



The impact of car-free housing districts on mobility behaviour – case study

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Abstract

The model district Freiburg-Vauban is one of the first low-car housing projects in Germany. Within the project "Optimisation of the Traffic Concept of the District Freiburg-Vauban during Implementation" sponsored by the German Federal Foundation for Environment, an evaluation of the traffic concept was carried out.¹ The results show the influence of car-ownership on the mobility behaviour of people and the changes of mobility behaviour that took place after the residents relinquished use of their cars. This paper reports on the traffic concept implemented in the district as well as the positive effects for the district that could be reached by reducing the number of cars.

1 Introduction

The enormous increase in motorization in the last decades coupled with the still ongoing growth of passenger volume and the proportion of motorised modes of transport have caused severe transport problems in urban areas. Many urban districts are burdened with congestion, traffic noise, pollution and space constraints for motorised individual traffic. The advantages of urban life such as good shopping facilities and a broad cultural offering are often overshadowed by the disadvantages of decreasing quality of life caused by previous long term car-orientated transport planning. As a result, many people move to the periphery of cities and reinforce splinter development. Because of the lower level of public transport at the rural-urban interface, the dependency on car use is much higher. As a consequence, transport problems in cities increase, leading to a vicious circle.

¹ Project partners are the Forum Vauban e.V. and the Eco Institute e.V., Freiburg.

The solution to urban traffic problems is therefore one of the most important tasks of sustainable urban development. In the context of promoting a sustainable use of transport modes and of reducing the number, length and need for motorised vehicle trips, car-free projects play an important role. As there is a close link between car ownership and car usage, the mobility behaviour of people living in car owning households is usually highly dependent on the availability of a car. This makes it difficult to convince people to use alternative means of transport, as these measures have to overcome car-oriented habits and practices to be successful. Contrary to other concepts such as *the city of short distances*, *the mix of land use*, and *modal shift*, car-free projects get to the root of the problem as they focus on the very ownership of cars, thereby triggering long-term changes to one of the factors that determines mobility behaviour.

2 The car-reduced district Vauban

In 1992, when the French army pulled out of their military base Vauban, the city of Freiburg in Southern Germany had the unique opportunity of using the attractively located 38 hectare area for city development. The idea was to create a new city district providing 2.000 apartments for approximately 5.000 people. As the town planning process was characterised by extensive integration of ecological and social aspects, a high standard of sustainability could be reached: Vauban is, for example, one of the largest passive-housing areas in Germany. The energy is provided by an efficient co-generation plant run on natural gas. A system for the filtration of rainwater ensures that almost 100% of the rainwater remains within the district. Amongst the social aspects are the far-reaching citizen participation during the planning and construction phases of the district. Last, but not least, a new traffic concept has been developed in order to reduce the number of cars and the volume of motorised traffic within the district. Housing construction started in 1998 and by now a large part of the area is populated. The development of the district will be finished by 2006.

2.1 Good general conditions for car-reduced housing areas

The Vauban district offers good general conditions for the implementation of a car-reduced traffic concept, in that the creation of a city of short distances has become reality. Most of the daily needs of its inhabitants can be satisfied within the quarter itself or in its near surroundings. The infrastructure of the district includes a variety of shopping facilities, green areas within the district, a recreation area just outside the district, as well as nurseries, a primary school and a neighbourhood centre with a large number of social and cultural offerings. In addition, downtown Freiburg and its main line station can be reached by bus or by bike within 10 to 15 minutes. By 2006, when Vauban is connected to the tram and possibly to the suburban train line, it will be optimally integrated into the public transportation system.

2.2 The Vauban traffic concept

The Vauban district is one of the biggest car-reduced projects in Germany. The goal of the traffic concept is not to create a small, car-free enclave, but rather to reduce the use of cars in the entire district to the benefit of all inhabitants. The result is the combination of two forms that are not usually integrated into one concept: "parking-free" and "car-free" living. For large parts of the residential area, the Vauban development plan prohibits the building of parking space on private property. Instead, private cars are parked in a communal car park located at the periphery of the residential area ("parking-free" living). Cars are only allowed to enter the residential area for pick-up and delivery. The speed limit on the district's main road is 30 km/h, in the residential area cars should not drive faster than "walking speed" (5 km/h).

Residents without cars are exempted from the financing of the communal car park. Car-free households thus save the substantial cost of a parking space. The same is true for development companies who build "car-free" apartments for rent. The "car-free" households are not forced to subsidise the communal car ensuring the fair distribution of costs.

Since the building regulations of Baden-Württemberg require car-free households to prove that they do not need a car and also require them to reserve space for parking that may be required in the future, a formal, legal regulation of car-free living was necessary. To confirm that no car is needed, the households have to sign a 'car-free declaration' which has to be renewed annually. Since householders are not permitted to build the parking space on their own property, they cannot reserve any parking space on their own ground. For this reason the "Verein für autofreies Wohnen" (association for car-free living) was founded. The association bought a property at the periphery of the residential area which could be turned into a parking area if needed and each car-free household enters into a contract with the car-free association. At present the space is used for barbecues and sporting activities.

Up to now approximately 400 households have decided to live in Vauban without a private car. This corresponds to more than 40% of all households in that part of the residential area, in which parking space on own property is not allowed. [1, 2]

3 Field study: Evaluation of Freiburg-Vauban's traffic concept

3.1 Research methodology

The survey took place in the form of written interviews. Two questionnaires were developed: a household questionnaire to be filled out by one person in the household and a main questionnaire to be filled out by all adult persons i.e. those aged 18 or more. The objective of the household questionnaire was to gain information about sociodemographic data of all household members and their access to the various transportation modes. The main questionnaire dealt with the topics: current mobility behaviour, the change of mobility behaviour since moving into the district, and satisfaction with the traffic concept. In addition, the residents

were able to make proposals for the improvement of the current traffic situation in Vauban.

In order to gain information about the specific situation of the households, the questionnaire contained two special parts marked in different colours. One part was directed at people living without a car in Vauban, the other part contained questions for people who owned a car and used the communal car park.

The survey took place in May 2002. 247 household questionnaires and 438 main questionnaires were returned and could be taken into account for the analysis. The number of questionnaires answered, 32% of the total population of the district, was regarded as highly satisfactory.

3.2 Results of the survey

In this chapter the most important results concerning the availability of means of transport, the mobility behaviour, and answers to the specific questions for car-free and car-owning households are presented. To begin with, the specific social structure of the district will be discussed. As there is also a small part of the district where conventional parking on private lots is allowed, the results of the survey have to be assessed carefully. The basis for the results that are presented in the following are in general only the respondents who are living in the parking-free zone of Vauban. Only in the case of the results pertaining to social structure and car-ownership are all respondents who have answered the questionnaire taken into account.

3.2.1 Social structure of the district

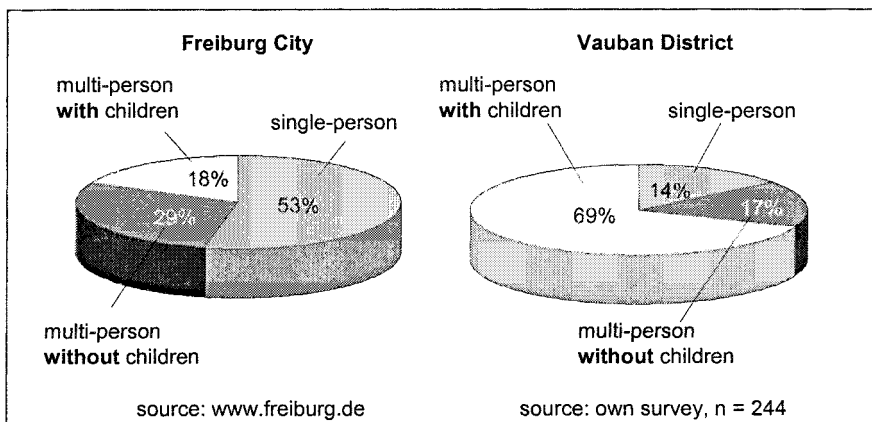


Figure 1: Distribution of Household Types in Freiburg and in the Vauban district

Compared to Freiburg as a whole, the average age of the inhabitants of Vauban is lower, there is an appreciably higher proportion of multi-person households, and a larger proportion of children. In Vauban the multi-person household with children predominates, and single-person households are seldom found. In the city as a

whole, the situation is quite the opposite: single-person households are the rule, and the majority of the multi-person households are without children.

The age-distribution in Vauban also differs appreciably from that of Freiburg. It displays two peaks; people of up to 15 years old and people aged between 25 and 45. Compared to the whole of the city these two groups are particularly well represented.

These statistics show clearly that Vauban is predominantly populated by young families whose special needs must be taken into account by the development of the mobility concept and the provision of transport facilities.

3.2.2 Availability of transport

The access to public transport and the availability of season tickets and travel cards for local, regional and long-distance transport show the importance attached to the use of the integrated transport system (public transport, pedestrians and cyclists) for the mobility of the people who live in Vauban. Two aspects stand out: the large number of people who own a Railway Travel Card² and the large proportion of people in the district who are members of a car-sharing organisation. According to the German Mobility Panel (Deutsches Mobilitätspanel)³ every 10th native speaker in Germany aged 10 or more owns a Railway Travel Card (BahnCard). Amongst the people surveyed in Vauban the figure is over 50% i.e. over half the inhabitants are Railway Travel Card users. The age distribution in Vauban is not an important factor here, since the proportion of Travel Card users is much higher than usual for all age groups.

Car-sharing shows a similar effect. In 39% of the households surveyed one or more persons are members of a car-sharing organisation. If individual people are considered, we see that 33% of all over 18 year olds surveyed belong to such organisations. Bearing in mind that, nation-wide, only 55.000 people [3] take part in car-sharing, we see that such an accumulation in one district is absolutely exceptional.

An examination of the results under the aspect of car-ownership shows that both factors (travel cards and car-sharing) are particularly marked in car-free households. 11% of the people in car-owning households take part in car-sharing. This value is still very high in comparison with the national average – only 0,1% of all German drivers participate in car-sharing⁴. Compared to people who live in car-free households this figure is very low. The percentage of persons in car-free households who belong to car-sharing organisations is much higher and reaches 59% for this group.

² At the time the survey was carried out the old conditions for travel cards were still valid i.e. a discount of 50% on all train journeys was granted. The conditions for travel cards were altered radically in December 2002.

³ The German Mobility Panel refers to an investigation of mobility habits carried out annually by the Traffic Institute of the University of Karlsruhe (Institut für Verkehrswesen, Universität Karlsruhe) in conjunction with Infratest.

⁴ Calculated based on figures found in [3] and [4].

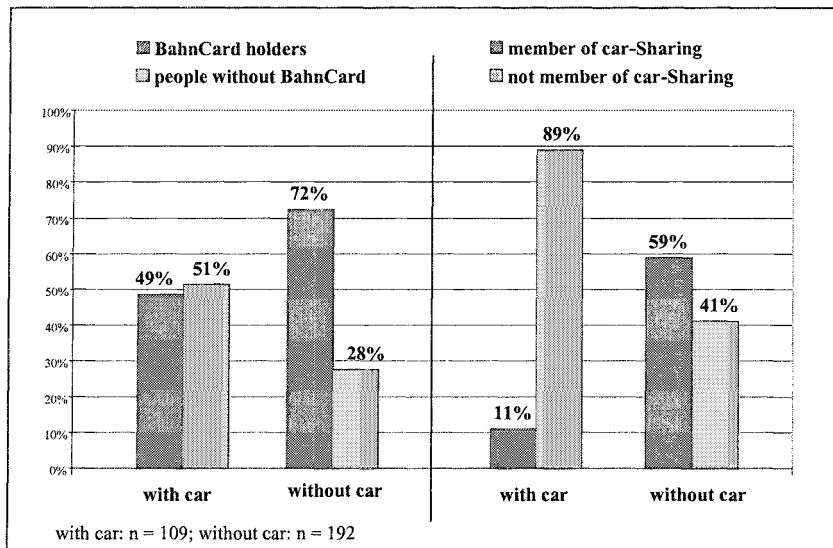


Figure 2: The proportion of BahnCard holders and membership in a car-sharing organisation in relation to car-ownership

The concept of car- and parking-free housing must obviously exert an influence on the frequency of car ownership. In this respect, it is, above all, interesting to observe the extent to which the density of cars can be reduced by such a concept, and to determine whether this reduction is mainly a result of car-free households.

In Freiburg as a whole, the density of car ownership is 427 cars per 1000 inhabitants. This varies greatly in the different districts. In the outlying districts the figure can exceed 500 per 1000. In the city centre some district show a much lower value (300 per 1000). The profile of inhabitants in Freiburg-Riesfeld is in many ways comparable with that of Vauban since it is also a development area with a high proportion of multi-person households and – though less than in Vauban – of children. It lies further from the city centre than Vauban, but had, from the very beginning, better connections to public transport: a tram route was already available when the first people moved in whereas Vauban will not have such a service before 2006. The car density in Riesfeld is 270 cars per 1000 inhabitants. [5]

For Vauban the statistics are as follows: For all households in the survey (both with and without cars) the density is 150 cars per 1000 inhabitants. If we look only at the car-owning households, the figure is 240 per 1000. Even though this figure does not include any car-free households, the figure is still much less than that for Riesfeld. The lower density of cars in Vauban is mainly, but not exclusively, a result of the car-free households. The overall statistic shows that with the traffic concept applied in Vauban the car density could be reduced to half of the lowest density (approximately 300 cars per 1000) previously found in any other district.

3.2.3 Mobility behaviour

The main reasons why people travel are: to go shopping; for leisure activities; to go to work or to a place of education. These three reasons make up 80% of all journeys taken by the inhabitants of Freiburg. [6] The mobility behaviour of Vauban's inhabitants was therefore investigated under the three aspects shopping, leisure, and work or education. The questions asked dealt with the place involved, the frequency of movement and the means of transport involved.

Vauban can be regarded as a cycling stronghold. Compared to the Freiburg average, people in Vauban use their bicycles to cover a much greater distance. This is true for people who live in car-owning households and is even more pronounced for those who live in car-free households.

Commuter traffic is the major field for bicycles. People who live in car-owning households use their bicycles for 61% of the journeys to and from work. For people who live in car-free households the proportion is even higher at 91%. In Freiburg cycles are only used for 34% of the journeys to and from work.

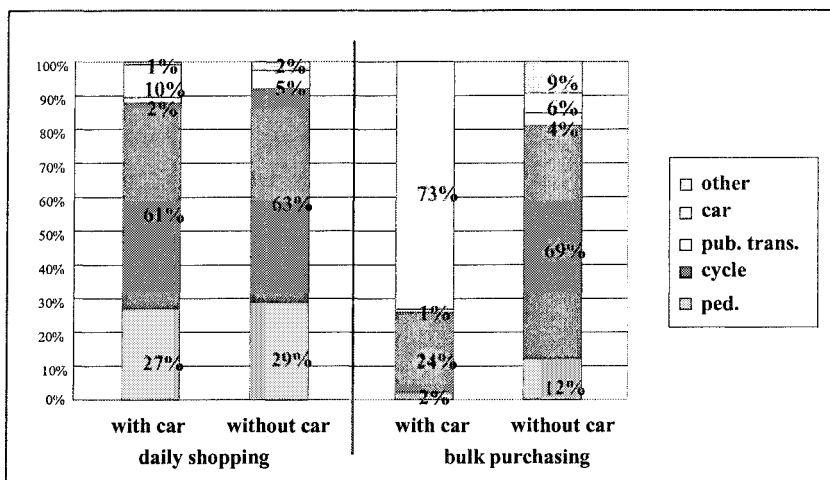


Figure 3: Types of transport used for shopping – parking-free households with and without a motor car

Shopping habits, and the associated means of transport were split into "daily shopping" (e.g. for perishable food) and "bulk purchasing". As far as shopping for articles of daily use is concerned, there is almost no difference between the habits of those in car-owning and car-free households. With 53% and 54% both groups favour the local shopping facilities in Vauban. For bulk purchases the preference is quite different. The car-free households still mostly shop locally, in the majority of cases with their bicycles but also on foot. For car-owners, the hypermarket in the industrial area predominates and the local shops in Vauban are of lesser importance. As a result there is a great difference in the means of transport used. Where three quarters of the people in car-owning households state that they use

their cars for bulk purchases, the bicycle is the main means of transport for the car-free households, and cars (through car-sharing) only make up 6%.

Studies of leisure activities have shown that eight of these are the most important ones, and these eight were examined in order to investigate people's leisure activities. As was the case with their commuting and shopping activities, people were asked about the frequency and place of their activities, and which means of transport they used. On the basis of their responses it was possible to calculate a modal split which revealed differences between people from car-owning households and those from car-free households. As figure 4 shows, the transport used by people from car-owning households is very similar to that of the "average Freiburger". However, this group of Vauban inhabitants use their bicycles more frequently while public transport is scarcely used (this is also the case when they commute or go shopping). They use their motor cars more or less to the same extent as the average Freiburger. For people from car-free households the segment for individual car use is almost completely absent and its place is taken over by the bicycle. Car-free households use public transport much more frequently than car owners but less than the average Freiburger.

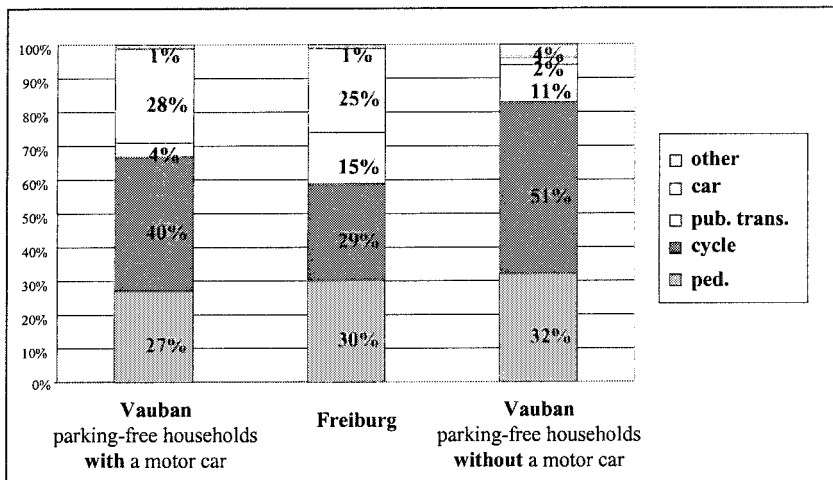


Figure 4: Modal split for leisure activities – Freiburg and parking-free households with and without a motor car

The results show clearly that car-ownership strongly influences people's mobility habits. The inhabitants of car-free households are by no means people who have been without a car for a long time and adjusted to the use of the integrated transport system. 81% of those in car-free households previously owned a car or had the regular use of one. Most of them had not long been without a car. 57% did not get rid of their cars until they moved into Vauban, another 16% had given up their cars within the last 5 years. Almost three quarters of people in car-free households do not have long-term experience of car-free living.

The survey shows that a large number of car-free inhabitants altered their mobility habits after they moved into Vauban: 70% of those without cars stated that they use car-sharing more often than before and make less frequent use of a car. In this group, the role of the bicycle, of buses, trams and taxis has increased, even though most of those in this group state that they use public transport no more frequently than before.

Changes can also be seen in the mobility habits of car owners. The proportion who stated that they use their bicycle more frequently is, with 41%, even higher than for the inhabitants of car-free households. The use of buses and trams has also increased slightly. As far as cars are concerned, those who use their car more often are balanced out by those who use their car less often. Most people stated that the frequency of car use had not changed since they moved into Vauban.

On the whole people who live in car-free households are satisfied with their mobility. On a scale of 1 to 5, 81% replied that they find organising their everyday living without their own motor car easy or very easy. About two thirds also stated that situations do arise in which they miss having their own car, but, for half of the people, this does not happen very often. Of the six possible reasons for missing a car, the most common one was "for excursions, short journeys and holidays". The ability to "just go and drive somewhere when I feel like it" was the second most common reason.

People in car-owning households are, in comparison, much less satisfied. In particular, the obligation to leave their car in the communal car park is still a major problem. 67% replied that it frequently bothers them not being able to park their car in front of their own house. Only 12% have no problem with this. The original idea of the project was to ease the everyday mobility problems of car-free households. The investigation has shown that car-owning households are more likely to have problems, and improvements should be aimed at this group. It also showed that car-free households have hardly any problems with their everyday mobility but that problems with leisure activities, even though they seldom arise, must be alleviated.

4 Conclusion

The investigation demonstrates that low-car projects are an effective way to reduce the number of vehicle trips, and to promote or to stabilise long-term mobility behaviour based on sustainable modes of transport. The fact that most of the car-free households owned a car before they moved into the district, proves that these kind of projects are attractive not only for households which are already car-free. Even though the residents of Vauban mainly belong to the group of young families which usually owns one or more cars, nearly half of the households decided to dispose of their cars. The results of the survey show that they are highly satisfied with their mobility and with the benefits of a car-free environment.

The current discussion in town planning and transportation research is characterised by two different positions. The one side believes in the possibility of exerting influence on mobility behaviour with town planning and traffic concepts such as the *city of short distances*, the *mix of land use* and e.g. *modal shift*. The

other side is convinced that the increasing expansion of space used for activities due to lifestyle changes exerts a greater influence on people's behaviour than town planning measures. The results of the investigation in Vauban demonstrate that the influence of town planning measures should not be underestimated.

Even though the experiences of Freiburg-Vauban cannot easily be transferred to other cities, the case study proves that it is well worth applying new mobility concepts like car-free living. Whether any single project will be a success depends not only on the traffic concept, but also on a whole variety of reasons such as prices, town-planning concept, attractiveness of the area, connection to public transport, image of the area and others. Market studies carried out in several German cities and the experience of Freiburg show that there is a demand for car-free housing areas, not only by car-free but also by car-owning households. This result, together with the positive aspects of the projects so far implemented, should encourage both politicians and those in charge of public administration to carry out these kinds of projects in their own communities, since car-ownership is still the best starting point for encouraging sustainable mobility behaviour.

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