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Putting Social Relationships to People, Things, and Places Centre Stage – Insights from a Qualitative Social Network Analysis

Maike Puhe[a], Jens Schippl[a]

[a]Institute for Technology Assessment and Systems Analysis, Karlsruhe Institute of Technology, Karlstr. 11, 76133 Karlsruhe, Germany, maike.puhe@kit.edu

Abstract

Given the transformative changes anticipated in the mobility sector, a comprehensive understanding of the factors influencing the stability and variability of travel behavior is important. In this paper, we employ insights derived from a qualitative social network analysis conducted in Karlsruhe, Germany. The primary objective of this study is to provide deeper insights into the factors that contribute to individuals' daily life configurations and their changeability. Unlike the traditional approach of investigating activity categories, this research centers on the social relationships of individuals. To capture diverse activity purposes, a social network is defined as a web of relationships that connects people, things, and places. As such, people maintain social relationships not only with friends and relatives but also with entities such as sports clubs and supermarkets. Consequently, this study yields profound insights into the characteristics of social relationships and the determinants that lead to flexible or stable mobility patterns. The analysis is dominated by two pivotal factors affecting stability and variability: the spatio-temporal context and the emotional-affective context. The article contends that an emphasis on relationships provides a useful amendment to activity-based research approaches, as it offers a holistic perspective on the contextual elements that shape the stability and variability of individual's daily lives.

1. Introduction

The transport sector is currently affected by various change dynamics that are expected to lead to a profound transformation of the mobility system. In various countries, dynamics are primarily driven by the growing urgency to decarbonize the transport sector to achieve the climate policy goals of the Paris Agreement. In addition, digitalization and developments in the field of automated and connected driving promise to gain maturity and enable

a series of novel mobility services and ownership patterns. At the same time, scholars point out that the required transformation cannot be realized through technical innovations alone, but that a transformation requires fundamental behavioral changes, either by reducing the number of trips, shortening trip length, or switching to more efficient transport modes (Banister, 2008; Holden et al., 2020).

Questions about the transformation of the mobility system are thus intertwined with questions about the stability and changeability of everyday life. For decades, the theoretical perspectives to understand and describe travel behavior have been built around the notion that individuals conduct daily activities to satisfy basic needs. It has become an established practice in travel behavior research and modeling to approach travel demand by activity types, for example for work, education, or leisure. The activity-based approach has proved to be a useful conceptual framework for analyzing and modeling how daily life and the respective travel patterns of individuals unfold in space and time. Changes to travel behavior are commonly approached by concepts of choice, which suggest that changes in travel times and costs can instantaneously lead to a reorganization of activity patterns, as modes or destinations become more attractive (Banister, 2011; Mokhtarian et al., 2015).

However, from a transformative innovation perspective, the diffusion of new technologies or restrictive policy measures do not only depend on economic determinants, but on the extent to which people are willing and able to integrate these changes into established routines and configurations of daily life (Fleischer et al., 2022; Puhe et al., 2021). In this perspective, a transition in the field of mobility requires not only new technologies or services to gain maturity but changes in the "deep-structures" of the mobility system, including fond habits, established practices, mindsets, and living arrangements (Geels, 2012; Truffer et al., 2017).

Empirical research has long been indicating though, that many arrangements in daily life are very stable and highly routinized (Dijst, 1999; Gärling and Axhausen, 2003; Pas, 1988). Interventions to foster behavior changes are in many instances not even recognized or perceived as unwelcome disturbances. The transformation of the mobility system is thus not straightforward or just a matter of technical maturity or economic determinants but interlinked with non-technical aspects, such as the degree to which living arrangements or daily life configurations are affected.

In this paper, we argue that several limitations to the activity-based approach exist that make it difficult to approach the changeability of mobility patterns. Firstly because activities as such do not provide any insight into their potential to relocate or reschedule them, e.g. to conduct a specific leisure activity at a different time of the day or a different location (Doherty, 2006). Secondly, because activity types are too heterogeneous to allow for a profound analysis of the social context in which they are embedded (Urry, 2007, 2003).

The purpose of this paper is to introduce a relational perspective to travel behavior by focusing on social relationships that people have with other people, things, and places. As a consequence, we have broadened the common understanding of a social network that only humans form with each other to a web of relationships that includes individual, corporate, and collective actors alike. In this understanding, grocery stores or fitness centers can be nodes in the network as well as friends, relatives, or colleagues. We aim to provide a deeper understanding of the conditions that lead to stable behaviors or that enable the emergence of new or changes in existing patterns of daily life. We will thus focus on which attributes of social relationships are suitable to explain stable or variable behaviors. To do so, we will present the results of a qualitative social network analysis, conducted between 2018 and 2019 in Karlsruhe, Germany.

The paper starts with a state-of-the-art review of research approaches to analyze the variability of travel behavior as well as social network analysis. We will introduce the methodological approach in section 3 and present the results in section 4. The paper ends in section 5 with a discussion and outlook.

2. Conceptual background

Up to today, the activity-based approach appears as the dominant paradigm for travel behavior analysis (Jones, 2012; Jones, 1983). Its theoretical frameworks date back to the seminal contributions of Hägerstrand, Chapin (1974), and Cullen and Godson (1975). While Hägerstrands' time-geographic approach provides a conceptual framework to understand spatio-temporal constraints of activity patterns, Chapin emphasizes the importance of motivation and needs as a source of activity participation. Cullen and Godson highlighted the varying degrees of flexibility, particularly pointing to the role of routines in the scheduling of activities.

Their contributions have largely inspired the development of the activity-based approach as a basis for understanding individual travel behavior and transportation planning (Jones, 1983). From this perspective, travel is a derived demand that emerges in response to individuals' needs and requirements to participate in out-of-home activities. The approach has developed since the 1980s as an alternative to the hitherto dominant trip-based approach, which placed vehicle or person trips as the basic unit of analysis (Jones, 2012; McNally and Rindt, 2008). It contrasts the trip-based approach in several aspects, including the way travel is represented. While the trip-based approach represents trips as separated entities, the activity-based approach differentiates between an aggregated set of activities, such as work, leisure, shopping, or escorting children, particularly emphasizing its limited availability in time and space. As such, activities serve as a proxy to represent the daily life of individuals, including day-to-day constraints and requirements. For travel behavior research, the main contribution of the activity-based approach is seen in its ability to capture the interdependences and interlinkages of timing, location, mode, and route choices, making it particularly useful for the analysis of particular aspects of individual travel behavior and forecasting (Jones, 1983; Miller, 2021).

From a conceptual perspective, the activity-based approach has proved to be very rich and it has contributed to the development of sophisticated travel demand models and a large number of empirical studies that center around activity participation and scheduling, trip-chaining or multi-day patterns of travel behavior (Axhausen and Gärling, 1992; Buliung and Kanaroglou, 2007; Kitamura, 1988). Considerable effort has also been put into understanding interpersonal differences in activity and travel patterns as a result of different roles or household task allocations (Ettema et al., 2007; Gil Solá and Vilhelmson, 2022; Schwanen, 2008; Schwanen et al., 2007). On that basis, the activity-based approach is concerned with addressing research questions relating to the patterning and necessity of travel in daily life, or, from a transport policy perspective, to the accessibility of spatial facilities and how they can cater best to people's needs and requirements (Jones, 2014).

However, despite its long tradition, it is still disputed how the complex patterning of daily life can best be approached, which aspects are particularly relevant for answering the pressing questions of our time, or whether the attributes to examine travel behavior are those that suit these questions best (Barr et al., 2020; Shaw and Hesse, 2010). In this paper, we argue that at least two important aspects are overlooked when focusing on activities as the only or the most important representation of daily life. What we aim to highlight is that by taking activities as the main representative of daily life, meanings and obligations that people assign to their doings and which are often finely configured and synchronized to make daily life work as desired get out of sight.

First, because activities themselves do not provide any information on the flexibility to do things differently. A widely used conceptualization uses activity types as a means to explain how daily life is organized. Particularly in the context of travel demand modeling, it is common to classify certain types of activities as compulsory (e.g. work, education) and others as discretionary (e.g. leisure, shopping), suggesting that some activity types are easier to reorganize or relocate than others (see e.g. Bowman and Ben-Akiva, 2001). Several models have been proposed to capture the dynamics of discretionary activities. For example, Fransen et al. (2018) use a person-based measure of accessibility to study activity participation in discretionary activities. Instead of using aggregate accessibility measures, their approach highlights the importance of accounting for an individual's complex time constraints. Additionally, Dharmowijoyo et al. (2018) use a hierarchically structured equation model to show that individuals' subjective characteristics and day-to-day time-space constraints significantly influence decision-making processes to participate in discretionary activities. Furthermore, modeling approaches exist that dive deeper into the determinants of particular activities, such as shopping (Arentze and Timmermans, 2005; Puhe et al., 2020; Wang and Miller, 2014) or eating out (Haddad et al., 2023; Han et al., 2023). As a consequence of the COVID-19 pandemic, several studies point out that the locational fixity of work is likely to diminish, at least for certain sectors (Christidis et al., 2022; Hensher et al., 2021). These studies contribute to a more nuanced understanding of the complexities underlying the decision-making process related to discretionary activities and their potential for change.

At the same time, empirical work has long been indicating that stability and variability differ not only between, but also within activity types. In this respect, the availability of longitudinal data provided several key insights into day-to-day travel behavior, including that activities (of whatever type) are rarely totally habitual nor totally variable. Rather, it turned out that in most peoples' life certain sequences are highly repetitious, both in terms of the frequency and the way they are executed (e.g. mode or destination choice), while other sequences provide more

scope for flexibility (Bayarma et al., 2007; Buliung et al., 2008; Hanson and Huff, 1986; Huff and Hanson, 1986; Järv et al., 2014; Pas and Koppelman, 1986; Pas and Sundar, 1995; Raux et al., 2016; Schlich et al., 2004; Schlich and Axhausen, 2003). However, while these studies provide important descriptive insight into the extent to which daily life follows certain patterns, they have not added fresh explanatory variables to account for the stability or the variability of daily life (Jones, 2014). A further approach to shed light on the patterning of daily life stems from Schönfelder and Axhausen (2010). They emphasize that analyzing temporal patterns of travel demand is possible by a more detailed classification of activity types. The MobiDrive study, on which they base their analysis, differentiates a total of 24 types of activities, including ten for leisure transport (Chalasani and Axhausen, 2004). They found out, for example, that certain activities, such as club meetings or active sports, follow a clear weekly rhythm, while other activities of the same type, such as meeting friends, are less rhythmic. A rather different approach has been introduced by Doherty (2006, 2005). To shed light on the spatial, temporal, and interpersonal flexibility of activities, a survey instrument was used, where respondents were asked to fill in their planned activities for the week ahead as well as to record rather spontaneous interactions and changes to the initial schedule during seven consecutive days. As a result, Doherty highlights that activity types show significantly different levels of flexibility. He proposes that the planning horizon of any given activity provides a more salient explanation for flexibility than the activity type alone, a consideration that has already been brought up by Cullen and Godson (1975).

The second aspect that we see as not well-represented by the activity-based approach is that travel behavior usually takes place in a social context, which is kind of blurred by the heterogeneity of activity types. Like other scholars before, we would like to contribute to the debate on the social embeddedness of travel by referring to the idea that a substantial part of daily life is networked, structured by a web of social relations, e.g. to see relatives at their house, to meet friends at a preferred restaurant, to attend important work-related events, or to provide best opportunities for children (Axhausen, 2005; Urry, 2012, 2003). In recent years, substantial effort has been made to collect data on people's social networks. Several studies from Europe, the Americas, and Asia use social network analyses to gain a better understanding of travel behavior (Carrasco et al., 2008; Carrasco and Cid-Aguayo, 2012; Frei and Axhausen, 2007; Guidon et al., 2018; Kowald and Axhausen, 2012; Parady et al., 2021b; van den Berg et al., 2009). Comprehensive reviews have recently been provided by Kim et al. (2018) as well as Parady et al. (2021a). In these studies, travel demand, especially in terms of interaction frequencies, is linked not only to sociodemographic characteristics or spatial structures but to the structure and composition of a person's social network (e.g. geographic dispersion, total number of relationships, number of strong or weak ties). Those studies show that relational factors, such as emotional relatedness or the duration of a relationship are linked to the frequency of social interactions. Moreover, several studies are concerned with analyzing how ICT influences interaction frequencies (Carrasco, 2011; Parady et al., 2019; van den Berg et al., 2013) or how life events affect the compositions of social networks (Sharmeen et al., 2014; van den Berg et al., 2017). Usually, quantitative ego-centric network analyses are used, in which respondents are asked to provide information on their strong ties (very close relationships) and weak ties (somewhat close relationships). These studies have made a decisive contribution to a better understanding of leisure travel and defined several new determinants to explain whether and how often interactions take place. At the same time, we argue, that they have only scratched the surface of what social embedding actually means, as they do not reveal the underlying processes that govern the configuration of social networks. Questions of where and how relationships come into place, how they evolve over time and under which conditions they change, what practices are linked to maintaining distinct relationships, and what they mean for the persons involved have yet not been addressed (Ettema and Schwanen, 2012).

Such questions are best analyzed qualitatively since this allows an in-depth understanding of the phenomena under study in terms of the meanings and practices from the viewpoint of the subjects (Hollstein, 2011). However, qualitative social network approaches in the realm of travel behavior research are yet rare, with only a couple of studies available to show how relationships determine the need for travel (Kesselring, 2006; Larsen et al., 2007; Ohnmacht, 2015). The studies provide rich explanations of the geographical spreading of social networks and illustrate heterogeneous mobility strategies and the necessities to maintain them. Yet, several aspects have not been examined. First of all, existing studies focus on relationships between individuals only and are thus limited to social activities. Other aspects of daily life, such as work, escorting children, or shopping remain excluded, even though

they can have a decisive societal meaning in terms of self-identity or status as well as serve as important "anchor points" in daily life (Cullen and Godson, 1975). Second, neither the qualitative nor the quantitative approaches aim at providing an operationalization to account for the distinct obligations and meanings that accompany different kinds of relationships.

3. Methods – a qualitative social network approach

The analysis presented here is based on a qualitative and explorative social network analysis. Generally speaking, social network analysis aims to explore the web of social relationships that individuals form with each other and to emphasize the implications these relationships have for social actions (Scott, 2011). As outlined above, this paper aims to illustrate how people's everyday lives are made up of rather different relationships with people, things, and places, each coming along with distinct social, spatial, and temporal preconditions. The starting point for the analysis is the thesis that social relationships frame activity participation and its changeability in important aspects. For example, both "eating out" and "doing sports" are activities framed under the purpose "leisure"; however, the social setting under which these activities occur can make an important difference in travel behavior. Going out to a restaurant with a close friend could leave more room for negotiation regarding location, timing, and duration than attending a business dinner with a superior. The same applies to "doing sports"; it does make a difference if someone does sports in a club with designated training times or if this person occasionally meets a friend to go for a run in the woods, where meeting times are agreed on as the case arises. This means that a relationship with a sports club could imply almost the same fixity levels regarding presence, timing, and location as commonly attributed to work. The relationship to a workplace could, in contrast, be characterized by rather flexible preconditions.

To map the various relations that people have with other individuals, things, and places, we defined a social network as a web of relationships that individual, corporate, and collective actors form with each other. In this perspective, a social network includes other individuals such as family members or friends, as well as the preferred hairdresser, sports club, or grocery stores (see Fig. 1). As outlined above, the study was primarily developed to highlight the different meanings respondents assign to their social relationships and to assess the spatio-temporal flexibilities they allow.

For accounting for the various relationships, we used a mixed-method approach, largely dominated by qualitative elements. The primary data source is interviews conducted with a total of 27 respondents in Karlsruhe, Germany between 2018 and 2019 (before Covid-19). The sample was purposefully selected and comprised of young adults with and without little children (up to and including the age of ten). The sample was selected based on the assumption that both groups differ substantially concerning their flexibility in everyday life. While young adults without little children were assumed to enjoy a maximum degree of freedom, the everyday life of parents was presumed to be strongly determined by the children's needs and schedules (see Table 1).

Table 1: Household context of the sample

	Respondents with children	Respondents without children	Total
Female	8	7	**15**
Male	5	7	**12**
Total	**13**	**14**	**27**

Respondents were aged between 18 and 47. Some lived in single households, some in a shared house, some were single mothers, and others lived in dual-income households, thus respondents provided a broad range of social realities. All respondents were recruited from the same inner-urban district of Karlsruhe, characterized by apartment houses and a diverse offer of services and amenities (e.g. restaurants, health care and childcare facilities, playgrounds, and supermarkets). The reason for recruiting from one district only was to be able to focus on the social context and not have spatial factors distorting the analysis.
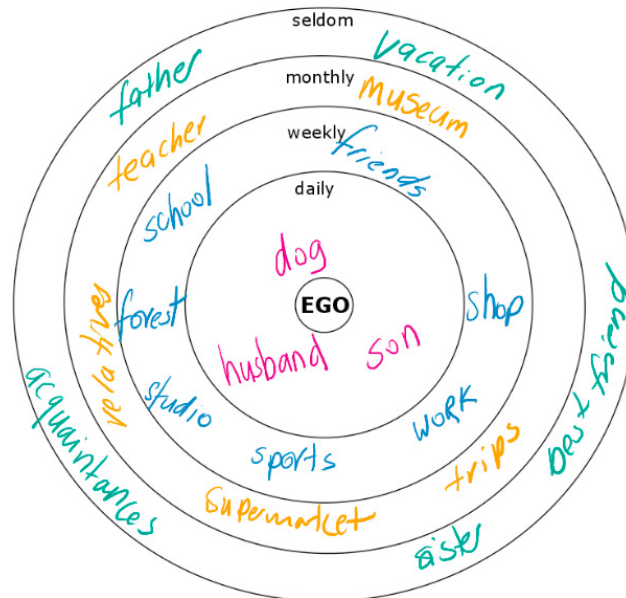
Fig. 1. Exemplary network map

The three-phase research design consisted of two in-depth face-to-face interviews and a one-week travel diary. The first interview was dedicated to the respondent's social network. Participants were asked to report with whom or what they interact on a daily, weekly, monthly, or seldom basis and for what reason. This was achieved by using a network map as depicted in Fig. 1. Further questions were centered around the duration of the relationship as well as the meaning of it.

In the second phase of the study, respondents were asked to fill in a travel diary over seven consecutive days. The diary captured information on activity type and an open question on details of the activity ("What exactly do you do there"), on the scheduling of trips, mode and destination choice, as well as the presence of others during the activity. The aim of using a travel diary in addition to the interviews was to make respondents aware of their mobility behavior during that week as well as to reveal network partners that they had forgotten during the first interview.

In the third phase, a follow-up interview was arranged to explore the situations that were captured through the travel diary in greater detail. The reason for this interview was to better understand the distinct practices connected to maintaining relationships and to explore what constraints and facilitates people's actions. Questions were resolved around destination and mode choices as well as the perceived flexibility or the desire to do things differently.

The interviews were audio-recorded, transcribed, and coded by using the software MAXQDA.

By putting the analytical focus on relationships, the approach provides rich descriptions of subjectively experienced constraints and freedoms, reasons for keeping some relationships alive and for letting others go, personal strategies to cope with uncertainties and structural changes, as well as the reasons for preferring particular relationships over others.

4. Results – approaching different contextual factors of relationships

We begin our analysis by identifying and generalizing the relationships which respondents reported during the study. Table 2 gives an overview of the relationships that comprise everyday life, categorized per activity type. The

relationships are generated from the data set, either by talking to the participants about their everyday life practices or by their mobility diary. The list comprises all relationships for which respondents need to leave their homes. As a consequence, members of the same household, such as children or spouses are not included in the list. The reason for this is that mobility-specific aspects of these relationships (e.g. spatio-temporal flexibility) appeared to vary from situation to situation, rather depending on the common relationships outside their homes, for example to childcare facilities, playgrounds, or clubs.

In total, respondents report about 415 relationships. More than half of them can be attributed to leisure purposes (n=233), accounting for very diverse relationships, such as with relatives and friends, to clubs or restaurants, or cultural sites. Work comprises of relationships to workplaces, as well as to business trips or mobile work. As the study was carried out before Covid, it was not common to work from home or elsewhere. Today, the share of people having a relationship with a mobile workplace would probably exceed the one presented here. With regards to shopping, we differentiate five relationships: to retail stores for non-daily demand products, to grocery stores, to more specialized stores such as bakeries, butchers, or drugstores as well as relationships to open markets. It appears that people do have rather different patterns to maintain these relationships. Private businesses also comprise rather heterogeneous relationships, e.g. to health care facilities, to services, to local authorities, or to financial institutions. For education, we differentiate two relationships, to the education institution itself (e.g. the university campus), but also to learning facilities, such as libraries.

It is important to note that the amount of relationships mentioned is not necessarily linked to the amount of travel being generated by these relationships. For example, a respondent may report about a large number of leisure relationships, while at the same time, this respondent has only one relationship with a workplace. However, in terms of transport volumes, it can well be that the workplace accounts for a higher share of trips since it is visited more frequently than compared to interactions with a specific friend or sports club. Yet, this list reveals the heterogeneity of activity types and provides a first glimpse into the idea that relationships even within the same type of activities are not equally intense or meaningful to a person. For example, it can be assumed that the relationship with one's parents is of a rather different intensity than a relationship with a certain bar, although this can differ from individual to individual.

Table 2: List of relationships per activity type

Relationships	Number
Work	**35**
Workplace	23
Business Trip	9
Mobile work	3
Education	**12**
Education institution (e.g. school)	8
Learning facility (e.g. library)	4
Shopping	**63**
Retail: non-daily demand (construction market)	13
Local market	8
Grocery store	31
Butcher, Bakery, Drugstore	11
Private business	**47**
Financial institution	1
Central and local authority	3
Health facility (e.g. physician)	32
Service facility (e.g. hairdresser, driving school)	4
Other	7

Relationships	Number
Leisure	**233**
Relatives	40
Friends	70
Partner	3
Acquaintances/ colleagues	3
Gastronomy (e.g. bar, restaurant)	21
Club/ association (e.g. sports club)	17
Garden/ cottage	5
Site for play, sports, and recreation (e.g. park)	39
Religious sites (e.g. church)	7
Entertainment or cultural sites (e.g. cinema)	14
Holiday vacation	14
Pick up/ Drop off	**25**
Education and care facility	18
Children's friends	2
Children's club/ association	5

To explore the stability and variability of relationships we suggest that at least two dimensions matter. First, the spatio-temporal context in which relationships are embedded. This dimension has also been the focus of existing literature, as already outlined in section 2. At the same time and as noted above, the potential to relocate or reschedule a relationship does not provide insight into the social embedding of a relationship. We therefore propose a second dimension that captures the affective context of a relationship, which we see as particularly crucial when it comes to the changeability of daily life configurations.

In the following, we will introduce the operationalization of the spatio-temporal context, before presenting the affective context.

4.1. The spatio-temporal context of relationships

The spatio-temporal dimension addresses both, the flexibility to reschedule and to relocate an interaction situationally. Table 3 shows that the basis for the spatial flexibility is the number of destinations that are usually being used for interactions. The interviews suggest that relationships can either be linked to one very specific destination or they can be linked to some or various destinations. For example, the relationship with one's parents can be firmly linked to their house (or their care facility), while a relationship to the gastronomy can take place at various locations, for example, the different restaurants in one's surrounding. For others, however, interactions with their parents can be linked to various locations, while having lunch is bound to a very specific restaurant.

Concerning the temporal flexibility, we focus first on the situational possibility to reschedule an interaction, that is to adjust meeting times to situational needs and requirements, for example the possibility to arrive 15 minutes late to a meeting. Table 3 suggests that certain interactions allow for readjustments during the day, while others don't. For example, for some working hours are bound to specific times, while others have rather flexible working hours.

Table 3: Characteristics of spatio-temporal flexibility

Indicator	Characteristics	Quotes exemplifying flexibility/ fixity of interactions
Spatial flexibility	Variety of destinations	*"For going out? I am basically open to everything"*
	Few destinations	*"Our weekly meetings take place either by one of the families or by the other"*
	Fixed destination	*"We have a garden plot. All meetings of the group take place in this garden. Always"*
Temporal flexibility	Adjustments possible	*"If I need to discuss something in kindergarten in passing, it's ok if I come late to work. I just stay longer, then"*
	Adjustments not possible	*"I am at work at seven, exactly. Because colleagues being sick need to give me a notice by then"*

What can be recognized by the data is that generalizations about the spatio-temporal flexibility cannot be determined by the activity nor by the relationship itself, but can only assessed from a relational perspective. For the respondents of this study, it appears that the majority of relationships are bound to very specific destinations (see Fig. 2). In terms of the temporal flexibility most relationships allow for situational adjustments. Concerning the distinct activity types it becomes apparent that leisure travel is particularly heterogenous in terms of the spatio-temporal flexibility. Around half of the relationships within this activity type are bound to specific destinations, particularly relationships with friends and relatives who live further away. Since spontaneous interactions in restaurants or going to the cinema are hardly possible, interactions are often linked to places of residents. Furthermore, relationships to sports clubs as well as to religious sites are often bound to a specific destination. Sometimes, restaurants or bars are linked to a specific destination, indicating that no rational consideration takes place.

Fig. 2: Share of spatially flexible relationships per activity type

4.2. The emotive-affective context of relationships

We approach the emotive-affective context with two indicators. One is commitment, a point that has already been brought up by Cullen and Godson (1975), who claim that activities follow a semi-institutionalized order of commitment. As noticed above, Doherty (2006) takes up this point and relates the commitment of an activity to the planning horizon. He found evidence that activities that are planned long ahead are more fixed in one's personal configuration of daily life than activities that allow for spontaneous activation. Similarly, respondents of this study talk about their relationships. Table 4 suggests to differentiate three distinct forms of commitment. Some relations require a high degree of commitment, they function as "anchor points" in daily life, around which other relationships are configured. The data reveals that commitment comes along with a certain degree of persistence, in the sense that it is an established practice to interact with certain relationships on a routinized basis, while others require long-term planning, and yet others can be recruited spontaneously. Commitment indicates that each relationship has its own position in someone's configuration, which can also be demanded in return. To make the difference between temporal flexibility and commitment more explicit, consider a person who goes shopping every Saturday (as exemplified by the quote in Table 4). This person has reserved a particular day, or sequence of the day, for this relationship, while it still allows for temporal adjustments on a situational basis. However, finding a different day for this relationship appears difficult amid the full schedule of this person. As such, an anchor point as a routinized relationship can still provide temporal and even spatial flexibility.

Table 4: Characteristics of commitment

Indicator	Characteristics	Quotes exemplifying flexibility/ fixity of interactions
Commitment	Anchor point	*"I do that [grocery shopping] every Saturday because it is easier for me to go without children."*
	Long planning times	*"I usually make an appointment for in two months, because then they [the hairdresser] have enough open time slots"*
	Short planning times	*"I usually meet friends very spontaneously, making appointments is hard for me, because of the kids"*

Relationships that are routinely activated, and that are anchor points in daily life are typically work relations as well as relations for picking up/ dropping off children. But also, several leisure activities are among these anchor points, such as clubs or religious sites. Other relationships are planned long ahead, sometimes various months in advance. Like anchor points in daily life, these relationships are given priority when it comes to organizing daily life, but they are not routinely activated. Interestingly, these kinds of relationships are particularly evident in leisure travel. Respondents report that interactions with friends and relatives living further away as well as to certain holiday locations or excursions usually need long planning times, sometimes they are even arranged weeks in advance. Lastly, some relationships allow for spontaneous activation. This applies mainly to relationships linked to shopping and private businesses, although there are also relationships within these activity types that act as anchor points (e.g. to grocery stores) or are planned long ahead (e.g. to hairdressers or physicians).

The other indicator to approach the emotive-affective context is the motivation to engage in or maintain a relationship (see Table 5). The data suggests that not all relationships within one's network are equally intense or meaningful, and it differs between persons which relationships are regarded as meaningful. We largely build our categorization on the theory of self-determination (Ryan and Deci, 2017). Central to this theory is a continuum of motivation that categorizes activities (or relationships), depending on the degree to which personal interests and social values have been internalized. Some relationships are of utmost importance to people, especially those that are relationally satisfying because they provide emotional relatedness. Those relationships are deeply in line with one's own identification and needs. For example, people's relationships with relatives and friends are often experienced as satisfying and meaningful. Other relationships are considered socially valuable but are not necessarily associated with pleasure. For example, work is for large parts of the academic world meaningful, without being necessarily (or not always) a pleasure. Then there are relationships, which have only been put in place because they are convenient, without representing one's self-perception. For example, relationships with a supermarket often appeared to be rather functional, without providing any emotional or social salience. Finally, there are externally regulated relationships, which are only maintained to attain any form of outcome, such as material rewards or to avoid sanctions. For example, relationships with the employment office are likely characterized by an absence of relatedness, it is rather a compulsory relationship. However, generalizations are not straightforward. For example, some experience internal pressure to interact with their parents, while they consider shopping in a specific grocery store as socially significant. For some, a bar is just a means to interact with good friends, while it is a relationship in its own right for others. Again, the motivation to engage in a relationship nor the commitment to it cannot be attributed to a fixed set of relationships but rather depends on relational aspects. Table 3 provides an overview of the indicators being used and some quotes for each characteristic in order to underline our conceptualization.

Table 5: Characteristics of motivation

Motivation	Emotionally meaningful relationship	*"I am just very attached to my physician, he is really good and he knows me since I am 12 years old. It is worth the relatively long journey"*
	Socially meaningful relationship	*"The café just has a real flair. Yeah, flair and I feel good going to a stylish café. They have good coffee, but it's also that it has such a flair that I get there"*
	Functional relationship	*"I go there [to the grocery store] because it´s so close. I mean it`s kind of obvious, isn't it?"*
	Compulsory relationship	*Well, the job center. They always come up with something. Even if they don't need anything. They have tortured me very, very much in the past"*

Ryan and Deci (2017) emphasize in their research that the greater the perceived self-determination (or internal motivation) to engage in a particular practice is, the greater is its persistence, even if it is associated with difficulties. Similarly, our data shows that relationships that are emotionally or socially valuable to respondents are often maintained for a long time, even enduring life events such as the birth of a child, job relocations, or stays abroad. This leads us to the suggestion that these kinds of relationships are not easily changeable, at least not by transport planning interventions. Consider for example a person being attached to a particular sports club. This person might have been actively engaged in this club for quite a while, and a sort of relatedness has been established. It is thus reasonable to assume that this person wouldn't give up this relationship just because a new service is available with which another club would be approachable in less time.
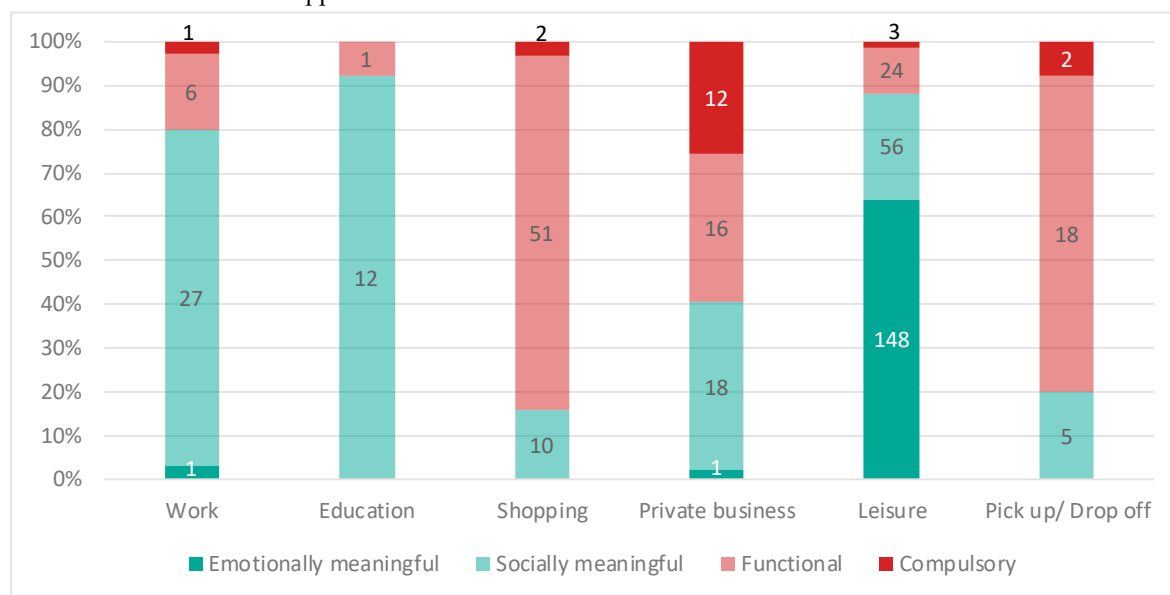

Fig. 3: Share of meaningful relationships per activity type

The majority of relationships that the respondents report are internally initiated in the sense that they are either emotionally or socially valuable to them (see Fig. 3). Not surprisingly, this is particularly evident for relationships in the realm of leisure transport, where respondents report about a lot of relationships that are emotionally meaningful to them. With regard to work and education, the data suggests that relationships are socially meaningful. Relationships to childcare facilities as well as relationships in the realm of shopping appear to be mainly functional. Nevertheless, there are some relationships to specific grocery stores or retailers as well as to childcare facilities, where people are not satisfied with the most proximate amenities, but look for relationships that suit their self-perception.

5. Discussion and outlook

In this paper, we have used a qualitative social network analysis to provide analytical categories to analyze the stability and changeability of everyday life. To include a variety of different activity purposes, a social network was defined as a web of relationships with people, things, and places. In this perspective, people have relationships with other people, but also with their hairdresser or their sports club. In doing so, we have highlighted that activity types are constituted by distinct relationships, each being accompanied by different spatio-temporal flexibilities as well as different commitments and meanings. We have thus identified additional contextual factors to the analysis of stability and variability of travel behavior, each pointing to different aspects of changeability.

The spatio-temporal context indicates whether a relationship allows for situational adjustments in terms of meeting times and destinations. In contrast to the common practice of framing certain activity types as temporally

and spatially fixed and others as flexible, our data suggests that a majority of relationships across all activity types are bound to very specific destinations. For example, think of a person who has a relationship with a sports club. An interaction with this relationship would likely determine his or her destination choice, as he or she would choose the club's facilities for an interaction. Destination choice would thus not be as discretionary as commonly assumed in modeling frameworks. The need to limit the universal choice set to a subset has long been acknowledged in literature (Cascetta et al., 2007). In this respect, Miller (2019) argues that it is rather difficult to assign attractivity measures to destination choice modeling without knowing what a person exactly intends to do. A future avenue of research for us is thus to use the list of relationships provided in Table 2 to model destination choices by explicitly considering social relationships with people, things, and places. In contrast to observing activities, focusing on relationships allows for an in-depth analysis of the different dimensions of changeability. This means that focusing on social relationships does not only allow us to consider spatio-temporal constraints but also the substitutability of relationships. As such, we could bring to expression that the substitution of a relationship does not only depend on objective attractivity measures and travel impedances, but also on its social context. Our data reinforces that a significant part of relationships is handled with priority within people's configuration of daily life, either because they are routinely activated or are planned long in advance. Often there are no alternative options to these relationships and thus no rational decision-making process. Rather, these interactions are activated more or less automatically. This configuration, having some relationships as anchor points in daily life, others planned long in advance, and yet others organized spontaneously around them, has been described as rather stable by the respondents. This provides an interesting perspective on habits and routines in activity participation. Social psychologists have long emphasized that despite frequent repetition, automaticity is an important pillar in approaching the strength of a habit (Verplanken and Orbell, 2003). So far though, research on habit strength is primarily designated to mode choice behavior, with activity participation and destination choice largely being a black box.

However, what is also frequently noted is that routines reflect a sense of social belonging, self-identity, or ways of seeing and interpreting the world (Freudendal-Pedersen, 2009; Urry, 2003). Social science research has a longstanding tradition of approaching such aspects by social network analysis. We introduced the indicator "motivation" to capture this phenomenon for relationships. The indicator is largely built upon the self-determination theory but has been adapted to our purposes. We suggest to differentiate relationships according to the motivation with which they are maintained. Some relationships appear to be motivated by their emotional or social meaning, while others are only put in place because they are presumed particularly functional or because people feel an external pressure. From this perspective, not all relationships are equal and it differs between individuals to which relationships they attach value. In this study, for example, some respondents assign a social or emotional importance to their grocery store, childcare facility or hairdresser, in the sense that they have chosen this relationship purposefully and not only for functional reasons. This differentiation leads us to the assumption that some relationships are more persistent than others. It is reasonable to assume that an individual who maintains a relationship with a specific supermarket for functional reasons is more likely to change behaviors in the course of interventions than a person who uses a supermarket to express his or her identity or social belonging.

It should be stressed though, that the conclusions of this study are drawn from a single case study, that does not allow extensive generalizations. Instead, further research is needed that considers different cultural or spatial backgrounds. Moreover, further research could aim to approach the phenomena described here in a quantitative manner.

Interesting results could also be drawn from linking social network configurations to the conditions of social or public acceptance. Scholars have emphasized that more restrictive policies are an indispensable element of sustainable transport (Schippl and Arnold, 2020). At the same time, more restrictive parking policies or car bans are often accompanied by public resistance. By addressing routines of daily life and their meaning, the perspective on social network configurations offered in this research could provide a valuable perspective on what is considered "normal" or a "good life". These aspects become particularly apparent for studies that aim to answer which policies are considered acceptable or legitimate and by whom.

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