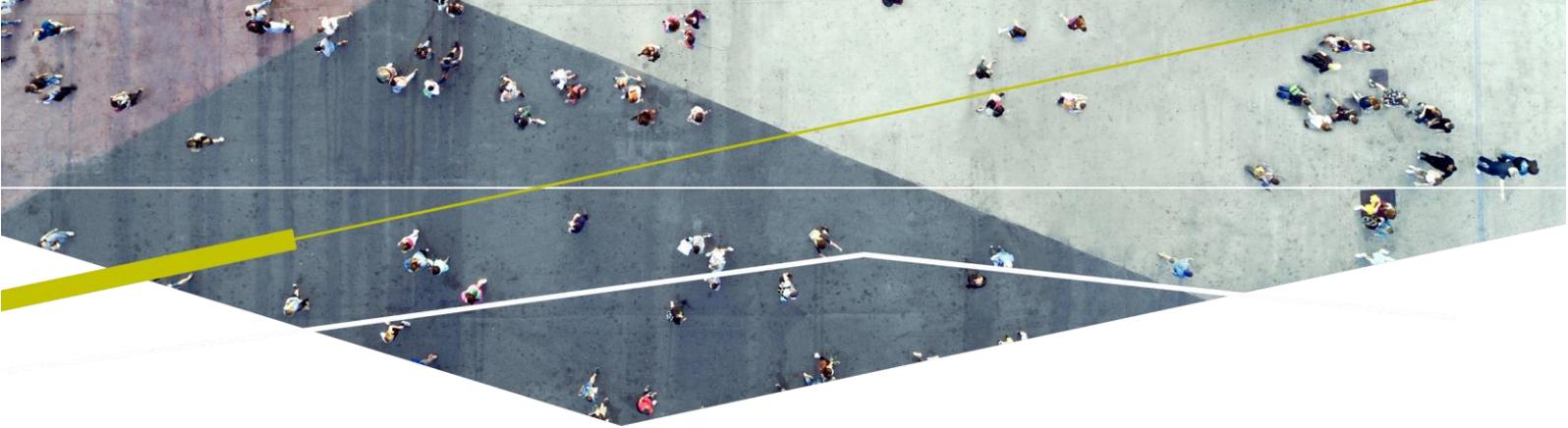
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# UniGR-Center for Border Studies

CENTRE EUROPEEN D'ETUDES SUR LES FRONTIERES  
EUROPÄISCHES ZENTRUM FÜR GRENZRAUMFORSCHUNG

**EN** The UniGR-CBS is a thematic cross-border network of approximately 80 researchers within the university grouping University of the Greater Region (UniGR) conducting research on borders, their meanings and challenges. Due to its geographical position in the “heart of Europe”, its expertise and disciplinary diversity, the UniGRCBS has the best prerequisites for becoming a European network of excellence. For the creation of a “European Center for Competence and Knowledge in Border Studies”, the Interreg VA Greater Region program provides the UniGR-CBS network with approximately EUR 2 million ERDF funding between 2018 and 2020. Within this project, the UniGR-CBS aims at developing harmonized research tools, embedding Border Studies in teaching, promoting the dialogue on cross-border challenges between academia and institutional actors and supporting the spatial development strategy of the Greater Region.

**FR** L’UniGR-CBS est un réseau transfrontalier et thématique qui réunit environ 80 chercheuses et chercheurs des universités membres de l’Université de la Grande Région (UniGR) spécialistes des études sur les frontières, leurs significations et enjeux. Grâce à sa position géographique au « coeur de l’Europe », à sa capacité d’expertise et à la diversité des disciplines participantes, l’UniGR-CBS revêt tous les atouts d’un réseau d’excellence européen. L’UniGR-CBS bénéficie d’un financement d’environ 2 M € FEDER pendant trois ans dans le cadre du programme INTERREG VA Grande Région pour mettre en place le Centre européen de ressources et de compétences en études sur les frontières. Via ce projet transfrontalier, le réseau scientifique UniGR-CBS créera des outils de recherche harmonisés. Il oeuvre en outre à l’ancrage des Border Studies dans l’enseignement, développe le dialogue entre le monde scientifique et les acteurs institutionnels autour d’enjeux transfrontaliers et apporte son expertise à la stratégie de développement territorial de la Grande Région.

**DE** Das UniGR-CBS ist ein grenzüberschreitendes thematisches Netzwerk von rund 80 Wissenschaftlerinnen und Wissenschaftlern der Mitgliedsuniversitäten des Verbunds Universität der Großregion (UniGR), die über Grenzen und ihre Bedeutungen sowie Grenzraumfragen forschen. Dank seiner geographischen Lage „im Herzen Europas“, hoher Fachkompetenz und disziplinärer Vielfalt verfügt das UniGR-CBS über alle Voraussetzungen für ein europäisches Exzellenz-Netzwerk. Für den Aufbau des Europäischen Kompetenz- und Wissenszentrums für Grenzraumforschung wird das Netzwerk UniGR-CBS drei Jahre lang mit knapp 2 Mio. Euro EFRE-Mitteln im Rahmen des INTERREG VA Großregion Programms gefördert. Im Laufe des Projekts stellt das UniGR-Netzwerk abgestimmte Forschungswerkzeuge bereit, verankert die Border Studies in der Lehre, entwickelt den Dialog zu grenzüberschreitenden Themen zwischen wissenschaftlichen und institutionellen Akteuren und trägt mit seiner Expertise zur Raumentwicklungsstrategie der Großregion bei.



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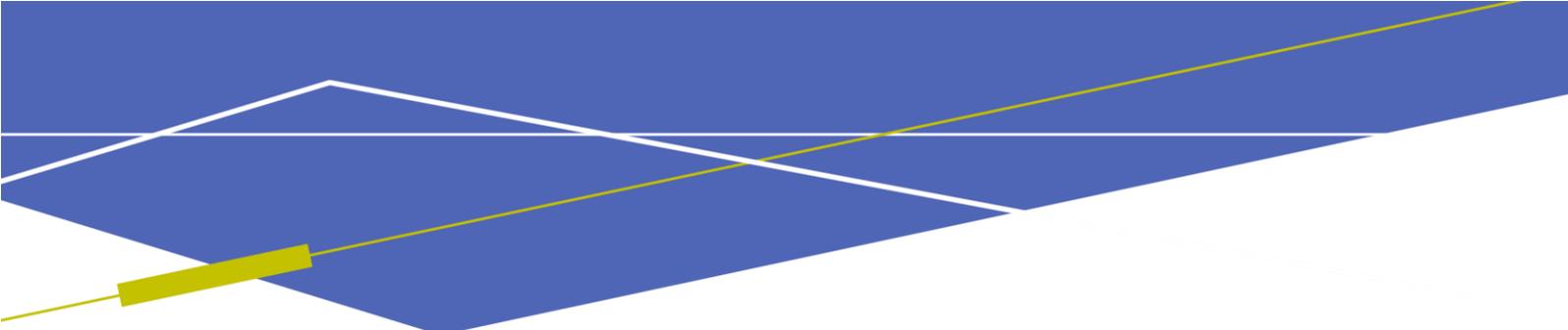
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# CROSSING THE BORDER EVERY DAY: a rhythmic perspective

GUILLAUME DREVON and OLIVIER KLEIN

With the job growth dynamics in Luxembourg, more and more workers are crossing the border each day to get to their place of work. This article studies the daily lives of these cross-border workers by analyzing their daily activity schedules, using a spatiotemporal approach. The analysis identifies and describes different types of cross-border workers' profiles according to the location of their daily activities, and explores the great complexity of daily activity schedules. Additional qualitative analyses exploring representations associated with their life rhythms reveal the high intensity associated with these lifestyles and the difficulty in managing numerous daily activities. The latter have a direct impact on quality of life and their degree of integration in Luxembourg.

**Cross-border workers, space-time, daily activities patterns, time geography, rhythms of life**

## FRANCHIR LA FRONTIÈRE CHAQUE JOUR: une perspective rythmique

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Dans le sillage de la croissance de l'emploi au Luxembourg, de plus en plus de travailleurs traversent chaque jour la frontière pour se rendre sur leur lieu de travail. Cet article propose d'étudier la vie quotidienne de ces travailleurs frontaliers en analysant leurs programmes d'activités quotidiens à partir d'une approche spatio-temporelle. Différents types de profils de travailleurs frontaliers sont identifiés et caractérisés en fonction de la localisation de leurs activités quotidiennes. Cette analyse met également en évidence la grande complexité de leurs programmes d'activités quotidiennes. Des analyses qualitatives complémentaires axées sur la représentation des travailleurs frontaliers au sujet de leur programmes d'activités quotidiens révèlent des rythmes de vie perçus comme particulièrement soutenus. Les résultats de l'enquête qualitative montrent les nombreuses difficultés rencontrées par les travailleurs frontaliers concernant la gestion de l'ensemble des activités quotidiennes. Les difficultés à concilier les différents aspects de la vie quotidienne ont des conséquences directes sur la qualité de vie des frontaliers et leur niveau d'intégration au Luxembourg

**Travailleurs frontaliers, espace-temps, programmes d'activités quotidiennes, géographie du temps, rythmes de vie**

## TÄGLICH DIE GRENZE ÜBERQUEREN: EINE RHYTHMISCHE PERSPEKTIVE

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Im Zuge des Beschäftigungswachstums in Luxemburg überqueren immer mehr Arbeitnehmer täglich die Grenze, um zu ihrem Arbeitsort zu gelangen. Dieser Artikel befasst sich damit, das tägliche Leben dieser Grenzgänger zu untersuchen, indem ihre täglichen Aktivitätsprogramme mithilfe eines räumlich-zeitlichen Ansatzes analysiert werden. Verschiedene Arten von Profilen von Grenzgängern werden gemäß dem Ort ihrer täglichen Aktivitäten identifiziert und charakterisiert. Diese Analyse zeigt ebenfalls die hohe Komplexität ihrer täglichen Aktivitätsprogramme. Zusätzliche qualitative Analysen, die sich darauf fokussieren, wie die Grenzgänger ihre täglichen Aktivitätsprogramme darstellen, zeigen Lebensrhythmen auf, die als

besonders intensiv empfunden werden. Die Ergebnisse der qualitativen Befragung zeigen die vielen Schwierigkeiten auf, mit denen die Grenzgänger beim Management ihrer sämtlichen täglichen Aktivitäten konfrontiert sind. Die Schwierigkeiten bei der Vereinbarung der verschiedenen Aspekte des täglichen Lebens haben direkte Auswirkungen auf die Lebensqualität der Grenzgänger und ihren Integrationsgrad in Luxemburg.

**Grenzgänger, Raumzeit, tägliche Aktivitätsprogramme, Zeitgeographie, Lebensrhythmen**

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## Introduction

Through several territorial development instruments (e.g. EGCT, European Grouping for Territorial Cooperation) and research-oriented programs (e.g. INTERREG, ESPON), European public policies are attempting to develop cohesion measures with regard to cross-border areas at the social, territorial and political levels (Durand, 2014). Measuring spatial and territorial cohesion is more often than not reduced to a set of spatio-functional indicators that reflects the intensity of interactions between spaces located on both sides of the border (ESPON, 2010). Some recent studies based on consumer practices (Spierings and Van Der Velde, 2013) and daily mobility of populations living close to border (Drevon et al., 2018) propose new approaches to understanding cross-border interactions. These disaggregated approaches help shed light on the different ways individuals experience the border and live in cross-border areas (Dubois and Rérat, 2012). A joint analysis of work, social and consumption-related activities allows us to trace the paths of the everyday life (Giddens, 1984) in these cross-border contexts. This article follows this perspective by linking ways of living (Stock, 2006) in cross-border areas and the daily practices of cross-border workers from the three neighboring countries (France, Germany, Belgium) in Luxembourg. The analysis is based on the theoretical corpus of Time Geography (Hägerstrand, 1970) and an activity-based approach (Jones et al., 1983). The resulting analytical tools make it possible to show how activities are carried out in space and time on both sides of the border. In this perspective, this article proposes a rhythm-based approach that analyzes cross-border workers' behavior in the Luxembourg cross-border area. It shows how cross-border commuters use different places according to the rhythm of their spatial practices. From this, different cross-border lifestyles emerge and highlight different levels of spatial integration in Luxembourg. In addition to analyzing the spatio-temporal behaviors of cross-border workers, it also attempts to enable a better understanding of the determinants of these different levels of integration. Spatiotemporal behaviors are effectively often related to socio-familial patterns that tend to shape daily activity programs (Chow and Recker, 2012; Ho and Mulley, 2013). Thus, the level of integration in Luxembourg revealed by spatio-temporal behaviors is also dependent on socio-familial configurations and the leisure time available. Cross-border workers' life rhythms govern how they carry out their activities and, consequently, their degree of spatial integration in Luxembourg.

The article is divided into three sections. The first introduces the conceptual tools used for the analysis, and based on which the methodology was developed. The second section presents the data and methodology. The third section presents and discusses the main findings of the analyses.

## Life rhythms for reinterpreting lifestyles in cross-border areas

The analysis of life rhythms takes two forms (Drevon, 2019). The first analyses the spatio-temporal configurations of activity programs. The second considers the perception of time and individuals' relationship with their daily activity programs more specifically. The analysis developed here combines these two approaches both conceptually and methodologically. The theoretical framework is therefore based on Time Geography (spatiotemporal configurations of activity programs) and the psychology of time (analysis of time perception). This first conceptual section presents these two approaches.

## A conceptual reference framework: Time Geography

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Torsten Hägerstrand initiated and developed the concept of Time Geography in the mid-1960s. This way of conceiving space and time based on an individual-centered approach makes it possible to study how events take place and are inter-related in a spatiotemporal setting (Hägerstrand, 1970). By investigating individual daily practices, this approach then analyses group behaviors in order to understand structures and processes at larger scales. Studying individuals who are representative of socio-spatial groups fosters greater comprehension of the factors at play in individual choices with regard to spatiotemporal budgeting. By taking the individual as its basic study unit, this approach emphasizes the importance of time in people's choice of activities. This temporal dimension clearly appears essential when it comes to synergizing people or objects to make the socioeconomic system work. By combining schedules and the spaces travelled and occupied daily, the concept of spatio-temporal path shows how people move in a spatiotemporal environment. These paths highlight the constraints and limits of possible activities and thus demonstrate that, in many cases, indi-

viduals' decisions are not independent of the spatial and temporal dimensions of their daily lives. Individual constraints refer to the limitations of human movement (i.e. physical and biological factors). Three main constraints identified were: 1) capability constraints, that physically limit individuals' movements; 2) authority constraints, defined by a group of individuals or institutions with power; and 3) spatiotemporal synchronization constraints, which occur when individuals must interact with each other in order to carry out a task at a given place and for a given time period.

The manifest interest for this approach is largely due to the relative simplicity of the concepts used and the original representations that it introduces. Naturally, the situation is more complicated when individuals live in cross-border settings.

## Difficulties balancing daily schedules

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Faced with long commutes and a lack of time, families must find solutions to the spatiotemporal challenges of their daily lives. Time pressure appears when several elements are combined. For workers, it is mainly a question of reconciling working life, family life and daily mobility. Understanding the life rhythms of cross-border workers requires a holistic approach that includes the combination of three structuring elements of the daily lives of working people: the professional sphere, the family sphere and the spatial sphere, which are part of the daily prism of Time Geography.

The professional sphere includes work-related activities, and family activities occur within the family sphere. The spatial sphere refers to the location of activities and daily spatial mobility. Each of the spheres is associated with time and activity obligations relative to the constraints identified by Hägerstrand (1970). For the professional sphere, this refers to authority constraints; for the family sphere, this means spatiotemporal synchronization constraints; finally, constraints in terms of linking all these activities fall under the spatial sphere. The increasing diversity of the activities of household members is now broadly accepted, and mobility is a key issue in family life (Thomas et al., 2011). This observation is even more significant for households living in low-density areas that are poorly accessible by public transport (Orfeuill, 2010). In cases where children are not yet autonomous with regard to their daily mobility, car use is necessary (Dupuy, 2000). Each household member has his or her own daily and weekly activity schedule, and mobility needs sometimes conflict within the family

unit, giving rise to trade-offs and negotiations. This clash of scheduling is most pronounced between parents and children (David, 2007), resulting in discord between family members and increased time pressure on the couple. Interactions between household members lead to the establishment of mobility arrangements (support, carpooling, etc.) (Timmermans and Zhang, 2009; Aybek et al., 2014). This situation directly influences individuals' choices in terms of transport modes, which are determined in part by interactions and arrangements (Ho and Mully, 2013). While interactions between household members lead to schedule planning, they also reflect the degree of time pressure. Daily life plays out based on households' mobility capacities. Long commutes may even increase the risk of separation (Kley, 2015). Travel is an obligatory time constraint that limits participation in other activities (Korsu, 2010). The mobility survey of cross-border commuters revealed an important relationship between fatigue, stress (28% and 23% of respondents) and commuting (Schmitz et al., 2012). Cross-border commuters in Luxembourg had the salient feature of travelling long distances from home to work (45 minutes one way on average). This feature suggests that Luxembourg's cross-border workers are potentially subject to significant time pressure.

## Data and methods

Understanding the temporal dimension of the daily lives of cross-border workers requires original data. The difficulty, however, lies in the cross-border context. Hence, two complementary surveys were used. The collected data were analyzed using quantitative and qualitative methods to better understand the life rhythms of the individuals surveyed.

### Data: two complementary surveys

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This research was based on two complementary datasets constructed from two surveys: a large cross-border mobility survey (2010) and a qualitative survey conducted on 10 cross-border households (2015) with two working adult members.

The activity patterns of cross-border workers were estimated based on a quantitative mobility survey covering a representative sample ( $n = 7,235$ ) based on sociodemographic (gender, age, PCS) and spatial (place of residence) criteria of all cross-border workers working in Luxembourg and living in France, Germany and Belgium in

2010. Respondents were contacted by means of a letter, sent by post, that contained the questionnaire. They completed the questionnaire themselves (self-administrated questionnaire) and sent it back to investigators with a pre-stamped envelope. The response rate was 18% of those contacted (40,000 letters sent and 7,235 respondents). We analyzed this dataset in order to understand the daily life rhythms of cross-border workers relative to the location of their daily activities within the Luxembourg cross-border metropolitan area. The method used included the number of activities, their succession over time and their location. It also combined techniques derived from spatial analysis and multivariate statistics.

Conducted between September and December 2015, the qualitative survey included 10 households in which 10 couples were interviewed, i.e. an overall sample of 20 individuals (Drevon, 2016). The interviews were conducted in a semi-directive manner at the place of residence of the recruited households. Respondents were recruited via a process that involved random selection of addresses within the morphological agglomeration of Thionville in France. This random selection process took into account three socio-demographic criteria and one spatial criterion, namely working couples with two to three children under 18, with at least one partner working in the Luxembourg urban area.

## **Analytical methods**

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The analytical methods dealt with two types of materials. The analyses of the observed daily rhythms were built based on the Cross-border Mobility Survey. The analyses dealing with representations of life rhythms were obtained from the qualitative survey analyses.

### **Analytical methods for the quantitative survey**

Cross-border activities patterns were reconstructed based on activities and travel data from the Cross-border Mobility Survey. To do this, the place/time of departure, place/time of arrival, duration, as well as the purpose of the trip were recorded for each trip. Based on these elements and by exploiting the previously mentioned variables, we were able to link activities and daily trips. The main goal was to analyze the length and layout of the patterns. This approach was applied to all cross-border workers in order to build their activity patterns. The size and layout of the patterns were analyzed by not taking into account the distribution of activities over countries, and secondly, by integrating on what side

of the border the activities took place into the analysis.

Beyond the organization and the time sequencing activities, the analysis of their rhythms also took into account their location. All the places individuals frequented daily were considered activity spaces characterized by three factors: the place of residence, the location of regular activities, and movement between the places frequented by the individuals (Golledge and Stimson, 1997; Schönfelder and Axhausen, 2010). The duration of activities was also taken into consideration and thus became an additional factor weighting activity locations according to the activity duration. To analyze the activity locations of cross-border workers, the standard deviational ellipse method seemed most relevant. Its direction distribution analysis allows it to characterize and synthesize the distribution of activity locations in space (Cauvin et al., 2008). For each individual surveyed, the activities were first described graphically in the form of a dot plot. The latter can be analyzed using a standard deviational ellipse and its derived indicators: length of the major and minor axis, center of gravity and surface of the ellipse. All of these parameters summarize the dispersion and spatial distribution of activities (Pumain and Saint-Julien, 2010). In the cross-border context, considering the border is essential. In this way, four supplementary variables were created: surface of the ellipse respectively in and outside Luxembourg, and number of activities respectively in and outside Luxembourg. As the data extracted was significant, we had to reduce it in order to facilitate our analysis. The Principal Component Analysis (PCA) was the most appropriate method for reducing the number of variables and making the information less redundant (Rey et al., 1977; Bavoux and Chapelon, 2014). In our case, the aim more precisely was to determine the correlations between the spatial variables resulting from the standard deviational ellipses in order to identify the main components that characterize the dispersion and distribution of activities in border residents' living areas. Once these components were determined, a Hierarchical Cluster Analysis (HCA) was used to create groups of profiles that were characteristic of cross-border activity areas.

To go beyond the simple description of behaviors, it was necessary to understand their determinants. The groups of cross-border commuters were classified, thus providing an overview of different daily mobility behaviors. Better understanding of these behaviors required further analysis in order to determine which factors contributed to a particular behavior. To do so, we used a multinomial regression model that aimed

to determine the effect of other individual variables on the various profiles identified (Lebart et al., 2006). This technique not only allowed us to understand the effect of a set of explanatory variables in a single probabilistic model (Hosmer Jr. and Lemeshow, 2004), but also to take into account variables that had more than two modalities. By considering the different spatial profiles as the variable to be explained and comparing them with sociodemographic variables, regression facilitated understanding of the determinants of the different groups identified.

### **Analytical methods for the qualitative survey**

The qualitative survey analysis was based on discourse analysis that can be considered in two ways. Firstly, a qualitative approach focused on the content and meaning of the expressions used by individuals, by thoroughly reinterpreting the body of interviews in order to detect strategies and individual representations. Secondly, a quantitative approach based on the recurrence of respondents' comments during the interview was developed. These two approaches were complementary within the framework of this research and were therefore used together. On the one hand, the goal was understanding and analyzing the meaning of individuals' comments; on the other hand, the analysis of occurrence allowed us to measure the importance of the words and expressions used by individuals (Degenne and Vergès, 1973).

The discourse analysis method was done in three stages. Firstly, the recorded interviews were fully transcribed. Then, the data was processed using qualitative and quantitative approaches. The qualitative analysis was subject to the researcher's subjectivity. However, from a deep review of the text corpus, it was possible to identify verbatims necessary for interpreting individuals' comments relative to the topics addressed and identifying perceptions, opinions and strategies. The analysis of occurrences reveals main lexical fields based on a count of the words or expressions used. The dialogue that emerged between these two approaches was an asset for the analysis. Effectively, an in-depth analysis of the comments was weighted using quantitative measures. Inversely, the qualitative analysis gives meaning to the frequency of the expressions used.

## **Results**

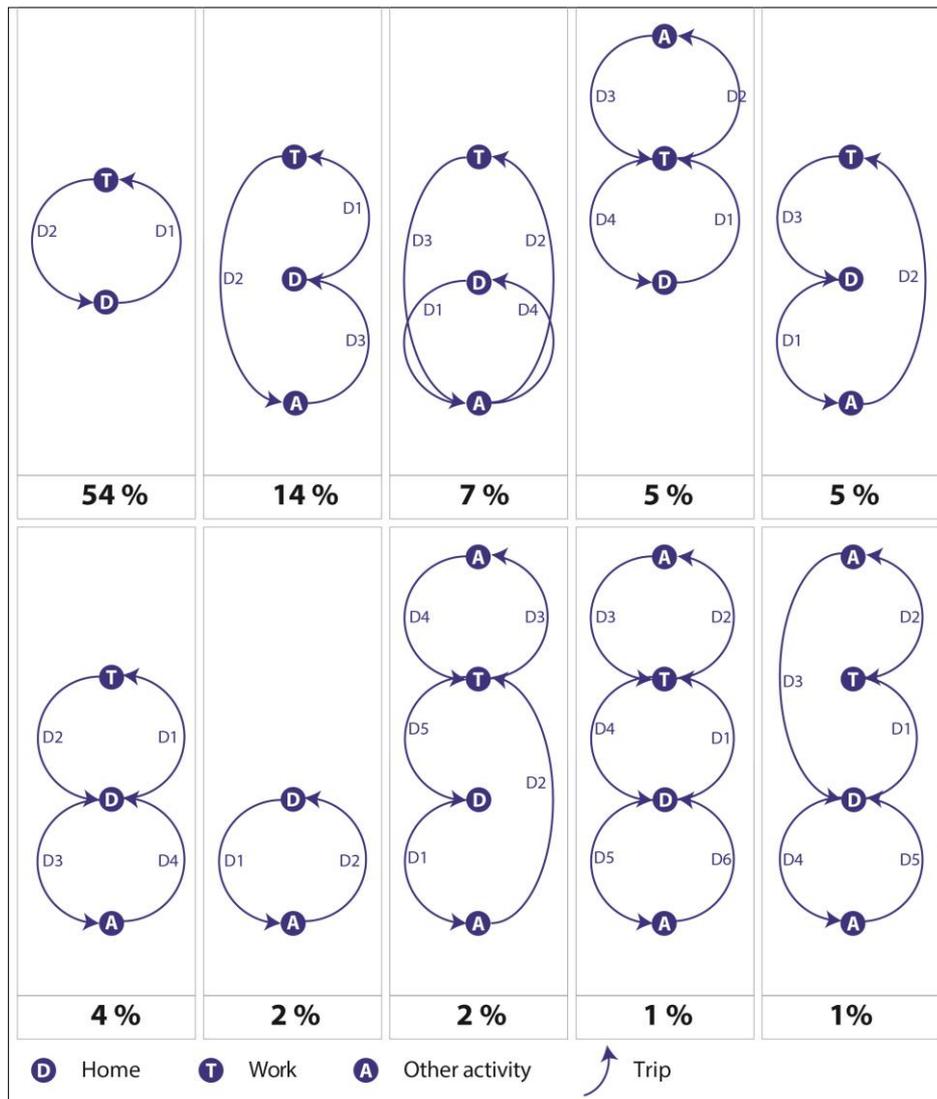
Cross-border workers have an important distinction with regard to the spatial configuration of their home-to-work trips. In 2010, Luxembourg's cross-border workers travelled an average of 44

kilometers to work. In comparison, workers living in the Metz agglomeration travelled an average of 20 kilometers per day for all their activities (SCOTAM, 2017). In France, the average distance from home to work was around 15 kilometers in 2008 (ENTD, 2008). These figures highlight the specific nature of Luxembourg cross-border workers' mobility patterns, which predispose them to significant time pressure due to long commutes. The results of the analyses are organized according to three main entries. Firstly, cross-border workers' activities schedules, which show their activities over a typical day, are presented and discussed. Secondly, based on the analysis of activities spaces, the way they carry out their activities is detailed. Thirdly, based on interviews, the heavy life rhythms of these workers are described.

### **Complex activities schedules**

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The results of the quantitative analyses show the daily pace of cross-border workers' lives. The first result comes from an analyses of activities patterns, which illustrates both the succession of activities of cross-border workers (Figure 1) and the number of workers and their location relative to the border (Figure 2). This analysis indicates how cross-border workers in Luxembourg organize their activities around two structuring places, namely their place of residence and their workplace. Secondary activities carried out outside home and work fall into several categories (leisure, shopping, drop-off, service, etc.). Figure 1 shows ten main activity patterns representing 95% of the total configurations. In total, about 600 different pattern combinations were identified. The aggregation of the various outside-of-the-home/outside-of-work activities helped us better understand the distribution of cross-border commuters according to the types of patterns. Not surprisingly, the basic home-work-home pattern represented the vast majority of cross-border commuters (54% of them). This pattern concerns cross-border workers who made only two trips per day, the first to get to work and the second to get back home. These individuals did not carry out any other activities on a typical day. This situation can be explained by the fact that their commutes are relatively long, in terms of both distance and time. Furthermore, 14% of cross-border commuters engaged in an activity after work, 7% before and after work and 5% between two work periods, usually during lunch break. The 46% of cross-border commuters who engaged in at least one activity outside of the home or workplace had more diversified, complex patterns.



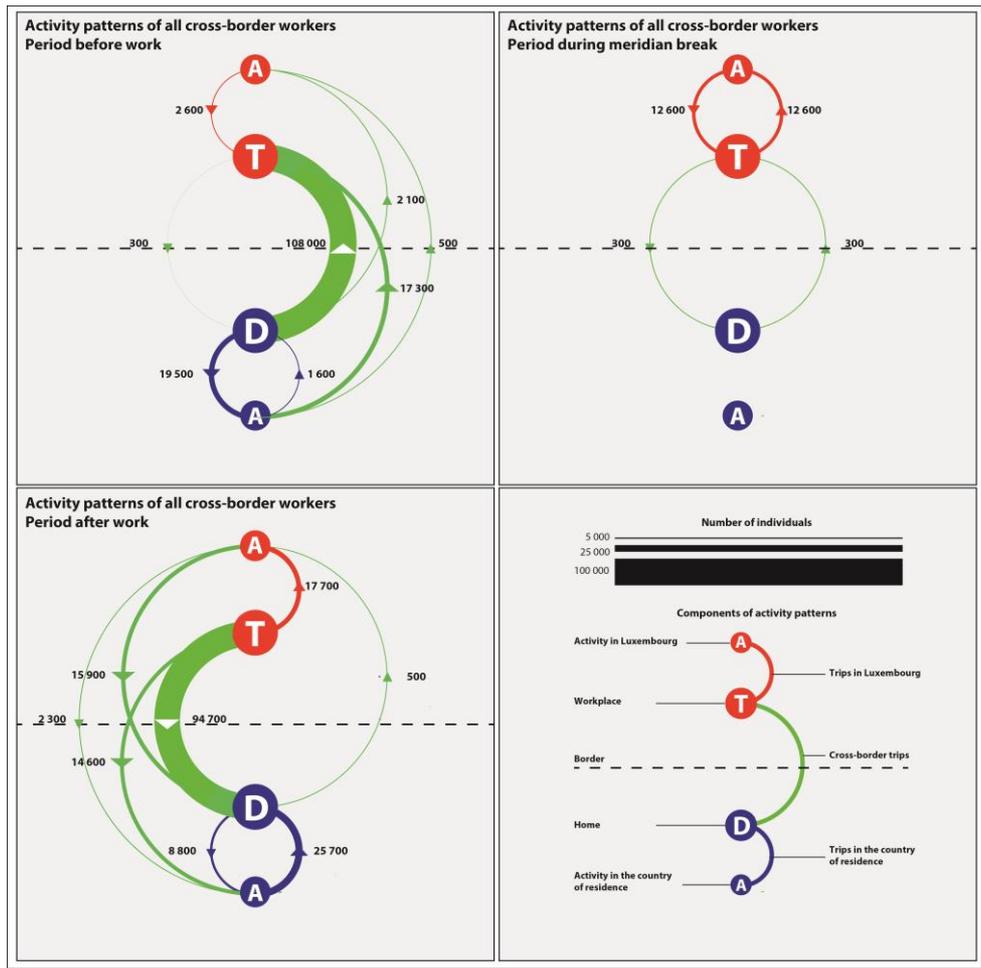
**Activities patterns of cross-border workers in Luxembourg Fig. 1**

Author: G. Drevon

Source: Cross-Border Mobility Survey (2010), with 7,235 respondents (a response rate of 18%)

Positioning the border in cross-border workers' activities patterns (Figure 2) shows how their activities are distributed on each side of the border. Incorporating the number of workers into the analysis allowed us to report on the size of the flows associated with the activities. Although home-to-work commuting was largely structured, the addition of other activities highlights the complexity of daily activity patterns. The patterns differed in length, from two to ten trips daily for one to nine activities. Clearly, residential and workplace location largely structure the organization of these patterns. To simplify the graphical representation, three successive periods were represented: the period before work, the period during the lunch break and the period after work. In the first period, which usually corresponded to the morning, 108,000 cross-border workers<sup>i</sup> (83%) travelled directly from home to work. About 15% (19,500) carried out at least

one activity in their country of residence before going to work. Only a small proportion (1.6%) of them carried out their first non-work activity in Luxembourg (2,100). During the lunch break, nearly 10% of cross-border workers (12,600) carried out one non-work activity in Luxembourg, versus 0.2% who returned to their country of residence (300). Finally, the majority of cross-border workers (73%) returned directly to their homes after work (94,700), while 14% engaged in a second activity in Luxembourg and 11% did so in their country of residence. The distribution of activities for this period was almost symmetrical for both sides of the border. This shows cross-border commuters' interest in carrying out certain activities in Luxembourg (17,700). A limited number of cross-border commuters (2,300) carried out activities on both sides of the border before returning home. Once home, they very rarely returned to Luxembourg (less than 1%).



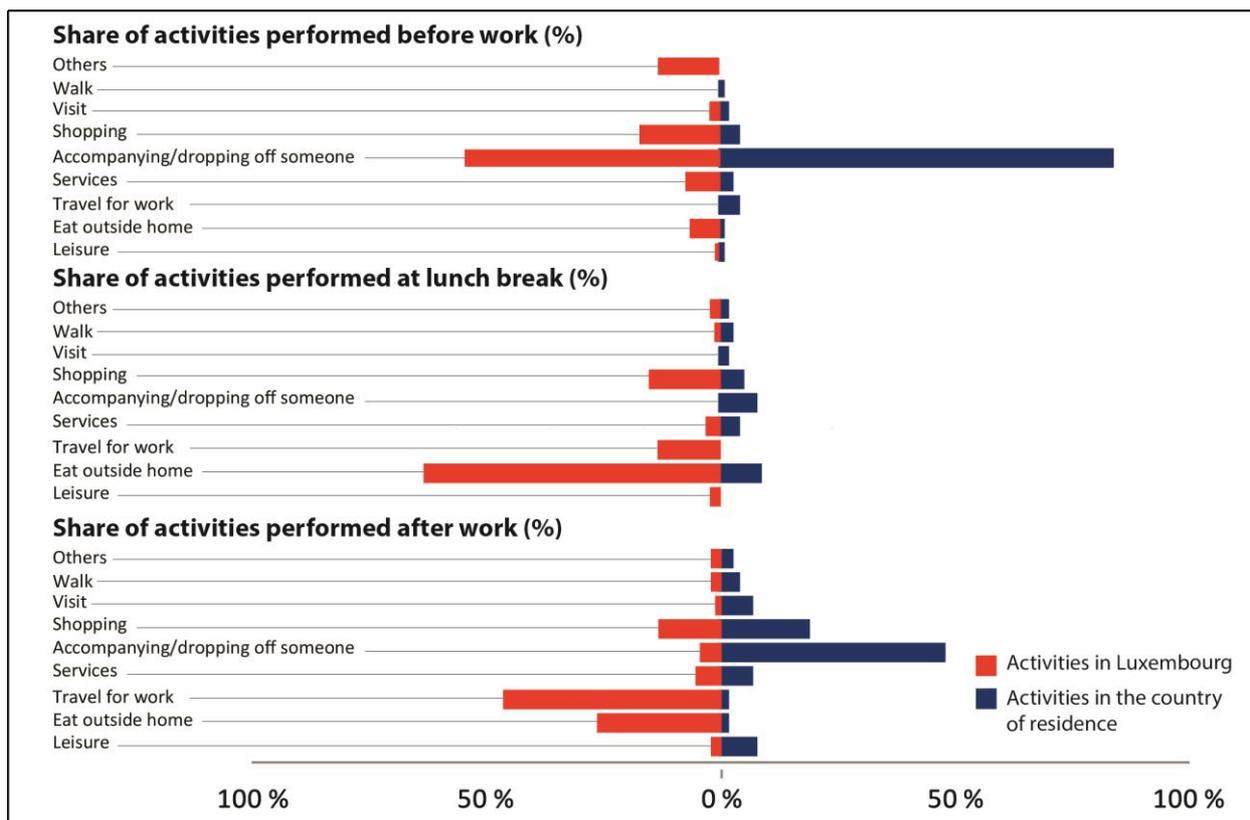
**Activity patterns during the three major periods of a working day Fig. 2**

Author: G. Drevon

Source: Cross-Border Mobility Survey (2010), with 7,235 respondents (a response rate of 18%)

For 60% of cross-border commuters, working hours were imposed by the employer, versus 26% who negotiated their hours jointly. Only 14% were able to choose their own working hours. Thus, a majority of these workers organized their working activities according to non-flexible hours. Other activities were organized around working hours and can be differentiated according to three periods of time (before work, lunch break, after work). As a result, 50% of the activities carried out before going to work (morning) involved accompanying/dropping off someone, and 9% involved shopping activities (Figure 3). During this first period, in the country of residence, 92% of the activities also involved accompanying/dropping someone off. The lunch break was mainly characterized by lunchtime activities outside of work and the home in Luxembourg (60%). After work, activities in Luxembourg were related to work-related travel (45%) as well as eating out (20%). On the other side of the border, in the country of residence, the main activities were accompanying/dropping off

someone (50%) and shopping (19%). These results show a clear differentiation of activities according to the period of the day. The morning was devoted to accompanying/dropping off people in Luxembourg and in the country of residence. The lunch break was almost exclusively spent in Luxembourg. The after-work period was more ambivalent, with a more balanced distribution between the country of work and the country of residence. Regarding the classification of activities, we can see that, beyond the spatial distribution, cross-border commuters mainly carried out obligatory activities outside the home and workplace (accompanying/dropping off someone). However, some of these activities were also voluntary (like shopping) and represented times of relaxation and sociability. By 'obligatory activities', we mean activities related to accompanying/dropping someone, which most often correspond to childcare, as well as catering, which includes activities that meet the physiological and social needs of individuals. Finally, shopping is done to support the house-



**Breakdown of activities according to three main periods of the day: before work, between noon and two, and after work Fig. 3:**

Author: G. Drevon

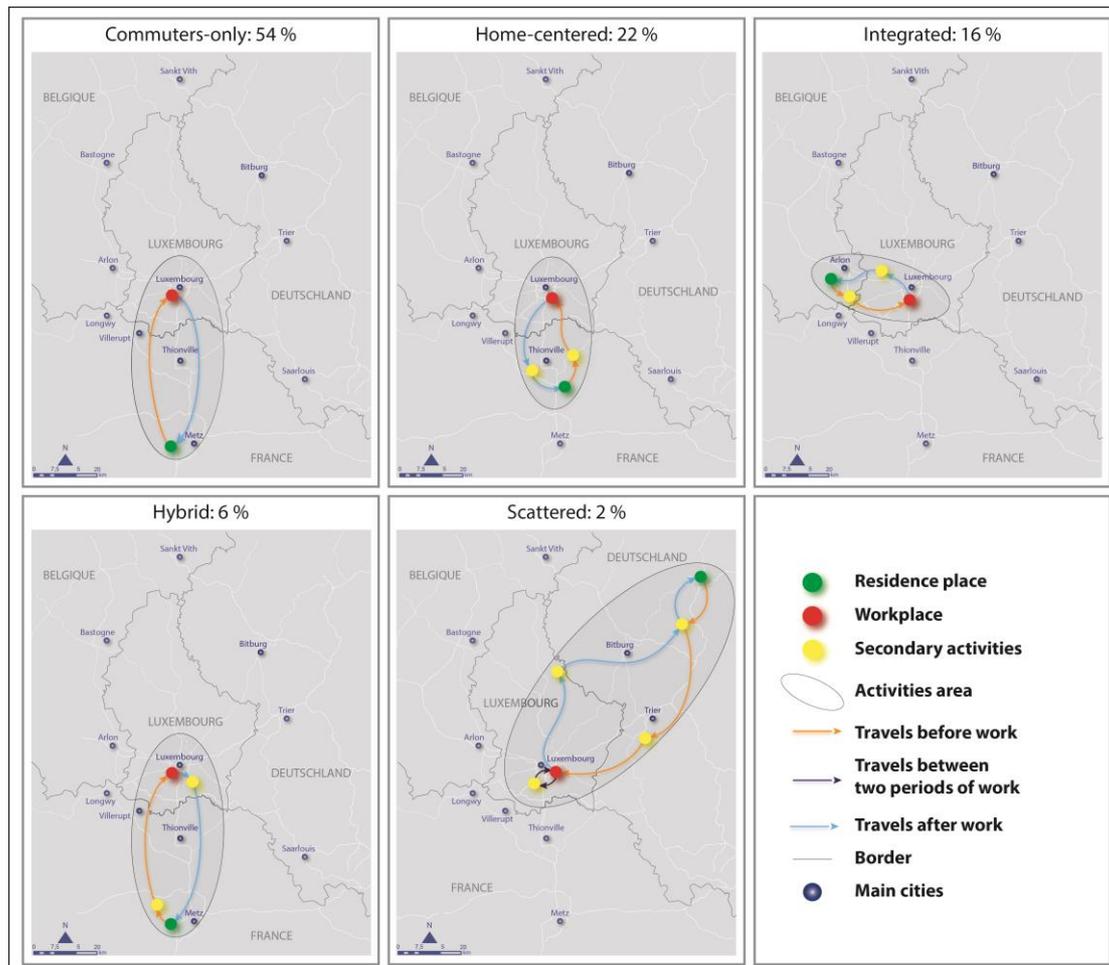
Source: Cross-Border Mobility Survey (2010), with 7,235 respondents (a response rate of 18%)

hold and is therefore an obligation. Beyond these initial observations, it is clear that little time remained for leisure activities.

### How are these activities carried out?

The analysis of activity spaces allowed us to understand the dispersal and distribution of daily activities. The analyses were based on variables identified from a standard deviational ellipse. The standard deviational ellipse may be one of the most appropriate techniques for analyzing the daily spatial configurations of cross-border activity spaces. It can be used to synthesize activity locations, which are graphically represented by a set of dots. This spatial analysis approach provides several spatial indicators that characterize the spatial distribution of activities: the mean center, the length of major and minor axes of the ellipse, and the ellipse area. The area of the ellipse represents the actual size of the activity space. By combining a PCA and an HCA, the analysis provides five typical profiles, which were present in the three countries of residence (Figure 4). 'Commuters only' (54%) were one category of cross-border workers who only trav-

eled from home to the workplace and back. The home-centered group was the second largest group of employees (22%). These commuters had a more concentrated area of activities in the country of residence. Their secondary activities were mainly around home. The integrated group formed the third group (16%), with different characteristics illustrated by its standard deviational ellipse. In most cases, the center of gravity of their ellipse was located within Luxembourg. This group also carried out more secondary activities in Luxembourg. These cross-border workers generally lived close to the border and their activities areas largely included Luxembourg, with a significant area ratio between the part of the ellipse inside and outside Luxembourg. The fourth group, which we called hybrid (6%), was characterized by a residential location relatively far from the border. The average center of the distribution was generally located outside Luxembourg and their activities were relatively close to one another. Finally, the scattered, the last group (2%), distinguished themselves by the significant distance between their place of residence and their workplace. People in this category took part in numerous activities and had a fragmented area of activity.



**Spatial profiles of Luxembourg cross-border workers Fig. 4**

Authors: G. Drevon and O. Klein

Source: Cross-Border Mobility Survey (2010), with 7,235 respondents (a response rate of 18%)

The next step consisted in understanding the sociodemographic determinants and mobility patterns associated with the different standard profiles (variable to be explained). The multinomial regression model was based on five explanatory variables: age, gender, socio-professional category, principal mode of transportation and travel time between the home and the workplace. The commuter only profile (54%) was used as a reference modality for the variable to be explained. This was the dominant profile and corresponded to the structuring pattern (D-T-D) common to all workers. The regression deepened our understanding of the addition of the secondary activities that characterized the other spatial profiles (home-centered, integrated, hybrid and scattered). The commuter profile was the reference (the most important) to which the other profiles were compared, based on the explanatory variables, by integrating them into a single regression model. This technique measured the probability of adopting one or the other spatial behaviors according to individuals' sociodemographic characteristics and mobility pat-

terns.

As suggested by the results presented in Figure 5, the modalities of the explanatory variables influenced spatial behaviors in contrasting ways by acting specifically on certain profiles at different levels. Those with a home-centered profile tended to be aged 35 and under and, to a lesser extent, the 30-50 age group. They also tended to be women with at least one child, whose preferred mode of transport was the car. The distance between home and work was relatively non-discriminatory insofar as it appeared to be significant in both its modalities (less than 30 minutes and between 30 and 60 minutes). For the integrated profile, age was relatively insignificant. However, being under 35 sometimes resulted in the individuals concerned undertaking more activities in Luxembourg. Being a woman also seemed to be correlated with such behavior. Individuals in managerial positions tended to carry out their activities in Luxembourg; this observation also applied to employees. The distance between the home and workplace was also not very discriminating. Like the home-

centered profile, it was also relevant for both modalities of the variable. The hybrid profile was less marked by age or gender. Having at least one child increased the likelihood of falling into this profile. Falling into the categories of professional/managerial staff or intellectual professions increased the probability of having hybrid spatial behavior, with a relatively balanced distri-

bution of daily activities between the country of residence and the country of work. Only child-related and socio-professional variables seemed to influence the dispersed profile somewhat. However, this low significance suggests that having children increased the likelihood of having a rather dispersed profile.

|   | Spatial profiles of cross-border workers |        |            |        |        |        |           |        |
|---|--|--------|------------|--------|--------|--------|-----------|--------|
|   | Home-centered                            |        | Integrated |        | Hybrid |        | Scattered |        |
|   | Sig                                      | Exp(B) | Sig        | Exp(B) | Sig    | Exp(B) | Sig       | Exp(B) |
| <b>Age</b>                              |  |        |            |        |        |        |           |        |
| Under 35 y.                             | ***                                      | 1.895  | **         | 1.401  |        |        |           |        |
| 35 to 50 y.                             | **                                       | 1.432  |            |        |        |        |           |        |
| 50 y. and more (Ref)                    |  |        |            |        |        |        |           |        |
| <b>Gender</b>                           |  |        |            |        |        |        |           |        |
| Woman                                   | ***                                      | 2.119  | ***        | 1.483  |        |        |           |        |
| Man (Ref)                               |  |        |            |        |        |        |           |        |
| <b>Children</b>                         |  |        |            |        |        |        |           |        |
| At least one child                      | ***                                      | 2.114  |            |        | ***    | 1.804  | **        | 1.626  |
| No children (Ref)                       |  |        |            |        |        |        |           |        |
| <b>CSP</b>                              |  |        |            |        |        |        |           |        |
| Managerial & intellectual prof.         |  |        | ***        | 0.705  | ***    | 0.608  |           |        |
| Employees                               |  |        | ***        | 0.412  | ***    | 0.382  | **        | 0.585  |
| Intermediate professions (Ref)          |  |        |            |        |        |        |           |        |
| <b>Principal mode of transportation</b> |  |        |            |        |        |        |           |        |
| Car                                     | ***                                      | 1.778  |            |        | ***    | 3.444  |           |        |
| Bus                                     |  |        |            |        | *      | 2.218  |           |        |
| Train (Ref)                             |  |        |            |        |        |        |           |        |
| <b>Travel time D-T</b>                  |  |        |            |        |        |        |           |        |
| Less than 30 min.                       | ***                                      | 1.955  | ***        | 2.019  |        |        |           |        |
| 30 to 60 min.                           | ***                                      | 1.459  | ***        | 1.759  | ***    | 0.325  |           |        |
| More than 60 min. (Ref)                 |  |        |            |        |        |        |           |        |
| <b>Constant</b>                         | ***                                      |        | ***        |        | ***    |        | ***       |        |

|                         |       |  |
|-------------------------|-------|--|
| <b>Pseudo R-squared</b> |       |  |
| Nagelkerke              | 0.132 |  |
| McFadden                | 0.054 |  |

|                                   |     |
|-----------------------------------|-----|
| <b>Thresholds of significance</b> |     |
| 1%                                | *** |
| 5%                                | **  |
| 10%                               | *   |

**Significance of sociodemographic and economic characteristics of spatialized lifestyles of cross-border commuters Fig. 5**

*Note to the reader: The home-centered spatial profile of cross-border workers generally corresponds to a woman, aged under 35 years, having children, and travelling by car regardless of the duration of the trips.*

Author: G. Drevon

Source: Cross-Border Mobility Survey (2010), with 7235 respondents (a response rate of 18%)

The regression model provided elements for understanding the profiles of cross-border workers. It was particularly interesting for the home-centered profile, which was one of our most important findings. Home-centered behavior often applied to women and men who were the parent of at least one child. These individuals used the car for most of their trips, a finding that may suggest the high percentage of obligatory activities related to household management, which corroborates previous findings that show the importance of these activities in daily activity schedules. Carrying out these rather obligatory activities may therefore induce cross-border workers to do their daily activities closer to home.

Several findings from the analyses stand out in particular. First, certain activity patterns highlight

the fact that cross-border workers carry out few activities outside of the place of residence or the workplace. The patterns also show the overwhelming tendency to have complex activity schedules due to heavy life rhythms and long commuting distances. The pattern analysis revealed daily activities patterns of up to 22 successive activities over the course of a day. The nature of activities undertaken outside home and workplace showed that cross-border commuters were more likely to undertake obligatory activities. The analysis of cross-border commuters' daily activity areas revealed five spatial profiles. Although the vast majority of cross-border commuters only made a roundtrip journey between home and work, or had a strong residential base (home-centered profile), a relatively large proportion of cross-border commuters



whole, heavy rhythms mainly referred to children's activity schedules, which required parents to provide support during the week, combining professional life, daily travel and household management.

The analysis confirms the hypothesis of heavy activity rhythms for all of the couples interviewed. Understanding these rhythms also yields

important elements based on the relationship families have with their daily schedules. To our knowledge, few studies question this temporal dimension that significantly improves our understanding of the structuring elements of families' daily lives from a more comprehensive perspective that attempts to sum up the interactions between the various spheres of daily life.

- "The rhythm is monstrous, but we chose it" (cross-border commuter 2, man)
- "Hectic pace, we chose it, we do not complain, I prefer to move rather than to do nothing" (cross-border worker 2, woman)
- "At full speed..." (cross-border commuter 2, man)
- "When we add children, their homework and their activities, we can say that we have a really strong rhythm during the week and no time left" (cross-border worker 1, men)
- "We organize our schedules according to the schedules of the children" (cross-border commuter 2, woman)
- "Yes, there are activities every evening. Whether one or the other, or when we are together, we are out because of them on Mondays, Tuesdays and on Thursdays. However, on Wednesday afternoons there are several activities. It's for kids every evening, it's sport and music" (Cross-border worker 1, woman)
- "Concerning the children, it's complicated. The little one, he was playing football on Wednesday, but it is not possible any more. The week is focused on the job and then obviously we have children so we must follow their homework. When we come back home, we take care of the children right away" (Cross-border worker 1, man)
- "Today, I counted, I spent two hours in the car, just managing the day-to-day" (Cross-border worker 2, woman)

**Excerpts from cross-border commuters' interviews Fig. 7**

Author: G. Drevon

Source: Cross-border households interviews (2015), where 20 individuals (10 households) were interviewed

Detailed analysis of respondents' remarks about everyday life rhythms highlighted five major results. (1) Couples' concerns mainly have to do with the sequencing of activities and finding the right arrangements. This result refers in particular to activity patterns, which can be considered as markers of everyday life arrangements. (2) Work appeared as secondary, though it was considered as structuring in terms of the time budget for the activities done there. (3) Children were the central feature of everyday life for the households interviewed. (4) Presented as a choice, the rhythm of activities seemed suitable, but subject to well-known concessions, for example, in the form of part-time work (Nicole-Drancourt, 1990). (5) Although this intense pace was partially deplored by the interviewed households, it seemed to be largely compensated for by residential satisfaction.

## Conclusion

The results of the analyses show particularly complex programs of activities. This complexity suggests that cross-border workers are confronted with high-intensity living patterns. The perception of daily activity programs shows significant difficulties related to time management in daily life. Time pressures associated with time management issues tended to affect the quality of life of the people interviewed. Beyond the analysis of life rhythms, the analyses helped highlight different ways of living on the border. Spatial profiles showed different levels of integration that reveal the complexity and scattered nature of activity schedules. The analyses suggest that time constraints seem to influence the level of integration of cross-border workers in Luxembourg. Indeed, family configurations and the related time constraints seemed to have a greater influence on the level of integration in Luxembourg. From this perspective, living pat-

terns were a determinant of spatial integration for cross-border workers in their country of work. Integration was greater for cross-border workers who had more flexibility in their activity schedules. On the other hand, cross-border workers with schedules wherein family obligations were heavy were likely to be less integrated in their country of work. The choice to go to one or another activity location also depended on opening hours and accessibility. Recent analyses show that cross-border workers undertake more activities near their place of residence depending these two factors (Drevon et al., 2015).

This paper highlights several important points in the literature. First, it complements traditional approaches to Time Geography (Hägerstrand, 1970; Pred, 1977; Miller, 1991) which do not take into account the perception of time (Hallin, 1991). The association between the joint analysis of spatiotemporal behavior and the interviews conducted with a panel of cross-border workers made it possible to take into account the effects of particularly complex activity schedules on individuals. Taking into account socio-familial configurations also provided a better understanding of how time constraints shape individuals' behaviors (Drevon, 2019). These results reinforce the capacity and social interaction constraints mentioned in Time Geography theory. Regarding Time Geography theory, mobility patterns of cross-border workers are specific, mainly because of long-distance commuting. These long distances considerably re-

duce the time available for other activities. According to Time Geography theory, the "constraint time" (work and travel time) of cross-border workers is greater than that of other workers (e.g. inhabitants of Metz's agglomeration). This mobility configuration tends to impact other activity spheres, such as social and familial spheres, a situation that seems to affect cross-border workers' well-being.

The methodology developed in the article allows us to propose a new disaggregated approach to cross-border functional integration that complements that of flows (Van Houtum, 2000) by using the spatiotemporal behaviors of cross-border workers. This approach reveals different ways of living in cross-border areas (Drevon et al., 2018). The specific analyses developed in this article notably suggest that time resources influence the degree of integration in the country of work. From this perspective, the rhythm or pace of life is determinant for cross-border integration. The rhythmic approach developed in this paper, which combines quantitative and qualitative analyses, paves the way for new perspectives for analyzing cross-border metropolitan areas. Based on spatiotemporal behaviors, the analyses reveal cross-border lifestyles corresponding to compositions in the time and space of daily activities and experiences which reveal ways of living (Pattaroni, 2013). The measurement of these forms of cross-border lifestyles could open new analytic perspectives for the border studies field.

## NOTES

<sup>i</sup> Flows were calculated based on the cross-border mobility survey. The results obtained have been adjust-

ed from the characteristics of the population at the place of residence.

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