
Analysing Swiss longitudinal travel data

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Abstract

Transport planning and its methods are dominated by the tradition to collect one-day cross sectional travel behaviour data. Despite successful multi-day travel surveys abroad there is no recent longitudinal survey conducted in Switzerland so far. Consequently, there is data missing to answer those questions like:

- How do people mix the different travel modes ?
- Which complex coordination mechanisms are allocating tasks and activities within the household ?
- How large are daily activity spaces of different groups ?
- How stable is the travel behaviour over time?

This data gap was overcome by a recent SVI-project called “Study of the stability of travel behaviour”. In autumn and winter 2003, 99 households were asked about their travel behaviour for 6 weeks. The paper describes the survey itself in terms of purpose and contents. Moreover it shows first analysis results and gives an outlook of research potential since the data offers not only opportunities to analyse the temporal and spatial structures of individual travel behaviour but also the mechanisms of activity planning and scheduling within a household.

Keywords

Travel behaviour – stability – longitudinal survey – 6-week-travel-diary – Thurgau

1. Background

It is common practice worldwide to conduct cross-sectional travel surveys to gain input data for transport analysis and modelling. With few exceptions, the standard period of reporting is one-day based on the assumption that the travel behaviour of a representative day of a traveller is monitored. As in other countries, this approach is the same in Switzerland where the national travel survey (Mikrozensus Verkehr) has been for long a standard one-day survey (for an historical overview see Simma, 2003).

In order to make transport models more sensitive to policies such as new parking fee schedules, road pricing and further measures of information and pricing, it seems necessary to expand current modelling practise as such policies have impacts on behaviour beyond a single day. Therefore, a widening of the temporal horizon of planning and forecasting models in particular is wishful. This consequently raises the issue of how policy changes interact with underlying rhythms of daily life (Axhausen, Zimmermann, Schönfelder, Rindsfuser and Haupt 2002). To face this challenge, it is crucial to collect panel data of persons over longer time periods of at least several days. Moreover, the requirement of longitudinal data is driven by the movement of transport modelling towards activity-based approaches (Widmer and Axhausen 2001).

Because of the high costs and the big reporting burden for the respondents of individual panel surveys, there are only few such datasets available so far. Recent availability of GPS-based tracking and the increased interest in agent-based modelling of traffic flow and travel demand are about to change this shortcoming, but those datasets usually don't cover all transport modes and generally lack the comprehensiveness transport modelling requires. Only few multi-week travel diary surveys including all trip purposes and transport modes have been conducted up to now of which the most prominent are the Uppsala Household Travel Survey (1971) and Mobidrive (1999/2000) (Marble, Hanson and Hanson, 1972; Axhausen, Zimmermann, Schönfelder, Rindsfuser and Haupt 2002). Particularly, the German Mobidrive project has shown that it is possible to motivate people to participate in travel diary surveys over a time span of several weeks. Mobidrive, which was funded by the German ministry of Research and Education, was conducted in the two fairly large German cities Halle and Karlsruhe.

2. Study overview

In order to expand the national data base for analysis and modelling, it was decided to conduct a longitudinal travel survey in Switzerland as well. In contrast to Mobidrive, the study area was chosen to be within the rural Canton of Thurgau. Beyond collecting Swiss data as such, it opens up the opportunity to draw comparisons with the German Mobidrive data from more urban areas.

The aim of the project was the study of the rhythms of daily and the patterns of space use and innovation on the basis of a long duration survey. The study was conducted in autumn and winter 2003. The research was supported by a grant of the Swiss Department for Environment, Transport, Energy and Telecommunications and was administered and initiated by the Swiss Association of Transport Engineers (SVI). The tender was won by the IVT, ETH Zürich in collaboration with the Büro Widmer, Frauenfeld, which was in charge of the fieldwork.

The survey mainly replicates and improves on the 6-week Mobidrive survey (Axhausen, Zimmermann, Schönfelder, Rindsfuser and Haupt, 2002). The scope and protocol of the Mobidrive survey was maintained in principle, but slightly adjusted to reflect recent experiences and new interests. As mentioned, the major difference was the choice of a small town and its rural hinterland for the recruitment of the respondents.

A total of 99 households with 230 members were recruited in the City of Frauenfeld (20.000 inhabitants) and in the countryside with small villages north of Frauenfeld between Thur and Bodensee/Rhine. Only households with children older than 10 years were recruited. Every household member was asked to fill out a travel diary for every single day for a time span of consecutive 6 weeks.

The protocol involved an announcement letter to randomly chosen persons in the study area. Quotas were set for single households, couple households and families. The aim was to have one third shares for each group. The incentives were 80, 120 and 150 sFr, depending on the size of the household. An effort was made to include commuters, defined as persons not working in their residential municipality, but no explicit quota was set (see Table 1 and 2). The quotas were not met exactly, but within an acceptable band. The share of households with commuters is substantial, but – as expected –, higher in the rural villages outside the Cantonal capital of Frauenfeld.

Table 1 Number of participating households by type and area

Household type	Area		Total
	Frauenfeld	Seerücken	
Singles	18	15	33
Couples	19	16	35
Families	11	20	31
Total	48	51	99

Table 2 Number of participating households by presence of commuters and area

Household type	Area		Total
	Frauenfeld	Seerücken	
Commuter present	21	39	60
No commuter present	27	12	39
Total	48	51	99

If the respondents agreed to participate in the survey during a telephone recruitment interview, they were visited by a member of the fieldwork staff. An usually one-hour lasting interview was conducted which covered questions on the socio-demographics of the household and its members, the moving history of the respondents and the locations of their friends and relatives. Besides, the diary instrument was explained in detail and the first weekly form was handed over together with a pre-paid return envelope. The respondents received a new diary form before each of the following five weeks. They were asked to return the diaries at the end of the week, which allowed the fieldwork staff to check the diary and to clarify any errors, omissions and questions briefly after the event. The respondents received a letter asking them for their account details in week 5, which reminded them of the promised incentive.

A share of 16 percent of those contacted and eligible returned all their weekly forms. A small number of households, which had been recruited towards the end of the survey period (August to December 2003), are counted as complete, although they were given the permission to not return the forms covering the Christmas and New Year weeks. This share is comparable to those observed in other longitudinal surveys such as the Mobidrive and the SVI 12-week leisure study (Schlich, Simma and Axhausen, 2003).

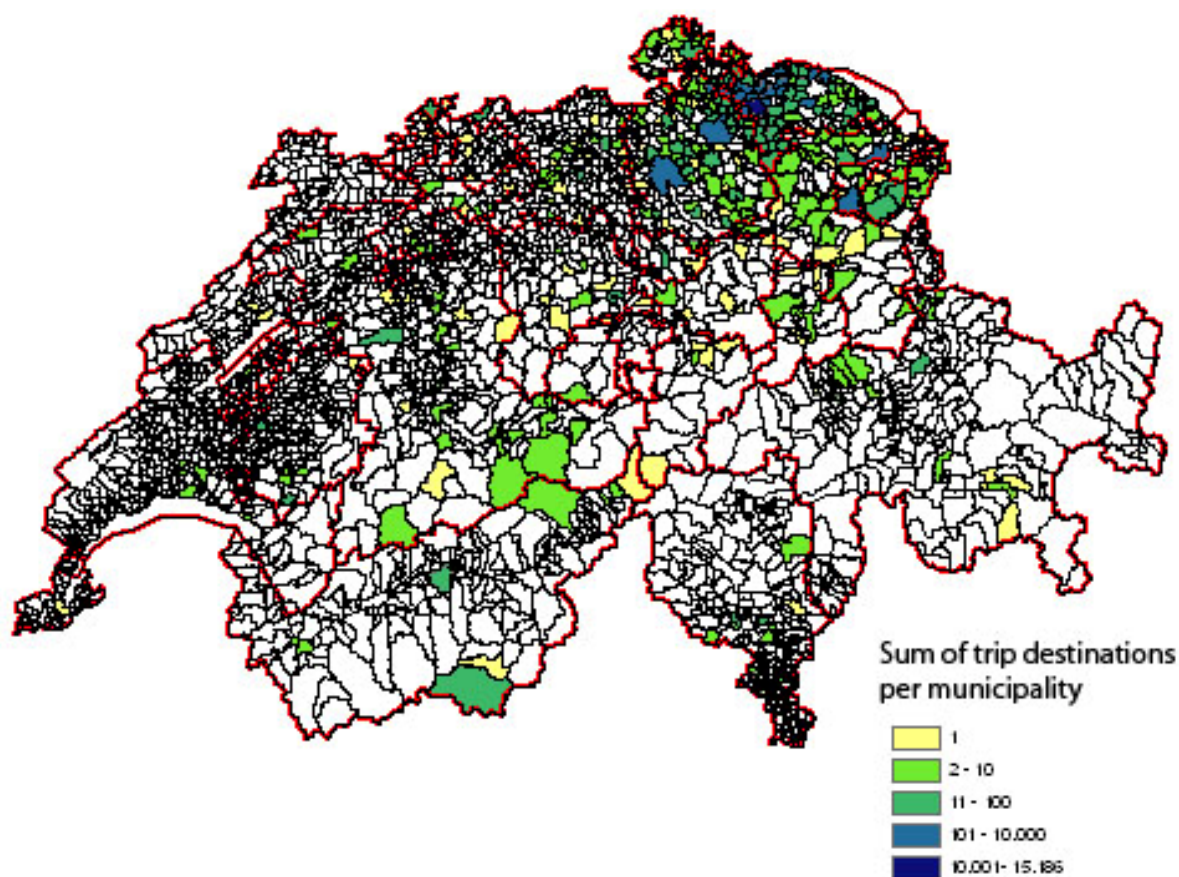
For every reported trip, the respondents were asked to state trip details including the exact street address. The data was coded on return and the field worker eventually called back to

clarify any omissions, particularly omitted or unclear addresses. Address information quality was a clear priority for everyone involved in the survey.

Consequently, the majority of destination addresses and household locations could be geocoded with high precision so that finally 36'454 of the 36'783 trips could be connected with geographical coordinates (Machguth and Löchl, 2004).

Trip destinations are concentrated in Canton Thurgau and the adjacent cantons as well as in the neighbouring regions in Germany. In addition, there were also trips to Austria, France, and Slovenia reported. Destinations abroad were coded to street block level in Germany and to municipality level (centre point) elsewhere.

Figure 1 Sum of trip destinations per municipality¹



¹ for municipalities within Switzerland

By using those geocoded trip destinations, mode and route choice alternatives have been generated (Machguth, Löchl, Bürgle 2004). Therefore, for every trip, up to 25 alternative public transport connections (from the 5 closest transit stops at trip origin and destination while considering the access path) and two car routes (fastest and shortest path) have been considered.

3. Analysis of selectivity and weighting scheme

To place the survey sample into the context of the local population, who had denied to participate, the refusing persons were asked to answer a small set of questions about their household. A total of 212 persons did answer these questions for their household, 49 of which answered for household which were in one way or another not eligible for participation in the survey. Therefore the information about 262 households can be used for a selectivity analysis. Using the binary logistic procedure of SPSS 12.0 a logit model was estimated using the log-likelihood ratio test forward entry method to identify the relevant variables. The Expectation Maximisation method was used to impute any missing value on that short interview, employing all available variables. The fit of the model is good identifying 84% of the household correctly with a ρ^2 of 0.44.

In contrast to the Mobidrive experience, there is a number of variables, which did influence participation in the 2003 Thurgau survey. Income, number of public transport season tickets and number of employed increased participation significantly, while licence ownership and household size (number of household members) decreased it. Household location, tenure, and the number of children in the household had no significant impact.

Table 3 Results of the selectivity analysis (Base: Households completing the interview for non-participating households; excluding non-eligible households)

Household variable	Parameter	Significance level
Income [k SFr]	0.22	0.00
Number of season tickets	0.82	0.00
Number of driving licence holders	-1.99	0.00
Number of employed	1.20	0.00
Household size	-0.35	0.05
Constant	-1.57	0.00
N	262	
ρ^2	0.44	

In order to be able to compare the Thurgau 2003 survey results with the most recent Swiss national travel survey (Mikrozensus 2000), the data had to be weighted. Therefore, some of the significant variables of the selectivity analysis, were taken into account. Household size, driver licence ownership and household income characteristics of the respondents were considered and compared with corresponding national travel survey data for Thurgau. For household income, the values had to be imputed for 30 out of the 230 respondents, since they

were missing in the original dataset of Thurgau 2003. Again, the Expectation Maximisation method in SPSS was used for this imputation task.

The resulting weighting values are shown in Table 4. The values particularly reflect the fact that people with low household income are underrepresented in the Thurgau 2003 dataset.

Table 4 Weighting scheme by person

Household type	Drivers license ownership	Household income		
		≤ 4000 CHF	4001-10000 CHF	> 10000 CHF
Single	Yes	0.965	0.532	0.089
Not single	Yes	6.211	1.310	0.454
Single	No	5.324	2.396	.
Not single	No	10.116	0.831	0.169

As an example, Table 5 shows the impact of the weighting on income. By using the weighting scheme, income distribution has been considerably adjusted to the national travel survey data for Thurgau, although it isn't exactly the same.

Table 5 Household gross income of respondents [%]

Household gross income	Thurgau 2003 ¹		Mikrozensus 2000	
	unweighted	weighted	Switzerland	Thurgau
< 2000 CHF	0.4	0.4	3.9	2.3
2001 - 4000 CHF	5.2	17.8	19.0	19.6
4001 - 10000 CHF	75.7	72.0	62.0	65.6
> 10000 CHF	28.7	9.8	15.0	12.5

¹ including imputed data

4. Descriptive analysis of the data

The following table gives some basic information about the data collected. Overall, the dataset provides information about 230 people in 99 households which have reported about 10'000 person days. While respondents living in Frauenfeld have shown a higher trip frequency, the trip length is longer in the rural area of the Seerücken area, as one might expect. Nevertheless, this does not show any significant impact on average trip duration, which probably is due to higher speeds on rural streets.

Table 6 Key data of the dataset by study area

	Area		
	Frauenfeld	Seerücken	Total
Amount of respondents	99	131	230
Amount of households	48	51	99
Amount of person days	4158	5502	9660
Trip frequency/day ¹	4.40	4.28	4.34
Trip frequency/day	4.23	4.00	4.10
Average. trip length ² in km	9.53	11.14	10.41
Average trip duration ³ in min	19.90	18.97	19.40

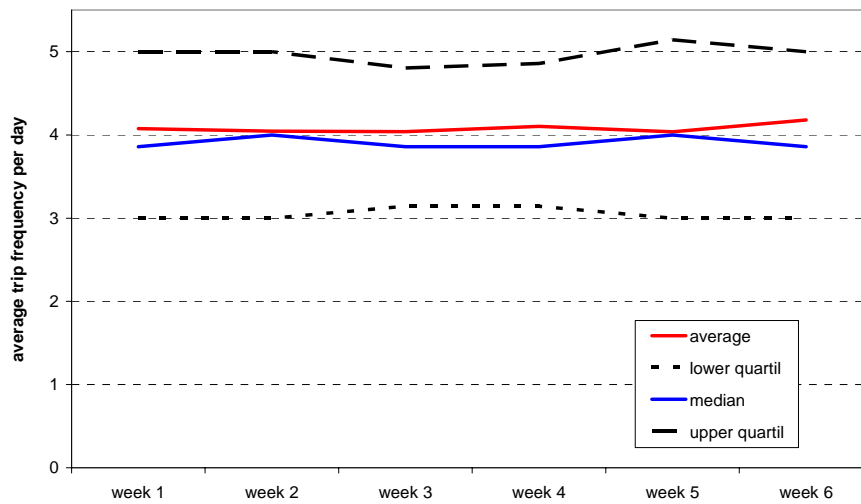
¹ only mobile days

² shortest path (calculated by routing program)

³ reported

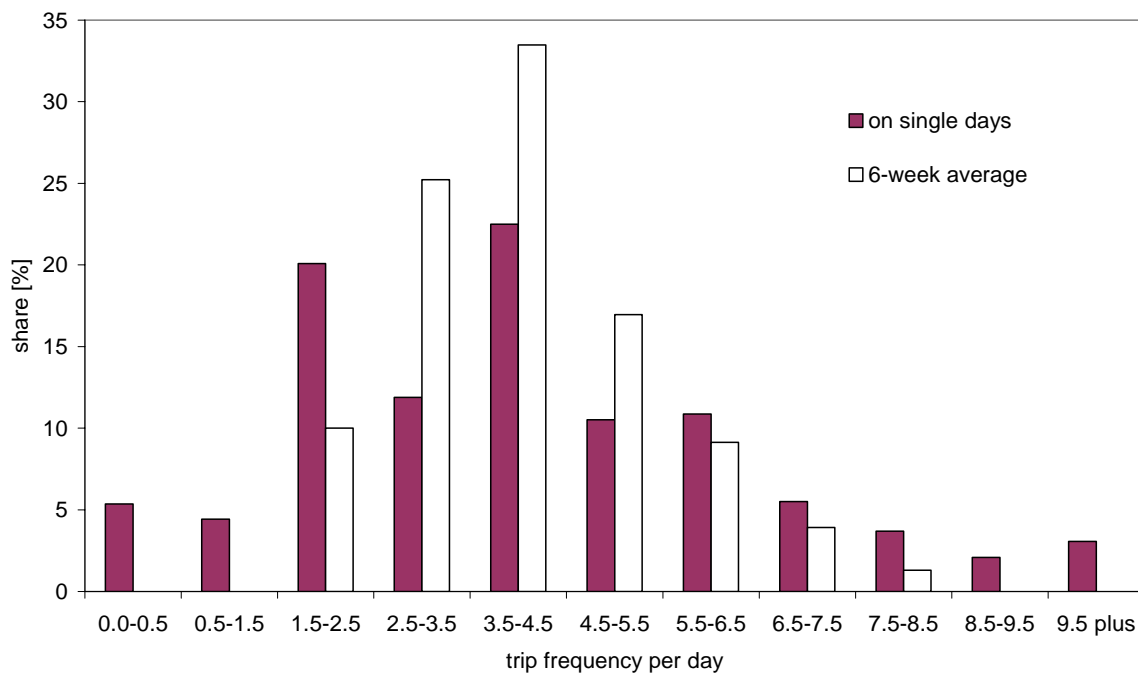
One could suppose that people are getting used to travel diaries within a reporting period of 6 weeks and don't forget to report rather shorter trips which respondents of short cross-sectional travel surveys might neglect. Nevertheless, the weighted trip frequency of 3.9 trip/day is exactly the same as in the national travel data from Thurgau, where people seems to be more mobile compare to the Swiss average, as the national average has been 3.6 trips/day. An analysis over the reporting period shows neither an increase of reported trips nor any signs of fatigue as shown in Figure 2. Therefore, the respondents reported an almost constant amount of trips over the reporting period. Consequently, one might say that fatigue is not an issue in well-conducted long-duration diaries.

Figure 2 Average daily trip frequency over 6 weeks



A comparison of the trip frequency of a person on single days in comparison to its overall trip frequency within 6 weeks shows a left bias of the daily perspective. Therefore, on the majority of days people are doing trips below their own average. This example shows the differences between aggregated data and analysis at the individual level.

Figure 3 Trips per day by person and average trip frequency per day by person over 6 weeks



Based on the weighting scheme, the data can be compared to the Swiss national travel survey Mikrozensus 2000. Since mobility tool ownership influences mobility heavily, this has to be considered. There are no major differences in terms of car ownership/availability also differences in the definition needs to be considered as the national travel survey doesn't distinguish ownership but availability of a car. However, differences are obvious in terms of public transport. Both GA and Halbtax-ownership is considerably higher in the Thurgau 2003 data. In contrary, the local public transport season ticket ownership is lower.

Table 7 Mobility tool ownership [%]

	Thurgau 2003		Mikrozensus 2000	
	unweighed	unweighed	Switzerland	Thurgau
Car ownership [%] ¹	54.8	57.0	53.0	55.4
GA ownership [%]	14.3	14.8	6.2	6.2
Public transport pass [%] ²	2.6	1.3	21.2	10.5
Halbtax ownership [%]	38.7	38.7	6.1	3.2

¹ Swiss Mikrozensus 2000: The answer „car always available“ is considered as car ownership

² Thurgau 2003: route pass ("Streckenabo"), annual or monthly pass ("Jahres- oder Monatskarte") for train/bus or city bus ("Stadtbus")

Overall, differences in the modal split between the longitudinal and the national travel survey data are minor. The only divergence can be found for walking, where the share is considerably lower. The slightly higher public transport share can be explained with the high public transport mobility tool ownership. Concerning trip length, there are differences noticeable for public transport. In the longitudinal data, public transport has been used for longer trips than it has been reported in the national travel survey. In a contrary, the duration of public transport trips are considerably lower than the corresponding data of the national travel survey. Therefore, mostly public transport with high average speeds such as trains must have been used in the reporting period.

Table 8 Comparison of key mobility figures [%]

category	Thurgau 2003		Mikrozensus 2000	
	unweighted	weighted	Switzerland	Thurgau
Share of all trips [%]				
motorized	56.5	58.6	53.1	57.3
public transport	8.6	7.4	11.2	5.0
bicycle	15.1	13.5	7.3	12.7
walking	18.6	19.2	27.2	23.2
other	1.1	1.2	1.1	1.7
Average trip length [km] ¹				
motorized	11.8	11.4	11.1	10.7
public transport	31.7	29.5	16.0	20.8
bicycle	2.3	2.4	1.7	2.1
walking	1.4	1.3	0.5	0.5
other	10.6	11.6	2.7	1.9
all modes	10.4	9.8	8.0	7.6
Average trip duration [min]				
motorized	17	16	24	21
public transport	53	51	59	90
bicycle	13	13	18	14
walking	17	18	21	22
other	20	23	40	32
all modes	19	19	27	25

¹ Thurgau 2003: shortest path route

An analysis of trip length by mean of transport reveals that a large proportion of the private transport trips are short. Almost 30 percent are up to 2.5 kilometre, even 47.4 percent up to 5 kilometres. Those distances can be covered by non-motorized transport means. Consequently, there seems to be a high potential for non-motorized travel.

Table 9 Distribution of trip lengths¹ by main mode [%]

Distance in km	Private transport	Public transport	Slow transport	Other	All
Up to 2.5 km	29.3	18.4	85.2	59.0	45.8
2.5 to 5 km	17.1	5.1	7.2	13.7	13.1
5 bis 10 km	19.0	11.9	6.3	9.1	14.5
10 to 100 km	33.9	60.2	1.2	15.1	25.8
More than 100 km	0.7	5.3	0.1	1.0	1.0
Share of all trips	58.6	8.8	31.5	1.1	100.0

¹ shortest path (calculated by routing program)

In the survey, people were not only asked for trip characteristics but also for the duration of the following activity which opens further analysis opportunities for activity modelling.

Table 10 Activity duration by previously used transport mode (without home trips, in percent)

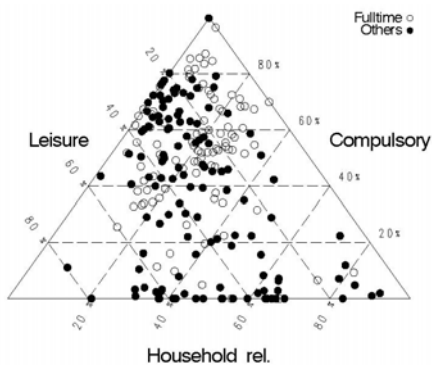
	up to 1 h	1-3 h	3-10 h	>10 h	mean (min)	std. (min)
Train	16	18	55	11	344	412
Bus	28	28	37	7	246	433
Motor bike	25	23	48	4	217	197
Car driver	48	22	25	5	216	274
Walking	44	21	24	11	216	330
Car non-driver	37	36	22	5	197	675
Bicycle	34	30	32	4	172	207
Other	53	26	18	3	130	245

In cross-sectional one-day surveys, it is possible to compare travel behaviour of different people on different days at an aggregated level. Nevertheless, variability at an individual level can't be observed because it is unknown if differences are due to slight behaviour changes of the majority or major changes of few respondents. With longitudinal data it is possible to analyse such behavioural variability. In Figure 4, the distribution of main trip purposes and main mode choices can be seen. Every dot resp. circle shows the individual combination of a single respondent by employment status. However, in areas of high density of entities, there are overlaps so that some of the dots are covered by others and not all can be seen. There are differences as well as similarities observable in the individual behaviour between weekdays and weekends. Similarities can be found in terms of household activities as they seem to be

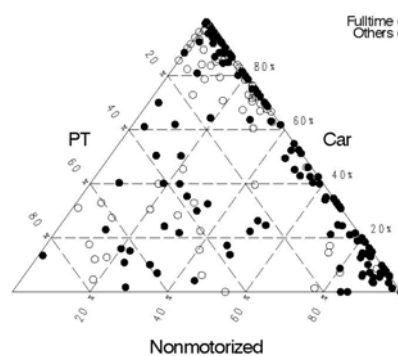
almost evenly distributed all days of the week. In a contrary, the shares of compulsory trips such as work or school sharply decrease while the share of leisure trips increase on the weekend, as one might expect. In terms of mode choice, the shares of public transport and non-motorized modes considerably decrease, although many are still using public transport on the weekend. Nevertheless, a higher share is using mostly the car on Saturdays and Sundays.

Figure 4 Individual combination of trip purposes¹ and mode choices² on weekdays and weekends for full-time employees and others

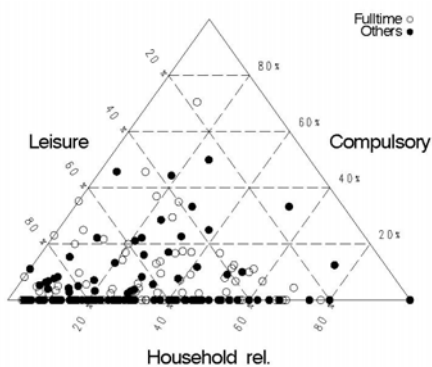
Trip purpose weekday



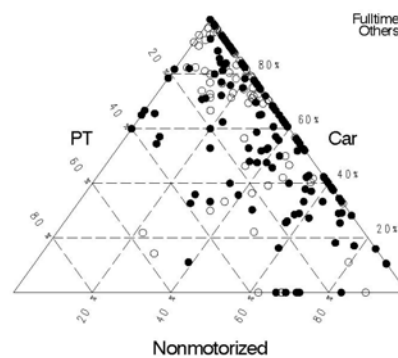
Mode choice weekday



Trip purpose weekend



Mode choice weekend



¹ trip purposes:

Household: shopping, private business, pick up/drop off s.o.

Compulsory: education/school, work, business

Leisure: leisure

² mean of transport:

Public transport (PT): bus, tram, train

Private transport (Car): moped, motor bike, car driver or passenger

Non-motorized: walking, bicycle

4.1 New variables

As mentioned, the study adopted the protocol of the earlier Mobidrive study, but it did adapt the contents in some areas. The design of the weekly diary was left unchanged, while the Mobidrive questions about trip and activity expenditures were exchanged and a question about the size of the party were modified (see Figure 5). The new or adapted questions are:

- How often have you visited this location before (Never, one to three times, more often) ?
- When did you plan this activity (One or more days in advance, during the day of execution, spontaneous, Routine/returning home) ?
- How many people travelled with you (number of household members, others, dog) ?
- How large was the group of people with which you performed the activity (number of household members, others, dog) ?

The second question arises from an interest in behavioural innovation (Schönfelder and Axhausen, 2004). In the earlier surveys it had been possible to determine, if a location was new to the observer, but not if it was new to the respondent. This question filled the gap and created no reporting problems for the respondents. The third question was adapted from the work on activity scheduling, as pioneered by Doherty and Miller (2000). Jointly with the second new question, it gives more insight into the stability of travel behaviour. While many surveys in the past have asked about the travel group size, fewer have divided it by household and non-household members. Time budget diaries tend to query the presence of others only qualitatively. Given the importance of the social element of travel, leisure travel in particular, this double question fills a gap, as it reveals both the group size while travelling and while performing the activity. It reveals the number of the persons met.

Surprising is the importance of activities planned substantially in advance for locations never visited before (Table 11). The odds are three-times higher than for the other two relevant categories. The share of never-before visited locations is quite substantial with 4%, about one absolutely new location per week. Routine and long-planned activities dominate, while spontaneous activities make up 10% of the total. This figure is difficult to compare as other surveys asking the question chose different categorisations.

Figure 5 Column from the travel diary

- Day of week (tick circles for each day)
- Departure time (military time)
- Purpose
 - Dropping off or picking up, private business, work related business, school or training, work (at work place), shopping (grocery/daily or longer term goods)
 - Leisure (please specify)
 - Other (please specify)
 - Return home
- Mode, indicating the minutes spent travelling with each
 - Walking, bicycling, motorcycle, car as driver, car as passenger, local public transport, heavy rail, other
 - Distance walked from the stop or parking space
- Exact street address of destination
- Frequency of visit
 - Never before
 - Once to three times
 - More often
- Number of people travelling with respondents/joining them during the activity
 - Household members
 - Other persons
 - Household dog
- Time since the activity was planned
 - One or more days in advance
 - During the course of the day
 - Spontaneous/right now
 - Routine/return home
- Arrival time (military time)
- Distance travelled (km and meters)

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<input type="text"/> Andere Personen	<input type="text"/>																																	
<input type="radio"/> Hund	<input type="radio"/>																																	
<input type="radio"/> Ein oder mehrere Tage vorher <input type="radio"/> Im Laufe des Tages <input type="radio"/> Spontan/gerade eben <input type="radio"/> Routine/nach Hause						PLANUNG																												
<input type="text"/> Anknft (Uhrzeit)						ZEIT/DISTANZ																												
<input type="text"/> km <input type="text"/> m						ZEIT/DISTANZ																												

Table 11 Share of trips by timing of the planning and the frequency of previous visits to the visited location (row percentages)

Frequency of visit to this location	When planned				Routine/Return home	Share of trips
	One or more days in advance	During the day	Just now			
Never before	60.8%	16.7%	22.5%	.	4.1%	
1-3 times	53.2%	23.0%	23.8%	.	6.4%	
More often	14.3%	8.6%	9.7%	67.5%	89.5%	
Share of trips	18.7%	9.8%	11.1%	60.4%	100%	

There seems to be pervasive lift giving in this sample of trips, but the bulk is associated with trips returning home, where the group seems to dissolve, mainly because the diary does not ask about in-home activities in particular (Table 12). Still, the data highlights the importance of meeting others for an activity, with whom the respondent had not travelled before.

Table 12 Share of trips by number of persons travelling along and participating the ensuing activity (Row percentages)

Persons travelling along	Persons participating in the ensuing activity						Share of trips
	None	One	Two	Three	Four	Five plus	
None	89.8%	4.1%	1.6%	1.5%	.8%	2.2%	61.2%
One	38.6%	52.7%	2.5%	2.2%	1.0%	3.1%	24.5%
Two	40.9%	4.0%	45.9%	2.6%	1.6%	5.0%	6.9%
Three	39.7%	2.1%	1.5%	46.9%	1.4%	8.4%	3.7%
Four	45.4%	1.7%	1.9%	3.8%	38.8%	8.4%	1.4%
Five plus	36.9%	2.7%	.8%	2.8%	2.3%	54.5%	2.3%
Share of trips	70.2%	15.8%	4.9%	3.5%	1.5%	4.1%	100%

While daily travel is rather routinised, travellers do add new locations to their choice set regularly (Table 13). When it comes to innovation by activity type, leisure travel obviously contributes significantly to the amount of new locations discovered over time. On average, about the half of all previously never or only seldom visited locations are leisure places. Similar results could already be found in the SVI Leisure study (Schlich, Simma and Axhausen, 2004). This highlights the dominant role of leisure in variety seeking but also the special challenge for transport modelling for related leisure travel.

Table 13 Frequency of visit of trip destination per day [trips per day]

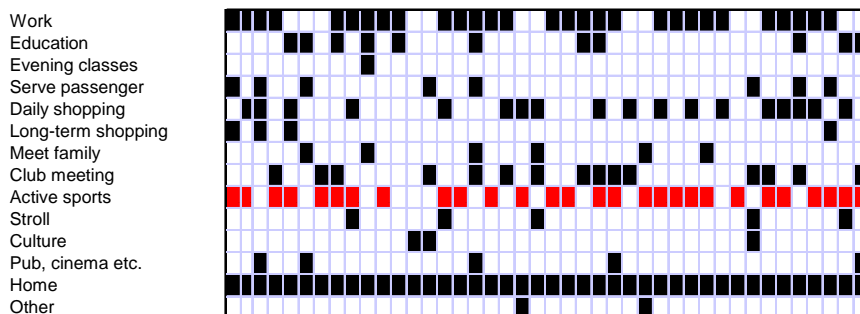
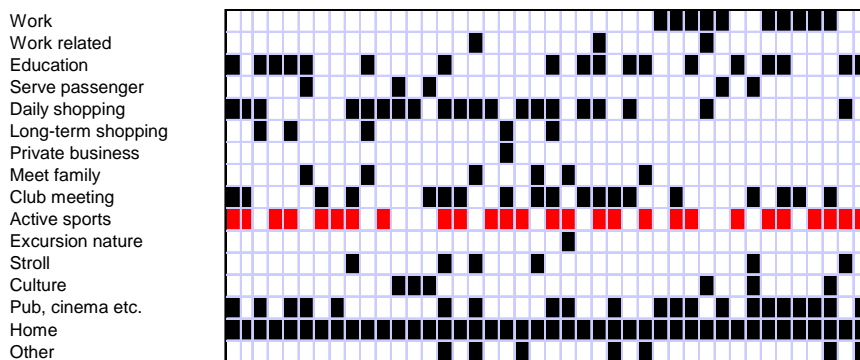
Activity	Have you been there before ?			Total
	Never before	1 to 3 times	More	
Leisure	0.106	0.139	0.746	0.991
Business	0.020	0.035	0.139	0.194
Services	0.018	0.040	0.137	0.195
Pick up/ drop off	0.010	0.018	0.123	0.151
Shopping (long-term)	0.007	0.019	0.084	0.110
Shopping (short-term)	0.005	0.013	0.220	0.238
Other	0.004	0.004	0.011	0.019
Education	0.003	0.003	0.277	0.283
Work	0.002	0.004	0.415	0.421
Home	0.000	0.000	1.555	1.555
Total	0.175	0.275	3.707	4.157

5. Rhythms of activity demand

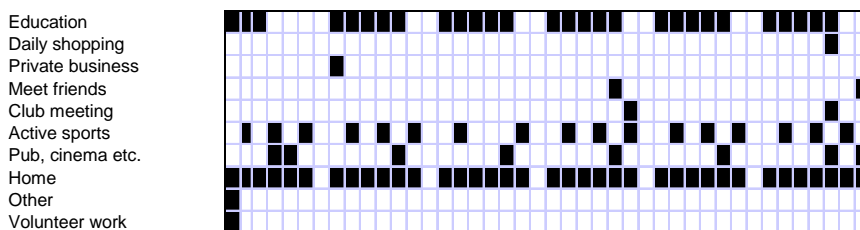
Figure 6 shows the activity patterns of three respondents of the Thurgau survey over a time span of 42 days. Every black marked small box indicates that the left listed activity has been executed at least once per reported day.

Figure 6 Examples of activity demand

2-person-household. Above: men, 37, „houseman“; Below: woman, 35, employed:



pupil, 17:



Clearly visible are periodical patterns for obligatory but also of supposed less-binding activity types as active sports and on the other hand sporadic or rather flexible demand for activities with less priority or fewer constraints (i.e. accompanying or meeting friends). Moreover, it can be shown that there are common activities within a household, which increases the requirements for deeper analysis and modelling of travel behaviour (see also literature on household activity scheduling, i.e. Doherty und Miller, 2000).

A first insight into long-term activity demand shows the share of interval length between same activities for the same person (Table 14). Many activities are done twice or even more often per day (interval length = 0). Moreover, there are activities which do not show any specific pattern as for shopping activities where daily to two day rhythms are observable but with some flexibility. Otherwise, leisure activities such as club meetings and active sport have to a large extent weekly intervals.

Table 14 Share of interval lengths between two same activities of one person (whole sample, unweighted) [%]¹

Activity	N	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Daily shopping	2033	14	14	10	7	5	3	3	4	1	1	0	0	0	0	1
Long-term shopping	993	18	6	5	4	4	3	3	4	1	2	1	1	1	1	1
Private business	2024	23	20	11	7	4	3	3	3	1	1	1	0	0	1	1
Club meeting	845	7	8	8	6	4	4	3	8	1	0	1	0	0	0	1
Active sports	1144	9	12	8	6	5	2	2	7	1	1	1	0	0	0	1
Family meeting	1211	14	12	6	5	3	3	3	3	1	1	1	1	1	1	1
Friends meeting	522	16	7	2	3	2	2	2	2	1	1	1	1	1	1	1
Walk	1189	20	21	6	3	3	2	2	3	1	1	0	0	1	0	1
Going out	1584	16	16	6	5	3	2	3	3	1	1	1	1	1	0	0
Trip into nature	720	29	13	5	2	2	2	2	3	1	0	0	1	1	0	0

¹ longer intervals (>14) and missing values are not shown, therefore sum doesn't necessarily equal to 100

6. Conclusions and outlook

A new long-duration travel survey has been conducted in Switzerland, which was described in this paper. The 2003 Thurgau data followed the protocol of the 1999 Mobdrive study, but developed the set of questions further. These new questions concerned both the social context of the respondents, but also trip related items, such as planning horizon of the activity, previous frequency of visit or the the groups involved in the trip or activity.

Alike Mobdrive, the Thurgau data is revealing a big portion of regularity in daily life travel which supports the common one-day survey approach. But it also shows the complexity of daily life with the interaction between periodicity and variability which eventually has contributed to the difficulties which transport planning has to face and the partial failure of several transport policy strategies in the past.

The descriptive analysis of the data showed that respondent fatigue is not an issue in the survey. In an average, the reported trip frequency over the whole period of reporting is stable and very similar to those reported in the national travel survey. Moreover, temporal differences of travel behaviour have been revealed.

Besides, the availability of the fully geocoded Thurgau dataset allows a wide variety of further analyses. Choice models can be estimated to highlight mode and destination choice, both at the level of the trip and of the tour (see Cirillo and Axhausen, 2004 or Cirillo, Koppelman and Axhausen, 2004 for a possible approach). More importantly, the dataset allows to investigate aspects, which are not visible in one or two-day diaries:

- the rhythms of activity participation by type and location,
- the interactions between household members of time,
- the size and structure of activity spaces.

Finally, the data could be used to calibrate activity scheduling models, as information about the planning horizons are available.

From a planning and policy point of view, longitudinal data add to the empirical base for transport related decision making. The analysis of such data will contribute to represent better the interrelationships between the travel environment, activity scheduling and execution. This finally will improve the knowledge about the necessary measures to change routines which are possible obstacles of an efficient and sustainable transport system. Such measures comprise target oriented instruments for mobility and space which explicitly consider persons' daily life routines. As examples, one could refer to the improvement of local or

residentially based infrastructure for shopping and leisure or more user sensitive offers in public transport especially for the growing volume of leisure travel.

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