# New data for social leisure travel forecasting 

First results of a survey on leisure activities

## Working Paper

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#### Abstract

In this working paper we report on the difficulties of surveying leisure activities for social leisure travel forecasting. We summarise findings of a a pre-test for a one-week activity questionnaire (paper-based) that was conducted during May and June in 2018. The main goal was to gather information on what people do, how frequently they do so and if it was a group activity, whether and how it was jointly planned. We conclude that on the one hand, a proper classification of leisure activities into well defined categories is necessary and that activities need to be reported as non-combined or as separated as possible. This seems obvious at first, but increases the response burden of such a questionnaire enormously especially when using open text questions. On the other hand, for group activities, respondents should be properly guided throughout the questions that investigate group size and composition. A web-based questionnaire would probably be a better way in that regard as one could force important answers where needed.


## Keywords

social leisure travel, leisure activities, group activities, joint planning

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## 1 Introduction

In modern societies, leisure travel makes up for a very substantial part of total travel. Previous research has shown that this travel is essentially social, in the sense that the main motive behind it is the desire to meet and engage with social contacts. This makes this kind of travelling difficult to forecast: their characteristics depend not only on the characteristics of the travelers and the built environment, but also of the geography and topology of their social network. Even though the characteristics of leisure activities performed in groups have been the focus of various studies, the group composition and processes of joint planning have yet to be elicited. In particular, there is still a lack of knowledge of how much the decision to perform leisure is constrained by the decisions of social contacts. Recent literature also showed that social contacts are an extremely important explanatory factor for mobility. However, it has been difficult to get satisfying insights into the structure of the global social network. Data collected at the IVT already provide insights on leisure and social travel together with its regularity and the geography of social networks. What is still missing, is the knowledge of how much do individuals' activities depend on those of their social contacts.

This paper summarizes the attempt to collect data on performed leisure activities mentioned in the first task of the project (Dubernet and Axhausen, 2015). The main goal of the survey was to gather information on socio-demographic information of the respondents and their leisure activities performed (alone or in groups) during a one week period in 2018. It presents a first descriptive analysis, may serve as a pre-test for a possible large-scale survey and helps to improve questionnaires about social leisure activities in the future.

The remainder of the paper is structured as followed: Section 2 describes the structure of the questionnaire, its response burden score and the corresponding participation rate. Section 3 highlights the results in two sub-sections: The first one, Section 3.1, presents general descriptive results on all activities reported, while the second one, Section 3.2, specifically focuses on group activities, its group composition and joint planning. The results derived as well shortcomings of the questionnaire are discussed in Section 4

## 2 Survey

The specific task was to develop a one-week diary of leisure activities in order to gather information on what people do, how frequently they do so and if was a group activity, whether and how it was jointly planned. It is essential to know people's activity patterns to be able to model leisure travel, which accounts for half of our everyday mobility ( $\overline{\mathrm{BFS}}$ and ARE, 2017). Despite the rise of new technology to track individual mobility, it has still been difficult to get insights into group activities and their underlying motivation. This project made use of a classical paper-based approach where people invited fill out the activity diary by hand.

### 2.1 Questionnaire

The goal was to aim for approximately 50 pre-test respondents living in the Canton of Zurich, not only to examine their leisure activity patterns but also to evaluate the quality of the answers and response burden score of the questionnaire that we developed based on previous projects at the institute (Chalasani and Axhausen, 2004, Schlich and Axhausen, 2004, Axhausen, 2005, Löchl and Axhausen, 2005, Axhausen, 2007, 2008, Frei and Axhausen, 2011; Kowald and Axhausen, 2012).

The questionnaire was paper based and created using Adobe Illustrator. It consists of three parts ${ }^{1}$.

1. Basic socio-demographic information on

- personal level: gender, age, occupation, work location, highest education, drivers license, car access, public transport ticket ownership, personality (big five)
- household level: size, mobility tool ownership, income

2. Form for each activity:

- date, start and end time (duration)
- type, location, cost, time of decision, regularity
- activity before and after, location of activity before and after

3. Form for each group activity:

- size, composition, regularity, subjective description, cost and allocation
- motivation, decision process (organisation, involvement)

[^0]The response burden score for the first part is 48 points according to Schmid and Axhausen (2019) and low compared to others in the papers mentioned above. However, the total response burden score depends on how many activities a participant reported during the one week period and is substantially higher if an activity was made as a group. A single activity performed without any co-participants results in a score of 32 points. The group activity form adds another 55 points, which yields a total of $48+32+55=135$ points if a respondent filled in the first part and reported one group activity. Due to budget and environment related reasons we decided to provide the participants with the option to report up to 10 (group) activities. Therefore, the total response burden score could vary between 183 and 1,553 points.

### 2.2 Recruitment and Participation

In total, 7,500 addresses were bought from the Statistical Office of the Canton of Zurich in order to invite participants to the study. For the pre-test, 500 invitations were sent out on May 4, 2018. After three weeks, we reminded invited people that had not responded to participate in the study. We paid an incentive of 10 CHF to each respondent for a completed questionnaire with at least one activity reported. Based on Schmid and Axhausen $(\sqrt{2019)}$ and the above mentioned average response burden score we expected a response rate between 10-20\%. An overview of the response rate is presented in Table 1 .

Table 1: Participation rate

|  |  | Total | Share (in \%) |
| :--- | :--- | :---: | :---: |
| Invitations | 500 | 100 |  |
| Responses: |  | 34 | 6.8 |
|  | complete | 24 | 4.8 |
|  | incomplete | 10 | 2 |

The participation rate is significantly below $10 \%$ and our expectation. First, it might be that the incentive was not large enough to convince more people to be part of the study. The response burden only considers filling out the activity diary for a whole week, but not sending it back afterwards, even though the participants were provided with the necessary envelopes. A second reason could be related to the size of the questionnaire and the corresponding task to keep track of the activities, especially when it comes to report about
the group composition for such activities. Almost a third of all responses were incomplete in the sense that important information was missing - going from simple information on for example the duration of the activity, up to almost blank group activity forms or completely missing ones. Paper based questionnaires are being and were commonly used for studies on social networks. However, it seems that these kind of surveys require reliable participants thoroughly filling out such diaries, even more than conventional transport related ones.

## 3 Descriptive Analysis

A map of home locations of participants, displayed as red crosses in Fig. 1, shows the spatial distribution of the sample with two clusters corresponding to the districts of Winterthur and Zurich (in green).

Figure 1: Home locations in the Canton of Zurich


This seems reasonable as those are the most densely populated areas in the Canton of Zurich and addresses were selected randomly.

Table 2 shows a comparison of selected socio-demographic attributes on personal and household level of the sample to the Swiss Microcensus Mobility and Transport (MCMT) 2015, filtered for residents living in the Canton of Zurich being at least 18 years old. Due to the small number of participants the sample is obviously not representative to the cantonal population in many of these attributes. Note that we did not weight any of the descriptive results in the remainder of this section to accommodate for that issue. The presented results should rather give a first insight into surveying leisure (group) activities and possible patterns about how they are planned as such.

Table 2: Sample compared to the Swiss MCMT 2015

| Variable | Value | \% MCMT | \% Sample |
| :---: | :---: | :---: | :---: |
| Age | 18-30 years | 15.1 | 8.8 |
|  | 31-40 years | 15.9 | 26.5 |
|  | 41-50 years | 20.1 | 11.8 |
|  | 51-65 years | 25.5 | 32.4 |
|  | 66-90 years | 23.4 | 20.6 |
| gender | female | 51.3 | 52.9 |
|  | male | 48.7 | 47.1 |
| education | not provided | 0 | 2.9 |
|  | no education | 2.0 | 0 |
|  | mandatory education | 8.1 | 0 |
|  | gymnasium | 5.4 | 2.9 |
|  | berufsmatura | 1.8 | 5.9 |
|  | berufsabschlusslehre | 44.3 | 47.1 |
|  | university | 29.6 | 41.2 |
|  | other | 8.8 | 0 |
| occupation | employed | x | 76.5 |
|  |  | x |  |
|  | unemployed/household duties | x | $11.8$ |
|  | searching for job |  |  |
|  | retired |  | 11.8 |
| drivers licence | yes | 81.9 | 100 |
|  | no | 18.1 | 0 |
| PT season ticket (GA) | yes | 11.1 | 14.7 |
|  | no | 88.9 | 85.3 |
| PT half-fare ticket (HT) | yes | 49.0 | 70.6 |
|  | no | 51.0 | 29.4 |
| household size | 1 | 20.0 | 5.9 |
|  | 2 | 39.2 | 58.5 |
|  | 3 | 16.2 | 8.8 |
|  | 4 | 17.4 | 17.6 |
|  | 5 | 5.1 | 5.9 |
|  | >5 | 1.7 | 2.9 |
| household income | under 2,000 CHF | 1.3 | 0 |
|  | 2,001-4,000 CHF | 9.4 | 2.9 |
|  | 4,001-6,000 CHF | 15.4 | 5.9 |
|  | 6,001-8,000 CHF | 15.8 | 11.8 |
|  | 8,001-10,000 CHF | 13.1 | 11.8 |
|  | $10,001-12,000 \mathrm{CHF}$ | 9.9 | 29.4 |
|  | 12,001-14,000 CHF | 5.8 | 0 |
|  | $14,001-16,000 \mathrm{CHF}$ | 5.1 | 0 |
|  | more than 16,000 CHF | 8.9 | 0 |
|  | not provided | 15.4 | 38.2 |

### 3.1 Activities

Table 3 gives an numerical overview on the activities performed and reported by the participants. Even though the participants were asked to fill out the activity diary for one week, there is a large range in the reporting period observed between the participants, going from a minimum of two days with at least one activity per day to a maximum of 49 . However, the median value of 6 days shows that most of the participants managed to do as asked. In total, 216 activities over a time period of 3 months and 5 days were reported. Note that most of the participants were able to report activities performed in one week $\boldsymbol{L}^{2}$. $37 \%$ (79) of all activities were performed alone whereas $63 \%$ (137) were group activities. As can be seen, there is also a substantial difference in the number of activities reported per person, ranging from 2 to 10 . For the given sample, this is positively related to the reporting period. On average, however, 6.4 leisure activities were performed per person. More in-depth descriptive statistics covering all activities are given in the current section. Group activities are discussed in Section 3.2.

Table 3: Activities overview

| Variable | N | Min. | Mean | Median | Max. | SD | NA |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Number of participants | 34 |  |  |  |  |  |  |
| Reporting period (days per person) | 34 | 2 | 12.4 | 6 | 49 | 14 | 0 |
|  |  |  |  |  |  |  |  |
| Number of activities | 216 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Number of activities per person | 216 | 2 | 6.4 | 6 | 10 | 2.35 | 0 |
| Duration of activities (min) | 210 | 25 | 205 | 120 | 780 | 181 | 6 |
| Distance to activity from home (km) | 103 | 0.1 | 16.9 | 4.6 | 100.1 | 25 | 113 |
| Frequent activity (dummy) | 214 | 0 | 0.65 | 1 | 1 | 0.47 | 2 |
|  |  |  |  |  |  |  |  |
| Number of group activities | 137 |  |  |  |  |  |  |
| Group activity: group size | 135 | 2 | 14.8 | 4 | 300 | 35.9 | 2 |
| Group activity: people known | 133 | 2 | 7.1 | 3.5 | 50 | 9.68 | 4 |
| Group activity: reported people known | 124 | 2 | 3.4 | 2 | 8 | 2.28 | 13 |

Classifying leisure activities into different types/categories is a major task when analysing such data and turned out to be difficult in this survey since participants were not provided with pre-defined types when filling out the survey. Rather, it was an open text question and thus our task to classify all reported activities. For better comparability we followed BFS and ARE (2012) and classified the activities into the 4 most important types observed

[^1]in the MCMT 2010 ${ }^{3}$ It is important to mention other travel purposes besides leisure that the BFS and ARE $(2012,2017)$ list in their reports and that are generally used in transportation research: work, education, shopping and work-related trips. The difficulty of such a classification also comes from the fact that leisure activities are often combined with for example working trips and hence are well integrated into a typical activity chain during a day/week. However, Table 4 lists 4 most important types of leisure activities as a share of all leisure activities per day of the week. They represent more than $70 \%$ of all leisure trips and are thus a good set to focus on. Going to the restaurant ranks top and accounts for $22.2 \%$ of the total. Outdoor refers to non-sportive solitary activities as hiking, taking the dog out for a stroll and such alike. These make up for $20 \%$. Visits do not include going to the restaurant as a main objective to socialize, but do still account for $19 \%$ of all activities. Active sport might mostly correspond to what Kemperman et al. (2006) define as "institutionalized" social activities where the choice of time and location is fixed by an external entity. Those cover $11.5 \%$ of all activities.

Table 4: Activity shares per type (BFS and ARE, 2012)

|  | Day of week |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Activity type | Mon-Fri | Sat | Sun | Total |
| Restaurant | 24.8 | 20.7 | 13.5 | 22.2 |
| Outdoor | 19.2 | 17.2 | 26.0 | 20.0 |
| Visit | 17.7 | 21.5 | 22.4 | 19.2 |
| Active sport | 13.0 | 8.6 | 8.8 | 11.5 |
| Subtotal | 74.7 | 68.0 | 70.7 | 72.9 |
| Other | 25.3 | 32.0 | 29.3 | 27.1 |
| Total | 100 | 100 | 100 | 100 |

Fig. 2 displays the spatial distribution of the activities by type. We geo-referenced the locations of 191 activities, which corresponds to a share of $90 \%$ of all given by the respondents. Out of those, 161 were performed within the border of the Canton of Zurich. There is no clear pattern to observe regarding the type of activities that were conducted within or outside of that zone. However, most activities are spread around the clusters of home locations mentioned in Fig. (1.

In a first step after classification and geo-referencing, we calculated the shares of activity

[^2]Figure 2: Activity locations by type in the Canton of Zurich and Switzerland

types per weekday (see Fig. 3) in order to be able to compare them to the MCMT 2010 (BFS and ARE, 2012). Note that this figure summarises all activities for a time period of 3 months as mentioned in Section 2.2. On average, these 4 types of activities mentioned above represent about $60 \%$ of all leisure activities, which is about $10 \%$ less as compared with the MCMT 2010.

While the overall share seems to be reasonable, the distribution between the types shows a different picture for our sample. Active sport accounts for the largest share of all activities throughout the whole week, with the exception of Friday and Saturday, where more outdoor activities were done. It is clearly noticeable that people were doing more sports on Mondays than on any other day. In contrast to the MCMT 2010, going to the restaurant represents the smallest share of activities on all days besides Thursday and Friday. The figure also shows that outdoor activities tend to be more frequently performed on Fridays and the weekend. Fig. 4 provides more information in the form of a zoom-in on the activity type "other", which accounts for 79 out of 216 reported activities (37\%). There are a few observations worth mentioning: non-active sport was quite often reported by younger respondents due to the European Soccer Championships that had taken place in July 2018. Shopping activities (broadly defined) were performed slightly more frequent in the first half of the week when compared to the second one. Larger events like concerts, festivals, exhibitions and such alike account for a good third on the weekend. Last but not

Figure 3: Share of activity type per weekday

least, a major share on each day could still not be assigned to any of the types defined in Fig. 4.

Figure 4: Zoom-in on activity type "other" per weekday


Another way to investigate activities is to calculate the share of an activity type by class
of frequency (regularity) since we specifically asked the respondents if it was a frequent activity and if yes, how frequently it was (see questionnaire page 6 in Appendix A).

The essential question is: what is the definition of a frequent activity? How regularly is it performed? In the literature there is no clear definition. Is it a daily activity? Or several times a week/month? We left the decision to the participants and present an overview of the given responses in Table 5. There were 12 respondents out of 75 who specified a proposed class frequency even though we did only ask to do so if they thought it was frequent. Two participants did not answer the question and also specified a frequency. Interestingly, we can observe 139 respondents that stated "yes", it is a frequent activity. Approximately $75 \%$ of those specified that the activity is performed at least several times a month. This finding clearly shows that there is no clear line between a frequent and a non-frequent activity as it depends on the time period in focus and the subjective perception of the definition of a frequent activity.

Table 5: Activity frequency overview

| Frequency dummy | Specification | Count | Share (in \%) | Sum |
| :--- | :--- | :---: | :---: | :---: |
| NA | once a month | 2 | 100 | 2 |
| No | NA | 63 | 84 |  |
|  | less than once a month | 10 | 13.3 | 75 |
|  | once a week | 2 | 2.7 |  |
|  | NA | 1 | 0.7 |  |
|  | less than once a month | 19 | 13.7 |  |
|  | once a month | 13 | 9.4 |  |
|  | several times a month | 18 | 12.9 | 139 |
|  | once a week | 36 | 25.9 |  |
|  | several times a week | 43 | 30.9 |  |
|  | daily | 9 | 6.5 |  |

Nonetheless, it makes sense to examine the share of activity type by frequency as well to gain more insight into the above mentioned problem. Fig. 5 gives an overview of which activity types were performed regularly according to the classes defined in Table 5. It is obvious that outdoor activities account for almost $90 \%$ of all daily activities and active sport is the dominant type for activities done at least once a week. Furthermore, outdoor appears to be a noticeable activity type among all other classes of frequency, which might be due to the fact that it is quite broadly defined. Also, it seems intuitive that visits and going to the restaurant are less frequently carried out.

Another commonly used way to investigate activities is presented in Fig. 6. It shows the activity type by weekday and the distribution of its duration throughout a week and excludes 6 activities where no answer regarding the duration was given (covering $97 \%$ of all activities reported). Again, the time horizon is not bound to a specific week, but the figure rather summarizes activities for the whole time period of the study. The most obvious pattern observed is an increasing trend in duration of activities towards the weekend, which holds for all activity types with a few exemptions: the duration of visits on Mondays is substantially higher compared to other weekdays, excluding the weekend; the reported restaurant activities tend to last rather long (median values between 4 and 5 hours from Wednesday to Friday) which suggests that it was probably not only meant for having a meal. Other observations seem to make intuitively sense: sportive activities on the weekend have a substantially higher duration as opposed to those in a normal working week. The same holds for outdoor activities and visits. Activities assigned to "other" are clearly influenced by larger events on the weekend, as explained in Fig. 4, and are thus related to a longer duration on Saturday and Sunday.

Figure 5: Share of activity type by frequency


Figure 6: Activity type by weekday and duration


Further information can be gained from what is called an activity location chain. Since we asked the participants for every leisure activity they reported where they had been before and after it, we were able to classify and depict such chains in a graph (see Fig. 7). In general, we can see that most of the activities ( 98 or $45 \%$ ) correspond to the case where the respondents were at home before and after the activity. Second most activities (20\%) fall into the case where people were at work before and then went home after the activity. Even though we could not geo-reference most of the work location $\left\{^{4}\right.$, the set up of the survey and this question specifically (see Appendix A, survey page 6/11), allowed us to carry out this analysis.

Figure 7: Activity location chain


As opposed to work locations, we could geo-reference all activities and home locations of the respondents. It was therefore possible to examine the distance distribution to activities from home (which includes $48 \%$ of all activities). Fig. 8 presents the distribution density for activities where people were at home before. Apparently, the figure shows that most of the active sport activities happened within 10 km from home compared to other

[^3]types of activities, which seem to be spread out further more frequently. Interestingly, none of those are further away from home than 100 km , even though Fig. 2 shows that there were several activities happening in the French-speaking part of Switzerland (e.g. Geneva/Lausanne). These activities did not start at home according to the responses.

Figure 8: Distance to activity by type from home


### 3.2 Group activities

Since we are also interested in group activities, two entire pages of the survey were devoted for each one to examine the group size and composition, motivational and organisational patterns as well as the respondents influence on the decision regarding the location and time of it. 137 out of 216 activities ( $63 \%$ ) were declared as an activity where other people participated as well. As mentioned in Section 2.2, a big issue were incomplete responses and specifically, entire sheets missing about group activities. Nevertheless, we present some interesting insights in detail in this section.

We asked the respondents to report the size of the group in general, how many of them they know personally and if possible, specific details of up to 10 co-participants. Since the survey was filled out by hand, there were no restrictions on the numerical format for any of these questions. Fig. 9 summarizes the distribution of group sizes for all three questions using boxplots. It can be clearly seen that the group size (first row of plot) is influenced by outliers for all types of activities except sport. As already hinted above, there were larger events/activities reported that we classified as "other", and one particular activity as "going to the restaurant". Again, activity type "other" includes a wide spectrum of different activity types and hence also shows more outliers in terms of reported group size. Still, as shown in Table 6, this type is associated with the highest median value for group size. The table also shows that restaurant and outdoor activities exhibit the lowest median values.

Table 6: Group activities (median group size, excluding the respondent)

|  | other <br> $(\mathrm{N}=44)$ | outdoor <br> $(\mathrm{N}=32)$ | restaurant <br> $(\mathrm{N}=13)$ | sport <br> $(\mathrm{N}=31)$ | visit <br> $(\mathrm{N}=17)$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| group size | 7 | 2.5 | 2 | 4 | 4 |
| known people | 4 | 2.5 | 2 | 2 | 4 |
| reported known people | 4 | 2 | 2 | 2 | 3 |

Of course, the numbers get smaller once we have a look at how many co-participants the respondents personally know, labelled as "known people" (second row in plot) in Table 6 and Fig. 9. Again, there are some outliers depicted as dots in the second row in Fig. 9. The median values of personally known people for "other" and "sport" dropped and are half as large as compared to the group size, whereas the other types do not show a change. The third row shows the distribution of the number of reported known people by activity
type. The respondents tend to report more co-participants of "other" and "visit", which is consistent with the fact that such activities were mostly performed in larger groups as opposed to the other types "outdoor", "restaurant" and "sport". Nevertheless, sport activities show the biggest range of values (1st quartile - 3rd quartile) that is probably related to team sport activities that happen frequently.

Please note that we extrapolated NA-values (no answer) for group size and known people with responses from the number stated in "reported known people" if available.

Figure 9: Group activities comparison by size


Fig. 10 sheds light on group activities and the relationship between known people and activity duration faceted by type and frequency. In general, it is difficult to see any strong correlation or clustering pattern since the sample size is low and for many activities, responses regarding the frequency were missing. It is noteworthy though that with increasing duration, activities tend to involve slightly more people. This does not seem to hold for going to the restaurant. Also, this relationship appears to be emphasized for less frequently performed group activities.

Figure 10: Group activities by size, duration, frequency and type


To investigate the group composition we asked the respondents to report up to 10 coparticipants with detailed information whether they are part of the same household and how they are related to the respondent (6 categories): close family, relative, life partner, boy/girlfriend, friend and colleague. There is no clear distinction between some of the categories. Hence, it was possible to assign co-participants to more than one category since they are not mutually exclusive. Again, we left the decision/assignment up to the respondents. Some co-participants are thus counted more than once. Fig. 11 shows two sub-figures: Fig. 11a, which presents the share of household members as co-participants for each activity type, and Fig. 11b, resembling a more fine grained breakdown. The numbers on top of the stacked bars show how many persons are represented by activity type. Concerning Fig. 11a, we can observe the highest share of co-participants living in the same household as the respondent for outdoor activities (more than $25 \%$ ), while it is substantially lower for restaurant, sport and visits (values between 9 and 14\%).

Figure 11: Group activities: group composition by activity type

b) Detailed membership breakdown


Fig. 11b unsurprisingly reveals that co-participants living in the same household (right facet) are mostly reported as close family or life partner, which holds for all activity types. This finding makes sense as our sample is biased towards older cohorts compared to the MCMT 2015. The left facet of Fig. 11b presents the share of co-participants not living in the same household. It is evident that only for outdoor activities people considered as "close family" make up for a third, and together with relatives account for half of non-household members. In contrast, co-participants for restaurant, sport and visit activities are almost exclusively reported as boy/girlfriend, friend or colleague. Interestingly, even for this small sample size, relatives account for more than $20 \%$ of visit co-participants. Furthermore, sport and restaurant activities are mostly performed with colleagues and friends ( $93 \%$ and $90.3 \%$ ). Activity type "other" shows more evenly distributed shares which might be explained by the fact this class of type includes a wide range of sub-classes as mentioned before.

Figure 12: Group activities: group composition and frequency


An additional question regarding the group composition asked the respondents whether a group activity was performed in the same composition if it was a frequent activity. In Table 5 we highlighted that the definition of a frequent activity is subjective and depends on the respective time period. The respondents showed different response behaviour about that question, which now appears again. Fig. 12 gives an overview on whether the activity was reported as "frequently performed" or not (facets in the plot) and if it was
done within the same group composition. The bottom facet summarises answers from respondents that we expected since they declared the activity as being frequent, while the top one shows answers that should not have been given. From the bottom facet we can observe for all types but visit, to classify them frequent group activities are mostly performed in the same group composition (in red, shares between $68 \%$ and $100 \%$ ). For visit, it is half of frequent group activities. Furthermore, $33 \%$ of visits are reported as one-time activities. However, many respondents still answered the question even if they were not supposed to (see questionnaire in Appendix A). It comes as a surprise to see quite large shares of activities performed in the same group composition.

There is a large gap in the transport literature on leisure activities performed in groups when it comes to (joint) planning processes and peoples motivation to participate. To shed light on such issues we asked the respondents whether the group had discussed/planned the time and/or location before the activity. This might well be different for each activity type and its corresponding frequency. Fig. 13 presents a simple overview on the counts of the answers given for each type of activity and faceted by frequency. It is generally difficult to draw clear conclusions from this figure since we probably have too few observations/activities.

Figure 13: Group activities: joint planning by activity type and frequency


There are a couple of noticeable insights though: it seems that for most of the group activities, irrespective of the frequency, time and location were more frequently planned for (green dots); there is no pattern observable when neither of it was discussed (red dots). Interestingly, there are a couple of respondents who reported that only location had been discussed (blue dots) while nobody answered that only the time of the activity had been planned.

Fig. 14 shows two sub-figures using jittered scatter plots. The top one, Fig. 14a, depicts if the respondents were asked/motivated to participate and the bottom one, Fig. 14b, illustrates if they did ask/motivate other co-participants of the group. Two thirds of the respondents in Fig. 14a were not asked/motivated to participate (left facet) by other group members. Also, activity frequency does not seem to matter as observations are widely spread along all categories of frequency. Apparently, it is also difficult to see any cluster of observations in the right facet. The response behaviour is similar in Fig. 14b, showing no distinctive pattern.

A reason for that might related to the formulation of the question itself. There is a difference in asking someone to participate compared to motivate someone, which is probably more related to convince or persuade a co-participant. It would be natural to investigate who (from the group, or someone else outside) the person actually was that asked/motivated the respondent. We did offer the possibility to do so in the questionnaire, but too many responses were missing. There might as well be other factors than activity frequency and type that influence the reason for being asked/motivated to participate.

Figure 14: Group activities: motivation to participate

b) Did you ask/motivate others to participate?


## 4 Discussion

This working paper highlights the main difficulties of surveying leisure activities. We show that a one-week leisure activity diary filled out by hand demands much time and commitment of the respondents to get reliable data. First, and depending on the number of activities reported, the response burden score varies substantially for the respondents which directly influences the response rate. In our survey, almost $65 \%$ of all activities reported were performed in groups. In our set up this meant to fill in another two pages of the questionnaire for each activity, as mentioned in Section 2.1. Together with an incentive of 10 CHF this led to a very low participation rate of $7 \%$ ( 34 responses). This might be too low of a reward to participate. Second, the structure and form of the questionnaire as well as the results reveal a couple of limitations that need adjustment.

We structured the questionnaire into three parts:

1. Socio-demographic information of the participants
2. General details for each activity: data, start and end time, location, type, regularity.
3. Specified details for each group activity, such as: size, composition, regularity, motivation, decision process.

In general, the first part was well filled out. The goal was not to get a representative sample in the first place since it was a pre-test, but rather to reveal how well the questions in part 2 and 3 about the activities work. Nevertheless, it is important to gather such information in order to be able to weight respondents according to the Swiss Microcensus Mobility and Transport 2015 for studies with a bigger sample size, and hence to derive results that hold for the Swiss population. Clearly, the weighting would be important and relevant for the corresponding leisure travelling modelling that is usually done in a next step, because activities define the purpose of a trip and affect peoples mode choice.

Section 3.1 discussed general results of all activities, neglecting whether they were performed alone or in groups. The respondents reported 216 activities within 3 months. On average, each person reported 6.4 activities over a period of 12.4 days (median for both: 6). It is difficult to validate these numbers since we only asked for leisure activities, but existing literature suggests that paper based surveys generally under report such numbers due to memory gaps. However, despite the rise of recent technology based methods, traditional surveys are generally still being used to investigate social networks because of the underlying complexity. The results showed in Section 3.1 seem reasonable overall, but depend heavily on the classification of leisure activities into well defined categories/types.

We followed the approach of BFS and ARE (2012) and used 4 main types of activities: restaurant, outdoor, visit and active sport. All remaining descriptions of activities were assigned to "other". This particular task was done manually and therefore a lot of work. That kind of work scales with the number of reported activities and it would take a huge effort to classify them for larger studies. We suggest to incorporate a question with pre-defined types in order for the participants to assign the activity to one of those themselves. Moreover, a couple of selected sub categories in "other" should be provided as well. However, such a classification then depends on non-combined activities. Many of the reported activities had to be split into two beforehand to be able to classify them properly. Paper based surveys need proper and time consuming data cleaning in order to get reliable data. In recent years, online based surveys got a lot of attention in many fields of research (e.g. Qualtrics, LimeSurvey, SoSci). If well formatted, they actually help a lot to improve data quality substantially. Of course, they do not guarantee better response rates for sure, but they put clear indication/rules on which questions are required or forced to be filled out. Also, it is possible to geo-reference locations on the fly using built in Google Maps for example, which is a big advantage over paper based solutions and would have simplified the analysis of activity location chains. On the contrary, online diaries in any form are difficult to implement for a smooth survey experience. However, paper based solutions still work to investigate leisure activities, but are associated with a couple of restrictions mentioned above.

Section 3.2 specifically focused on activities performed in groups. We asked about the group size in general and how many people they knew from that group. We were interested in the group composition and asked the participants to report up to 10 co-participants with specific details on the relationship to them. The respondents seem to experience a couple of problems with such questions. First, there was a big difference noticeable in the group size in particular for activity type "other". This category accounts for a large variety of activities such as big concerts, exhibitions and so forth and thus differentiates by definition from the 4 main categories we used to classify activities. The group size number of known people were similar between all types though and show a reasonable pattern. The same holds for number of people the respondents actually reported for the group composition. Second, the issue with the question concerning the group composition specifically was that there were many missing answers and very few people were willing to give that information. Although, even with few responses we got interesting and reasonable insights into which co-participants are from the same household or not, broken down by activity type. An online based survey solution could guide the respondents better in that respect. Our results also show that frequently performed group activities tend to happen in the same group composition and that time and location were usually
discussed before the activity, regardless of the frequency. Nevertheless, it would probably help and improve the analysis to know more about the respondents and their membership of associations/clubs on top of what we integrated in the questionnaire now. This could be added in the first part. Last but not least, the biggest challenge was to examine whether respondents were asked/motivated to participate by others (inside or outside the group) and whether they did ask/motivate someone else. We tried to see if the activity frequency or type would affect their motivation to participate, but we could only observe that more were motivated than they actually motivated others. It might well be that this issue is related to how we formulated the question, as we did not distinguish between asking/being asked to participate and motivating/being motivated to do so. We should have probably asked for a reason about why that was or was not the case to find out more about motivational patterns. We conclude that it remains quite difficult to examine leisure (group) activities and their joint planning process, mostly because it is a complex phenomena to survey, but also difficult as a respondent to recall specific details about it.

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## A Exemplary Questionnaire

## Befragung zum Mobilitätsverhalten der Bevölkerung

## ETH

Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich

## Vielen Dank für Ihre Teilnahme!

Der Fragebogen besteht aus zwei Teilen: Der erste Teil enthält allgemeine Fragen zu Ihrer Person, Ihrer Persönlichkeit, den Ihnen zur Verfügung stehenden Mobilitätswerkzeugen und zu Ihrem Haushalt. Der zweite Teil besteht aus einem einwöchigen Aktivitätstagebuch für Freizeitaktivitäten ausser Haus und Detailfragen zu Freizeitaktivitäten, die in Gruppen vorgenommen wurden.

## Allgemeiner Teil

Füllen Sie bitte zunächst den allgemeinen Fragebogen aus. In diesem Teil geht es um allgemeine Angaben zu Ihrer Person, Ihrem Haushalt und den verfügbaren Mobilitätswerkzeugen.


Besitzen Sie eines der folgenden ÖV-Abonennte?

$\square$ General-Abo 2. Klasse
$\square$ ZVV Verbund-Abo
Halbtax-AboStrecken-AboAnderes Abo (Juniorkarte, Inter-Abo, Enkelkarte, etc.)

Welchen Mobilfunkanbieter nutzen Sie?

| $\square$ | Swisscom | $\square$ Sunrise |
| :--- | :--- | :--- |
| $\square$ Salt | $\square$ UPC-Cablecom |  |
| $\square$ Migros-Budget Mobile | $\square$ Coop Mobile |  |
| $\square$ Mucho | $\square$ Wingo Mobile |  |
| $\square$ Lycamobile | $\square$ Einen anderen |  |

Können Sie uns sagen, wie hoch ungefähr das monatliche Bruttoeinkommen Ihres ganzen Haushalts ist?
(beinhaltet: Erwerbseinkommen, Kapitalerträge,
Mieteinnahmen, Renten, AHV, IV, Arbeitslosenunterstützung, Sozialhilfe etc.)

Diese Angabe ist für die statistische Auswertung sehr wichtig. Wie alle anderen Angaben wird auch sie streng vertraulich behandelt. Vielen Dank!
$\square$ Unter 2'000 CHF
$\square$ Zwischen 2'000 und 4'000 CHFZwischen 4'001 und 6'000 CHF
$\square$ Zwischen 6'001 und 8'000 CHF
$\square$ Zwischen 8'001 und 10'000 CHF
$\square$ Zwischen 10'001 und 12'000 CHFZwischen 12'001 und 14'000 CHFZwischen $14^{\prime} 001$ und 16'000 CHF
$\square$ Höher als 16 '000 CHF

Wie viele Personen leben in Ihrem Haushalt - Sie selbst eingeschlossen?

Erwachsene
Kinder (6-11 Jahre)

Wie würden Sie den Haushalt beschreiben, in dem Sie leben? Ist es ein...?
EinpersonenhaushaltEinelternhaushalt mit Kind(ern)
Paar ohne Kind
anderer Haushaltstyp
(Wohngemeinschaft)

Kleinkinder (unter 6 Jahren)
Jugendliche (12-17 Jahre)
$\square$ Paar mit Kind(ern)

$\qquad$

## Persönlichkeit

Wir möchten Ihnen nun ein paar Fragen zu Ihrer Persönlichkeit stellen. Diese Angaben werden erfasst, da die Wahl der Freizeitaktivitäten mit der Persönlichkeit einer Person zusammenhängt.


## Aktivitätstagebuch

Um die Vergleichbarkeit der Resultate zu gewährleisten möchten wir Sie bitten, das Aktivitätstagebuch am nächstmöglichen Montag zu beginnen und bis zum darauffolgenden Sonntag fortzusetzten.

## Anleitung zum Ausfüllen des Aktivitätstagebuch

## Aktivitätsblatt

Das Aktivitätsblatt dient zur Angabe der Freizeitaktivitäten, die ausser Haus stattgefunden haben. Beginnen Sie für jede Aktivität ein neues Blatt. Ein mögliches Beispiel finden Sie am Ende des Fragebogens.

1. Tragen Sie für jede Aktivität das Datum, die Startzeit und die Endzeit ein. Falls Sie sich nicht an die exakte Zeit erinnern, schätzen Sie so gut sie können.
2. Beschreiben Sie die Aktivität, z.B. „Zoobesuch", „Freund treffen", etc.
3. Geben Sie den Ort der Aktivität an, z.B. „Zoo Zürich, Zürichbergstrasse 221".
4. Die weiteren Angaben dienen zur genaueren Beschreibung der Aktivität.
5. Falls andere Personen an der Aktivität beteiligt waren, füllen Sie zusätzlich ein Gruppenblatt aus.

## Gruppenblatt

Das Gruppenblatt dient zur genaueren Beschreibung von Gruppenaktivitäten. Auch dafür finden Sie ein Beispiel am Ende des Fragebogens.

1. Übertragen Sie die Nummer des Aktivitätsblatts in die Kopfzeile.
2. Geben Sie die Anzahl beteiligten Personen an (Sie eingeschlossen) und beschreiben sie die Gruppe so gut wie möglich.
3. Geben Sie die bekannten beteiligten Personen an. Anwesende Personen, die Sie nicht kannten, müssen nicht angegeben werden. Sie können auch Fantasienamen für die Personen verwenden.
4. Hier geht es um Kosten, die für die Gruppe als gesamtes angefallen sind.



| Gruppenblatt für Aktivitätnr. | (2/2) |
| :---: | :---: |
| Wurden Sie von einer anderen beteiligten Person angefragt/motivi an der Aktivität teilzunehmen? Ja Nein |  |
| Haben Sie eine andere Person angefragt/motiviert an der Aktivität teilzunehmen? |  |
| Wurden der Ort und die Zeit der Aktivität vorher in der Gruppe abgesprochen?Ja, Ort und Zeit Ja, aber nur die Zeit Ja, aber nur der OrtNein |  |
| Auf einer Skala von 1 bis 5 , wie würden Sie Ihren Einfluss auf die Entscheidung hinsichtlich des Orts und der Zeit einschätzen? |  |
| Falls es sich um eine regelmässige Aktivität handelt: Findet diese im Allgemeinen in derselben Gruppenzusammensetzung statt? |  |

EHHzürich





[^0]:    ${ }^{1}$ The questionnaire is attached in Appendix A

[^1]:    ${ }^{2}$ The first activity was reported on May 13, 2018. The last one was on August 18, 2018.

[^2]:    ${ }^{3}$ Note that this analysis was not provided in the MCMT 2015.

[^3]:    ${ }^{4}$ Besides the home locations, the respondents could also report their working location, but too few of them actually did.

