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ARTICLE

Temporal displacement and spatial unbinding of commuting in the Brno Metropolitan Area

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Abstract

Commuting is generally considered a routine aspect of daily life. As a result of the growing importance of the tertiary sector in the economy, the increasing flexibility of work arrangements, and other individual factors, there has been a noticeable change in commuting patterns, both in terms of time and place. This study aims to characterise the spatio-temporal practices employed in commuting. We describe these spatio-temporal practices using spatio-temporal rhythms enforced among individuals in the case of the Brno Metropolitan Area. To achieve the results we use questionnaire surveys and semi-structured interviews. The results indicate that the major morning and afternoon commuting flows are spread out over several hours. The afternoon commute is more distributed in time. The phenomenon of the daily commute is clearly weakened. Part of the population commutes to work only some days of the week. Also, the spatial dimension of commuting is diverse, as many originally non-working places become centres where people commute, such as a café or a hotel. It turns out that commuters typically chain trips when commuting. In this paper, we demonstrate several specific practices associated with these movements, such as commuting to someone's house to work, commuting to a café or realising long-distance commuting. The observed commuting characteristics are then referred to by the terms of temporal displacement and spatial unbinding of commuting.

KEYWORDS

Brno Metropolitan Area, commuting, commuting practices, spatial unbinding, spatio-temporal rhythms, temporal displacement

1 | INTRODUCTION

Commuting is a constantly evolving process that is shaped by wider social structures. With the increasing prevalence of part-time jobs, the shift towards home-office work, the flexibilisation of working arrangements, and the economic transition to a knowledge-based economy, the temporal and spatial nature of commuting is gradually changing. These changes are complex. The most noticeable changes are the shifts in the most frequent morning and afternoon commuting times.

More and more people are commuting at non-standard times. The overall structure and sequence of commute-related activities are also changing. Studies (Liang et al., 2023; Paleti & Vukovic, 2017; Wöhner, 2022) show that commuting is ceasing to be a daily routine for some people. Additionally, many individuals work remotely from home or travel to multiple locations throughout the week.

This paper focuses on the spatio-temporal loosening of commuting patterns, specifically the flexibilisation and individualisation of commuting resulting from changing work arrangements. To express the processes currently underway, the terms 'temporal displacement' and the 'spatial unbinding' of commuting are used. Although the notion of the temporal displacement of commute has already been applied by Lyons and Haddad (2008), this article deals with it in a much wider sense by applying qualitative data. Temporal displacement in this paper represents the temporal distribution of commuting. This term refers to the distribution of commuting over multiple hours, with a noticeable number of individuals commuting to work outside the traditional peak hours. Related to this term is the time irregularity of commuting time and the frequency of commuting within the week, which varies from individual to individual. Spatial unbidding, on the other hand, refers to changes in spatial characteristics that result in new places becoming commuting centres. Furthermore, spatial unbinding reflects that an individual's commute is made to multiple locations. The above notions also explain the qualitative characteristics of commuting flows, specifically the sequence of activities individuals undertake during their journey to or from work. The properties of commuting flows are analysed through spatio-temporal rhythms, which is the main contribution to research on commuting. Spatio-temporal rhythms are generated by pacemakers (Parkes & Thrift, 1975). This paper conceptualises pacemakers similarly to Hägerstrand's (1982) 'pace-setters'. A 'pace-setter' in our context can refer to a place of employment, shops or cafés. In the context of Shapcott and Steadman (1978), who associate rhythm with specific rules or constraints in time and space, the primary 'pace-setter' can also be interpreted as working hours.

The main aim of this article is to provide an answer to questions:

- What are the characteristics of current commuting?
- What are the concrete spatio-temporal practices associated with current commuting?

We expect that in the current post-pandemic era, the importance of spatio-temporal commuting patterns has changed, some of which may have weakened while others may have gained importance. The research was conducted in the Brno Metropolitan Area. The region was chosen for the research because of its high tertiarisation of the economy and the growing number of educational and technological institutions. Furthermore, there is a lack of similar research in this area.

2 | FLEXIBILISATION OF WORKING ARRANGEMENTS

A currently ongoing process is the flexibilisation of working hours and work location (Minssen, 2012). Flexible working arrangements mean flexibility in the scheduling of hours worked, flexibility in the number of hours worked and flexibility in the place of work (Austin-Egole et al., 2020). Minssen (2012) discusses trust-based work. Employee time on the job is not checked, but they are obliged to complete a certain task in a certain amount of time (Minssen, 2012). Workers either must work a certain number of hours per week with the start and end of working hours varying daily/weekly/monthly, or they are required to work a certain number of hours per month but must be present at the workplace during designated core hours (Austin-Egole et al., 2020). Dunn et al. (2023) distinguish between task and spatial work flexibility. Task flexibility characterises how much control an individual has over what to do. Spatial flexibility describes the ability to influence the working arrangements on a given day.

Flexible employment options include a wide range of work forms, for example, teleworking (FWA, 2010; Handy & Mokhtarian, 1996; Mlezivová, 2018). Teleworking, also known as telecommuting or remote work, is a work practice that involves working outside of the traditional office setting, often using information communication technology to communicate and perform tasks. This can include working from home or a remote office (Beckel & Fisher, 2022; Hoffman, 2002). Teleworking allows the employee to individually optimise the performance of their work according to their own needs in terms of time and place (Sládek & Sigmund, 2021). Teleworking was still relatively rare until recently (Hynes, 2016; Mlezivová, 2018; Nunes, 2005). More expansion was registered during the pandemic. Not only is working from home growing in importance, but many people also use coworking centres (Clifton et al., 2022). Additionally, many employees alternate between remote and on-site work within a week (Minssen, 2012). The shape of telecommuting is complicated and depends on the specific working arrangement of the individual (Lachapelle et al., 2017), and travel choices are often

spontaneous and less predictable (Asgari & Jin, 2018). However, a higher desire to work remotely has been registered on Mondays and Fridays (Stefaniec et al., 2022).

3 | CURRENT COMMUTING

3.1 | Practices

Commuting must be seen as a complicated process influenced by more variables than working hours. In addition to working hours, it is important to consider other constraints and activities that affect commuting. Individuals may have flexible working hours, but their commute is influenced by the sequence of other activities that must be completed on a given day (Thorhauge et al., 2016).

Commuting takes on much greater complexity for employees with flexible working hours. Rahman et al. (2022) demonstrate that these individuals more frequently incorporate other daily activities into their work-related journeys. Thus, individuals with flexible working hours are more likely than those with fixed working hours not to perform a single trip from home to work but opt for a more complex commute, including several stops with other activities, such as picking up and dropping off the children near school (Thorhauge et al., 2016; Wöhner, 2022). Munch and Proulhac (2019) highlight that many individuals with flexible time who are seemingly free to choose their working hours are, in fact, constrained by the need to coordinate with others. Paleti and Vukovic (2017) discuss scheduling appointments with colleagues and demonstrate this behaviour in households with children. Lejoux and Pochet (2019) have documented the same trip chaining for individuals with variable workplaces.

Workers with flexible working hours undertake more non-work-related trips, such as leisure or shopping. In the final balance, the total distance travelled over a period of time is no different from that of a full-time worker. Lachapelle et al. (2017) illustrate that although employees working remotely from home don't go out to work, they have more child-related trips and education trips. Wells et al. (2001) and Hjorthol and Nossum (2008) also observed an increase in non-work trips on days when respondents did not commute to work. Such behaviour fulfils Black's (2001) prediction that trips such as taking kids to school will not vanish with the rise of teleworking but will continue to be implemented as separate trips. Thorhauge et al. (2020) point out that individual behaviour is affected by inertia, which can be defined as the tendency to remain unchanged. They claim that the existence of constraints reinforces inertia. Thus, fixed working hours that limit an individual's daily range of activities correlate with high behavioural inertia. Given that individual commuting is a repetitive and automatic activity, other authors discuss its habitual nature (Gardner, 2009; Zarabi et al., 2019). Munch and Proulhac (2019) discuss the existence of social norms. Behind the social norms is a set of unwritten rules. Colleagues may perceive an employee who arrives late to work as working less.

3.2 | Departure timing

The loosening of regular patterns and routines, which applies to daily, weekly and longer-term rhythms (Strambach & Kohl, 2015), is related to the growing number of jobs where individuals have the right to decide when and how many hours to work and how to divide their time between different work tasks (Lehdonvirta, 2018).

Flexible working hours can be considered a tool to manage transport demand and the distribution of departure times to and from work (Yoshimura & Okumura, 2001). Lyons and Haddad (2008) indicate that some individuals deliberately delay their commute to avoid traffic congestion. Wöhner (2022) claims otherwise, stating that people with flexible working hours still tend to travel in the morning and are thus part of the morning rush hour. It is argued that individuals with flexible working hours do not care what time they arrive at work and thus are not bothered by any delays in traffic. Further, individuals are often forced to drive to take their children to daycare. Therefore, some do not change their commuting behaviour in the long term even though they could theoretically do so. As Ben-Elia and Ettema (2011) mention, family obligations such as parental chauffeuring make behavioural change more difficult. Munch and Proulhac (2019) found that flexible working hours do not lead to a dispersion of arrival times at the place of employment in the morning. However, other research shows that telecommuters (Asgari et al., 2019), self-employed workers (Asgari & Jin, 2018; Shin, 2019) and workers with flexible time (Ben-Elia & Ettema, 2011; Rahman et al., 2022) tend to avoid morning and evening peak hours and tend to depart later or earlier. Lachapelle et al. (2017) and Wöhner (2022) concluded that a lower probability of making trips could be expected during the

evening rush hours. Therefore, the correlation between departure time and peak traffic time for residents with other than stable working hours here is not entirely clear. Oakil et al. (2016) also found a similar finding for part-time home workers. It is important to be aware that occupation significantly influences employee commuting times. Workers in business and finance, construction occupations and education characterise earlier times. Occupations with more flexible daily schedules, such as sports and entertainment, food catering and personal care, are typical of later commuting (Asgari & Jin, 2018). In general, for commuters, departure time results from a compromise between travel time and travel costs related to the difference between a desired travel time and the actual departure time (Yoshimura & Okumura, 2001).

3.3 | Changing workplaces

Against the backdrop of changes, especially the development of ICT, the spatial fixation of the workplace is weakening (Felstead, 2012; Felstead et al., 2005). Koroma et al. (2014) distinguish five types of work locations: 'moving places' (e.g., cars, trains, planes), 'secondary places' (e.g., customer or partner premises, remote and telework offices), 'third places' (e.g., hotels, cafes, and parks), the main workplace, and home. The term 'new working spaces' can also be found in the literature, encompassing cafés, libraries and co-working centres (Di Marino et al., 2023). According to the studies of Mariotti et al. (2017) and Di Marino et al. (2023), new working spaces are located in areas with good access to public transport, proximity to university campuses and a concentration of knowledge-intensive jobs. Existing literature notes changes in the spatial distribution of jobs, but there is a lack of research analysing the spatio-temporal mobility characteristics of individuals in the context of commuting patterns.

4 | RESEARCH DESIGN AND METHODS

The subject of this study is to analyse the current spatio-temporal commuting characteristics. Based on a mixed-research design, this research works with primary data obtained by the researcher. The article is composed of two interconnected parts. The first contains an analysis of commuting based on a questionnaire survey, and the second consists of specific stories of individuals that arose through semi-structured interviews. The quantitative data obtained from the questionnaire survey serve only as a framework for the qualitative analysis, which is the most important part of the paper and aims to explain the defined terms. The survey was conducted electronically at the beginning of 2023 in the Brno Metropolitan Area (BMA). Brno as a city is the second largest city in Czechia. The BMA is characterised by a monocentric structure, with the city of Brno as a strong core centre surrounded by smaller municipalities in the background. It includes a total of 184 municipalities with approximately 700,000 inhabitants living there. The BMA is a constantly developing area with a highly tertiarised economy and a growing number of educational and technological institutions. Most job opportunities are located in the core city and its hinterland. This regional imbalance in the distribution of jobs generates commuting. For this reason, this area was identified as suitable for analysis. Moreover, in terms of structure, demographic and economic characteristics, it is not distinguishable from other metropolitan regions in other states.

Questionnaires were collected from 1004 respondents (402 male and 602 female), which was considered sufficient. Almost two-thirds of the population live in Brno, and the remaining third live in municipalities in the metropolitan area. The questionnaire survey took the form of an online survey. People were contacted through social networks (Facebook, Twitter, Instagram, Reddit, LinkedIn) and websites related to Brno. The aim was to achieve a balanced structure of the sample population. Thus the sample was stratified by gender, education, age and place of residence to have the most balanced ratio between individuals living in and outside Brno, in terms of age, gender and education. The survey was open to anyone who came across its link. The sample structure was continuously monitored, and the strategy for sending the link to different networks and groups was continuously assessed to meet the predefined quality objectives of the sample. The sample comprises employed individuals from all urban districts of Brno and most municipalities that are part of the BMA. The survey was available to everyone employed at the time, both full-time and part-time. Approximately 20% of the survey respondents were part-time employees. The age range was not predetermined. The goal was to have representation from all age groups, with individuals who are legally able to work. The questions were focused on the spatio-temporal features of contemporary commuting. In addition to emphasising temporal and spatial features, the questionnaire included a second type of question to ascertain circumstance and context. The questionnaire survey results served as the basis for the semi-structured interviews, which were carried out after the questionnaire survey.

The main purpose of the semi-structured interviews was to provide in-depth information on the topic that the questionnaire survey would not allow. This information relates to specific commuting practices, including their justification. Gaining this information helped to understand the specific rhythms involved in commuting. The interview had a predetermined structure of topics. However, the participants had great freedom in their answers and thus could influence its course significantly. The interview comprised three parts. The first part addressed questions concerning the spatio-temporal characteristics of commuting to work. The second part focused on commuting from work, while the third part aimed to elicit contextual information. A total of eight interviews were conducted. The number of communication partners is based on the observation that certain spatial patterns were gradually repeated in the last interviews, concluding that the sample was sufficiently saturated. Communication partners were systematically selected based on data from the questionnaire survey. They were chosen to meet the optimal parameters for answering the research questions. The selection included individuals who work partly or fully from home (1), those who work part-time (2), and those who commute daily while working full-time (3). Communication partners include both single persons and those living with a partner, as well as those without children and those with children. The youngest interviewee is 26 years old, and the oldest is 61. Five communication partners live in Brno, three of them outside Brno. One of the interviewed persons was employed on a part-time basis. All interviews were recorded, transcribed and further analysed. All recordings were made with the consent of the participants. The average length of the interviews is 40 min. The analysis first identified possible themes in the text (e.g., morning rhythm). A qualitative analysis was performed using a coding technique. Numerous generic codes gave rise to dozens of higher-quality codes, among which interdependencies were studied. As the amount of knowledge grew, the meaning of the original code names was gradually smoothed over the course of the analysis. From the relationships identified, specific spatial patterns were ultimately defined, the validity of which was verified through repeated readings of the text and further interviews. Data processing through coding was carried out in three stages—open, axial and selective—in accordance with Hendl (2005). The data from the questionnaire survey then confronted the resulting information from the semi-structured interviews to complement the questionnaire data with the specific experiences of individuals.

5 | STATISTICAL DATA ON COMMUTING

The questionnaire survey conducted shows that individuals most often commute to work between 7–8 AM (31%) and 6–7 AM (28%). More than half of respondents admitted to commuting during this period. However, data indicate that 5–6 AM and 8–9 AM are also very strongly represented time periods with regard to commuting. In summary, it can be observed that around 90% of respondents commute between 5 and 9 AM. Although the high concentration of commuters in a short period of time is undisputable, from an overall time perspective it is apparent that the main flow of commuters is spread out over as many as four hours. In addition to the four prominent time intervals mentioned above, a non-negligible portion of the respondents report an even later departure commute to work (9 AM and 10 AM). The afternoon return commute from work is much more spread out in time than the morning commute. The results show that more than half of the respondents undertake this journey between 3 and 5 PM. The busiest commute belongs to the 3–4 PM (29%) and 4–5 PM (25%) time intervals. However, increased intensity is visible from 1 PM, with higher commuter flow rates persisting until 7 PM. These commuting times indicate a partial desynchronisation of commute trips over time. Within the population of the BMA, there appear to be individuals who have different commuting patterns to others. However, it is important to note that analysis serves as a snapshot showing the normal condition. Commuting times may vary from day to day during the week. Regarding commuting time, respondents reported travelling to and from work within an hour. The majority of respondents indicated a travel time of 16–30 min when travelling to work and 31–60 min when travelling from work. Therefore, travel times from work are longer.

Questionnaire survey results indicate that it also weakened the need to commute to work at specific designated times. It turns out that today's employees have greater flexibility and the ability to manage their time according to their needs, preferences or other obligations. The questionnaire shows that more than a fifth of residents can arrive at their workplace at whatever time of day is convenient for them. Another two-fifths do not have established fixed times but must arrive at the workplace within a range of one to two hours. Interviewees often comment on the irregularity of their commute with very similar arguments. Some individuals stated that their commuting time to work is based upon times when they have a meeting, a stand-up or an appointment with a client. However, many commuters never have a fixed arrival time. This group of individuals account for 23% of all commuters, claiming that their arrival to work depends on what time they get up that day or how much time they spend at the gym before work. The survey also included responses referring

to the type of transport used at certain times of the year, which can have a direct impact on the duration of the journey to work. However, no relation was found between mode of transport and departure time. Some respondents commute both earlier and later to avoid rush hour traffic. Certain individuals also mentioned the role of shifts as an essential factor in conditioning the commute departure time. The partial or complete management of one's time and, respectively, the possibility to adapt one's commute to suit oneself is proving to be a modern phenomenon of commuting. Consequently, this is related to the fact that commuting times vary from one day to another. Morning departure time varies for more than a third of the individuals. The afternoon return commute home from work is characterised by a higher degree of irregularity. About two-fifths of individuals leave work at a different time. Although the majority declared going to work at roughly the same time, the representation of irregular commuters is relatively high. Almost half (45%) leave work at slightly different times on different days of the week. Therefore, not only does commuting vary between individuals within a day, but individuals also exhibit different temporal features as regards days of the week.

Commuting does not have to be an everyday occurrence. For some respondents, commuting to work is no longer a daily routine carried out on all five working days of the week. It turns out that a growing number of commuters are only going to work some days of the week. Consequently, some individuals are not part of the daily traffic flow to work on certain days because the remote mode replaces their commute. More than a third of respondents stated that they commute less than five days a week to work. One-fifth of the respondents commute at most three days a week. The specific responses show a wide variety of when individuals do not commute to work. Some individuals skip Mondays, others skip Fridays. Many individuals commute completely irregularly. It can be said that the growing role of the home-office clearly influences commuting behaviour in this region. Commuting is also becoming increasingly spatially diverse. About a tenth of all respondents reported that they do not commute to a single place of employment, but the centres of their commute vary. Within this tenth of individuals, approximately half commute to other locations regularly on fixed days, and half are day dependent. However, this finding demonstrates that spatial diversity is still marginal in this region. Although this represents a relatively low proportion of individuals, tracking the spatial movement of these individuals would be very beneficial.

Spatio-temporal changes are also strongly encouraged by the structural characteristics of individual journeys. The data show that the morning commute is coupled with other journeys for more than one-third of interviewees. Thus, the route represents neither the shortest nor the fastest route, but other activities linked to it. A significantly higher proportion of chained trips occurred in the afternoon commute. On the return afternoon trip, over 75% of all commuters reported usually not going directly home but making some stops within a single work-home trip. One-fifth of commuters do trip chaining even every day. Most often, the journey takes this form two to three times a week. The individuality of the commuters manifests itself here in a significant way, which complicates the commuting process considerably. Due to different life scenarios, plans, preferences and values, stops differ between individuals, which creates differences in time and space in commuting patterns. The data show considerable variability in the number of individuals depending on the specific working day and week. The most frequently mentioned places where respondents stop are stores and various pick-up points (70%), schools (16%), fitness centres (4%) and restaurants (4%).

6 | COMMUTING PRACTICES OF INDIVIDUALS

6.1 | Commuting to untypical places

Interviews revealed that somewhat atypical commuting destinations are becoming increasingly popular. Following the research of Felstead (2012) and Koroma et al. (2014), we can classify these atypical commuting locations in the BMA as 'third places'. These 'third places' are important for research mainly because they are bound by specific spatio-temporal rhythms. The analysis identified that our interviewed individuals commute to a café, a friend's house and a hotel. Lukáš is one of the individuals who use a café as a working place. Lukáš is an employee of an international company, working in a fully remote mode. Consequently, he has no stable workplace to which he must commute daily. However, he has established a routine over time, which includes working at a nearby café on certain days of the week. His spatio-temporal pattern appears to involve commuting to the cafe in the morning. This transfer is often made by walking, and a feature of this movement is the large time span over a month or a year. He may not get to the place at an exact time; rather, the time at which he decides to go to work is fully up to him. However, he typically departs around 8:30 AM as part of his daily routine. Sometimes his commute is combined with lunch. In this case, the process known in the literature as trip chaining (e.g., Primerano et al., 2008; Schneider et al., 2022) has been observed. Lukáš' movement exhibits two regularly

repeating spatio-temporal rhythms when generalised. These rhythms can be described as *being home – working from the café – going home* (1) and *being home – working from the café – lunchtime in the city – going home* (2).

> Lukáš: 'I usually walk there because it's really close. I usually go there around 8:30 AM and work for a while, then we have stand-up, and then I usually go straight from the café for lunch. That's around noon. After lunchtime, I go home. That's around 12:30 PM, and then the rest of the day I spend at home'.

A friend's house is another place that embodies the case of a new workplace, using the definition from the research of Di Marino et al. (2023). As Martina stated, her friends come to her house to work. This implies that her home becomes the place of employment and, therefore, the place for her friends to commute to. The peculiarity of this case is that this newly formed working group comprises individuals from different corporations, with each member working for a separate company. However, since all their friends have flexible working hours, it allows them to change their place of work during the week. Within the commuting system, we can thus speak about the existence of a specific spatio-temporal rhythm in the form of *being home – coworking with friends in someone's home – being home*.

This analysis demonstrates that a hotel can serve as a destination for work-related travel. Among those interviewed was Rostislav, who mentioned that he is used to working from multiple locations within a month. In addition to confirming the work from the café, he commutes to the hotel for work at the meeting on a monthly basis. Although his spatio-temporal experience features great variability in terms of the places visited and the temporal anchoring of individual journeys, a certain regular repetitive spatio-temporal rhythm has been identified. In his example we can observe the spatio-temporal rhythm with a sequence of activities of *being at home – going to a multi-day colleague meeting – working during the meeting – going home*. Lastly the rhythm of *being home – working from the train – meeting – working from the train – going home* cannot be overlooked.

> Rostislav: 'I work from anywhere where I can turn on a computer. I work from home, from a café, from a train. I'm on the train while I'm inventing business'.

The statements of the communication partners indicate that commuting is a very diverse phenomenon. The locations from which individuals work are diverse. This impacts not only the transformation of activity sequences but also the specific movements of individuals in a given time and space, such as in the BMA. The above-mentioned places that emerged from our research are adapted to the preferences of individuals. Based on our interviews, the primary motivation is to maximise time efficiency and strive for maximum productivity and performance during the workday. Therefore, these places can be found closer to one's place of residence.

6.2 | Flexible commuting at convenient times

Commuting can be very flexible in terms of the choice of time of departure to and from work or the choice of when an individual wants or needs to work. Several communication partners, including Roman, Dominik, Tereza, Martina, Lukáš and Adam, stated that they do not commute to work at the same time every day. They justify this method of commuting on the grounds that they do not have fixed working hours. It follows that the flexibility in the working hours is linked to the fact that every day is different and original. Each day consists of a different set of work activities which translates directly into the shape of the commute. Participants reported having appointments either in the evening or arriving early in the morning for important consultations. These factors are subsequently reflected in their atypical commuting behaviour. According to Rostislav, his working day follows a plan he creates in the morning. Individuals can increasingly dispose of their free time according to their internal preferences. As Adam mentions: 'I have an internal schedule that I try to follow'. This option has been a significant driver of change in the organisation of commuting in recent years. A specific spatio-temporal pattern characterises Dominik. When commuting to work, he takes a roundabout route on foot, even if it takes more than twice as long as a direct route. This behaviour contradicts the goal of saving time and energy during commutes, as noted by other interviewees. However, Dominick's actions highlight the uniqueness of each commuter's decision-making. The great independence in the decision-making process also characterises Roman's commute.

> Roman: 'Sometimes there are so many activities that I can only realistically work 3 or 4 h out of the day. Typically, when it comes down to it, I start work at 8 AM, work until 12 AM, then go to lunch, to the gym, to the daycare, to the store, and arrive at maybe 5 PM. It just so happens I don't go to work at 5 PM. And then I know that the next day no gym, that I will work from 8 AM to 6 PM because I need to catch up'.

6.3 | Realisation of the non-daily long-distance commuting

Commuting is typically described as a regularly recurring process with a daily frequency. There are several studies that focus on daily commuting from various perspectives (e.g., Ecke et al., 2022; Gábor & Pregi, 2023). Based on the daily commute, daily urban systems are defined (Grunfelder et al., 2015; Verhetsel et al., 2018) as commuting is considered an essential process in forming metropolitan systems. However, observations show that commuting to work is not just a daily affair. In the literature, we can find the concept of extreme commuting (Vincent-Geslin & Ravalet, 2016). Liang et al. (2023) work with the terms short-range and long-range commute and distinguish between 'mono-days' and 'multi-days' commuting cycles. A case of long-distance commuting was also observed in this research in the BMA, specifically by Roman. Roman works for a company located more than 300 km from home. As his job does not require daily commuting or personal contact with colleagues, he only commutes to work once a week. The one-way journey takes him two and a half hours. Because of the great travelling distance, he leaves for work in the early morning hours and returns later in the evening. This implies that he differs fundamentally in commuting behaviour from the other individuals studied in this research. As it turned out in his case, this mode of commuting was accompanied by the realisation of a specific rhythm: *being home – long commute to work – leisure activities with colleagues – going home*. Rostislav also practises a daily commute during the year. Unlike Roman, however, his journeys to work do not follow a regular pattern.

To conclude, the phenomenon of the long commute is another element that primarily affects the time at which the commute is made, as an individual must leave earlier to get to work on time from a longer distance. Thus, it is more likely that such a person makes the commute partly out of the main peak hours.

6.4 | Realisation of completely new spatio-temporal rhythms

In the BMA, another non-standard spatio-temporal rhythm was observed. This spatio-temporal rhythm is also related to the rise of remote work. Its essence is leaving home at the traditional commuting time in the morning, even though a given individual has a home-office day without necessary work trips. The representative of this rhythm is Dominik, who incorporates a walk into his daily routine before starting work activities. He explains this behaviour as the need to go through a transition phase between personal life and work responsibilities. Thus, in connection with the transition to the home-office mode, there is a completely new rhythm carried out by some individuals, which can be described as *being home – walking before starting working – working from home*. This rhythm runs parallel to other commuting rhythms but in different places and with different dynamics. It is important to be aware of the existence of these practices when studying commuting flows.

> Dominik: 'So I've arranged it so I just have to imitate the commute to work. That means I've to take a shower in the morning, get dressed, walk 5–6 km around the neighbourhood, come back home, crawl into my office, and start working'.

Awareness of understanding this rhythm is very crucial. The discovery of this spatio-temporal rhythm contributes to the extension of the previous research. Specifically, it expands the understanding of commuting as a 'rite of passage' (Cheng, 2020). At the same time, it also moves forward perceiving commuting as a kind of transition phase during which an individual can switch from a home to a work role and vice versa (Jachimowicz et al., 2021). This research has revealed that even individuals who work at home-office have the need to implement a redundant journey just to switch from 'home mode' to 'work mode'. This finding then has clear manifestations in space and time, the implications of which should be addressed by planners.

7 | CONCLUDING DISCUSSION

This paper addressed current spatio-temporal commuting practices in the BMA. The quantitative analysis presented the contemporary distribution of commuting over time and revealed the following statements. First, the major morning and afternoon commuting flows are spread over several hours. Additionally, the afternoon (return) commute is more distributed in time. Second, the phenomenon of the daily commute is clearly weakened. The data prove that commuting only on certain days of the week occurs in part of the population. Third, the spatial dimension of commuting is also diverse. Many originally non-working places become centres to where people commute. Lastly, it turns out that commuters typically chain trips when commuting. Analysis of the structured interviews revealed the presence of several spatio-temporal patterns. These include commuting to non-typical places such as a café, a hotel or someone's house. Interviews confirmed and extended awareness of rhythms associated with commuting at convenient times for individuals. Practices linked with long-distance commuting have also been identified as an important part of the mosaic of spatio-temporal practices. It was discovered that there are entirely new ways of behaviour when someone incorporates walking as a replacement for the commute. The abundance of observed practices is a consequence of the ability to flexibly manage these journeys according to the requirements and preferences of a given individual. The growing importance of flexible working arrangements is a major contributor to this. As Rahman et al. (2022) demonstrate, individuals with flexi-time are more likely to leave for work between 9 and 12 AM. Wöhner (2022) claims that teleworkers are less likely to commute during evening peak hours. If individuals have flexible working hours with a floating starting time, it is to some extent up to them what time they leave for work. Increasing the possibility of leaving work at a time of one's own choosing contributes to the existence of a large number of trip variations that disperse the commute in time and space. Thus, we agree with the statements of the authors Strambach and Kohl (2015) about the loosening patterns in individuals' daily lives. However, other factors also affect commuting, such as the opening hours of various offices, the start of school (Rahman et al., 2022), the need to coordinate with others (Munch & Proulhac, 2019) or the inertia, mentioned by Thorhauge et al. (2020). Flexible working brings some choice and flexibility to commuting patterns, but it does not necessarily mean that all employees who have this option have journeys to work involving multiple activities, stops and vice versa. The questionnaires and interviews also revealed the existence of traditional commuting from home to work and then from work to home. It is necessary to emphasise individuals' individuality and concrete discourse, making reality more complex. The specific journeys of individuals often depend on day-to-day decisions. It was found that days without commuting vary not only between individuals but even when comparing weeks for the same individual. It appears that the increasing role of home-offices in the regional economy directly contributes to the decline of daily commuting.

Based on the above-mentioned research and our findings, it can be assumed that it is a longer-term development rather than a temporary state after a pandemic. The results of this research, which describe the current shape of commuting in the BMA, can serve as a basis for further research. The qualitative section reveals specific spatio-temporal practices associated with contemporary commuting. However, it is worth noting that this description does not aim to cover all possible variations of movements between home and the workplace. The qualitative analysis presented here provides valuable information on a particular segment of reality in relation to the existence of less typical patterns of behaviour. Future research could aim to gain a deeper understanding of specific aspects of commuting, such as long-distance commuting, or explore the spatial dimension of individual movements, such as the location of coworking centres as new commuting hubs and how this manifests itself in the territory. It would be useful to explore the temporal evolution of commuting patterns further.

The comprehensive aim of this article was to show that commuting in the BMA can be described by the notions of temporal displacement and spatial unbinding. The traditional quantitative commuting approach is insufficient to understand these notions properly. As this paper demonstrates, interpreting spatio-temporal practices, which provide deeper insight into commuting processes, gives these terms a new dimension.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author.

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