

The Effect of Increasing Motorization - Traffic Policy in the Future United Europe

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Good morning,
ladies and gentlemen,

I am Hermann Knoflacher and I am teaching traffic planning and engineering at the University of Vienna. I have been teaching this subject for seventeen years. During this time I have come to the conclusion that it is necessary to change the whole concept of the field. I was educated to teach the students how to optimize the life of machines in the traffic system. I changed this proposition a little bit - how to optimize the life of the man. So today I am teaching traffic planning for man.

This provoked harsh reaction on the part of the public and lobbies. The result is that at the beginning of next year another institute will be established which will teach the contradiction of what I am saying.

Before going on to the main point of today's speech I just want to mention the difference between NGOs and GOs. The difference basically is that NGOs use for demonstrations people and GOs use for demonstrations machines.

Well, anyway, let us turn to the main issue I am supposed to talk about today and that is the effect of increasing motorization and the traffic policy in the future of the "United Europe". And if we are trying to talk about these two matters we have to understand what we are talking about. First I will give you an example of a typical misunderstanding concerning terminology, this time in traffic engineering.

For example we use the word "automobile", which means a self moving thing. Well, let an automobile move or drive by itself and you will see the result. Or another example of misused terms - nowadays we are using the so-called ECO points, meaning ecological points when talking about the transit contract between Austria and the Community. One ECO point stands

for a certain amount of air pollution, that means these are air pollution points really, not ECO points.

Well, after having given these examples of misused words I will try to make clear, at last to myself, what I am doing here and whether I am using the right words. Among motorization one can understand either the car ownership or the use of the car. We have to distinguish among these two things. People can buy cars just for the sake of owning them and not use them, or they can buy them for practical use. One of my students shows rather nicely in his publication that the cars in fact replaced the horses (Fig. 1).

Motorization is defined as cars per 1 000 inhabitants. And you see what the Hungarians expected: the saturation level between 280 - 330 cars per 1 000 inhabitants (Fig. 2). This is the expectation in Germany, they expected 525 - 570 cars per 1 000 inhabitants (Fig. 3). And if you look at the history of motorization, you find so called prognosis. And you see that people in Austria and Germany expected (in the 50s) that the level of saturation will be 61 or 62 cars per 1 000 inhabitants (Fig. 3). Other prognosis, carried out mainly by the Shell company, shows that the motorization level goes always up.

Traffic engineers think that motorization is unavoidable and they react in this way. So the reaction of experts and politicians is - this is the motorization and save yourselves. The politicians stare at the snake of motorization and the experts are carrying some food for it as well as the traffic engineers.

You can look at the problem as it will be looked upon in the following two days. And if you look at the publication called "Traffic 2 000 plus" by an expert group you will reach the very same conclusions. Growing motorization is unavoidable and we have to feed it. That means destroy life to escape from this development. But we can look at the motorization in another way, we can investigate how many people per car there are and we can see that with an increasing motorization the number of people per car is decreasing, and this can be shown in an interesting curve (Fig. 4). This is a curve going through the whole time scale and you see that the motorization would have been stopped at the level of some 200 cars per 1000 inhabitants but some efforts were made to prevent this brake and the growth began again. At the time of the energy crisis the saturation level was some 280 - 300 cars per 1000 inhabitants but again some actions were taken to allow a further steady increase of motorization.

If you make this analysis, then it is interesting to use what we call automatic control. We have a control section, the input and the output of the system. A so called uncontrolled or unwanted control section will feed into the society nothing else but cars, the society reacts on cars and the result is what we have seen. It means we have a strong irritation for everybody to use a car and we have now to check how the politicians react. But this is not an automatic

controlled system because an automatic controlled system has a controller. The controller was to take care of the goals of the automatic system and its reactions and the reactions have to be compared with the goals. And if the goals are achieved the controller has to make some actions. If you control the temperature in this room you have at least, in connection with the outside temperature and the inside, to install the controller. Your whole body, everything is working in the same way, our temperature, our blood pressure works.

If we look what the controller should do, the controller should make the policy and its enforcement. The policy should take into account environment, costs, space, road network, quality and the acceptance in the society. Since the controller does not exist we have to admit that we have no traffic policy at the moment.

I can support this argument by the following diagram (Fig. 5). This is the incitement for a car owner in 1960, how many kilometers of motorways he had and how many kilometers of motorways he has now and you see he has more motorways than he had thirty years ago. It means the incitement has become greater. He is encouraged to use the car. The politics always says "well, we should encourage public transport", but this is the reality and a lot of money is spent on roads and motorways so the incitement to use the car becomes even bigger. In fact the politicians do the very contrary of what they say.

Or we take the issue from another point of view, that of the costs. You can compare how many litres of gasoline you could buy in 1954 with the average income and how many liters of gasoline you can buy now (Fig. 6). This leads to the same effect. It encourages the use of the car because the energy is always cheaper and, moreover, I did not take into consideration the efficiency of the car. If I took it into account I would have to admit that the diagram is even steeper because a car in 1954 consumed much more energy and was less comfortable than the car at present. This is also a very strong argument for the further increase of motorization.

But if the politicians did what they proclaimed, the situation would not be as it is now. For example, if the price of gasoline increased to 30-35 schillings or 4-5 DM we would have the same situation for car rises as it was in the 50s. There is another factor that plays an important role and that is the space.

If you take a city like Vienna, let us investigate how many parking places there are per 1000 m² of apartments. And you see that between 1955 and 1960 there were only two parking places for 1 000 m² of apartments but today in the regulations eight parking places for 1 000 m² of apartments are offered. This also encourages people to buy and use more and more cars. So you see that motorization is not a miracle at all but the result of political actions in a wrong way, which is completely contradictory to what the politicians are telling the people. There is no excuse any more.

But if the politicians organized the system in this way, or the price level (which is very important for the European Community because we cannot change the price level in individual countries because we would get otherwise "gasoline-tourism" over the borders) we can come to a motorization level where we want to have it. It is up to us where we establish the saturation level. It is no miracle at all any more.

So you see that we can take different points of view either in a scientific or a mystic way, as this is usual. Since the speed is not coming from nowhere and we use a lot of energy in order to produce it, which means for example burning gasoline or some other stuff, the environment reacts. And the reaction of the environment is the following (Fig. 7). This is the number of species and this is the time scale. And you see what is happening. Just today a friend of mine from the Ecology and biology department has told me that four kind of species die out every hour and in the past it was one species a year. This is an extinction rate of species and you see the very bad situation.

There are a lot of mistakes in the traditional conception of traffic policy and traffic planning, one of them is that mobility is only related to car mobility. Only the number of car trips per people is counted as mobility and with increasing car ownership this figure is logically increasing (Fig. 8). But what, in fact, happens: only a small part of mobility is counted, pedestrians, cyclists and public transport trips are forgotten. The pedestrians still represent a majority in all our cities, at least in European ones, the number of trips on foot is still greater, compared to personal trips in cars (Fig. 9). Today we know that the number of trips per person and days does not change by technical instruments. It is an absolutely stable figure that includes all trips per person and day.

The second type is the belief that we can save time by increasing the speed. People do not want to admit that the Earth is a globe, they think it is a disc. And if you increase the speed the disc grows. Thanks to a lot of scientific works, some of them older, some of them new ones, we know nowadays that the travel time, or the average mobility time, is absolutely constant (Fig. 10). It is an absolutely constant figure. It is a bit more than an hour.

If you change the speed, since the time does not change, it must be the distance that changes. And you see the effect (Fig. 11). The tangent of this angle (angle of the ascending line and the axis of speed) is the time. And you see here the pedestrians, the city bus users, the regional-bus users and here are the car users. And you see that each increase in speed is lost in the increase of the distance. And if some thousand years ago you had these cars and you bought them to the people on a large scale there would be no settlements nowadays, neither Prague nor Vienna, only flat scattered areas of houses and some "feeding places" called shopping centers and some entertaining places like Heavenland. It was the pedestrians

who had been the cause why the cities were founded, the highly developed European cities. All our cities are the residuals of pedestrians so cars have no place in the cities.

Another argument concerning the negative effect of motorization. The speed increased but our ability to perceive the environment has not increased. We get the same amount of information per time unit as we did thousand years ago. There has been no change in our senses. If we walk through the country like pedestrians, the country is in scale very large with a lot of varieties and this is the wonder of Europe (Fig. 12).

If I increase the speed by 30 km the country seems to shrink. I see a lot of carriageways but they are rather narrow and nice roads. And then I make progress and build a motorway so that one can drive at a speed of 130 km through a country, with one's limited senses and what one gets is a leftover of that country. And this is progress???

And people are not aware of what is happening, so they destroy everything. If you have a small country it is very easy to eat it if you are a big lobby; if you have a small mouth you have to shorten and treat what you want to eat; so that it is your interest to make the country very small to consume it. There is a typical behavior of parasites to organize as they want to have it. Higher speeds create dependency from stronger and greater units.

Price of gasoline - growth of traffic - elasticities in the system: lifecycles of transport system. These effects were studied in Germany, Switzerland and Austria. If the price is high there is a low increase (Fig. 13). If we had the prices of thirteen schillings, which was the price in Austria in 1987, there would be no more increase of car traffic. In Germany the overall mileage would go to zero if the prices were about 1.60 DM. The price is a very strong instrument to change the behavior.

The outcome of the study corresponds exactly to what the Swiss have found. They studied over seventy factors, one of them was the price over the period of ten years, and the price elasticity was -0.6. If you double the price, the demand for traffic decreases by 60% during ten years. The study was carried out by a Swiss body in 1985. And this is exactly what we have found. So European Community do exactly the opposite to what is necessary.

Or another example: it seems unbelievable that we can change a steady growth of traffic. This is the situation on three roads to Vienna between 1970 and 1985 (Fig. 14). This is the increase of car traffic on these roads. Then the S-Bahn system was introduced. You see, there was no further increase of traffic on the road. The traffic went down and people were using public transport. This is a way how we can influence very strongly the degree of motorization.

These are the reactions of the car owners in the neighborhood cities of Vienna when they had a reserved parking place and when they did not have it (Fig. 15). When they have reserved parking place, only about 10% of them used public transport. But when they did

not have a reserved parking place, about 30% of them decided to use public transport. This clearly shows how the possibility of easy parking influences people's behavior.

The third assumption in classical traffic engineering is that productivity is increasing with increased motorization. I have defined the productivity as a number of DM or Swiss francs (SFR) per driven km. Productivity is the output divided by the input. If you have a bigger output for driven km, it means you get more DM, then the productivity increases. Fig. 16 is the result of the analysis. The triangles are German figures and the squares are Swiss figures. And you see with the increase in motorization the number of DM and Swiss francs per driven km.

It seems that traffic modes have a lifecycle of fifty years. In former eastern countries we are beginning to introduce a wrong system at the moment if we introduce car motorization because car motorization is at the end of its lifecycle. It is absolutely stupid to continue in this direction and spend money on this system. It would be much more interesting to look for other solutions, I do not know what solutions but not for the car. No question at all. The lifetime of the car is over. You can look at the USA roads and at the USSR. There is a decline of this kind of infrastructure.

Well, this was as far as motorization is concerned, now I am coming to the traffic policy. Motorization is no miracle at all, it is scientific, understandable and politically changing system.

Well, as far as policy goes, in my understanding it is a set of goals, measures and effects. Policy has to set up some goals and introduce some measures to serve the effects, and if the effects are not in line with the goals then the policy has to be changed. If you have the possibility to change it.

Let us talk about the goals. There are two possibilities how to set up the goal. You can have a goal where the main value is money or profit which is more or less the goal of the western society, of the governmental organizations. Besides here are goals where the growth is steady or infinite which is necessary in order to survive, or if you have a goal where you think the resources are unlimited. You will get different measures and future aspects. If you consider the optimization of comfort and convenience for car users (which should be optimized which is traffic engineering) or if you prevent market economy from penetrating into the traffic system, which is the case at the moment, we get the same measures in this way.

If we think there are other values necessary beside money or if growth is only useful to a certain threshold and growth over this threshold may be dangerous or if we know the resources are limited or if we think that we are responsible also to the future generations we should change our behavior and goals. When we ask what will be the price of this oil in one or two hundred years we would not be able to buy this oil because it would be so expensive that it would be impossible to buy it. Or comfort and convenience and safety is necessary

for all the users, especially for the unprotected and ecologically comparable users, and if we introduce market economy also into traffic system we would get quite different measures.

I have to admit that it is not necessary to change one's behavior - which is exactly happening today. If we have existing goals we can keep our political behavior. It is not necessary to make an active traffic policy because the whole system organized in this way is based just on words, no responsible actions are necessary.

It is not necessary to introduce barriers against wrong behavior but what is necessary to construct are motorways, from the east to the west, it is necessary to expand the cities because the cars use a lot of space, it is necessary to make more profit out of the growing population to have bigger shopping centers. Everything must be concentrated. We have no special chances for the eastern countries to have their own way, they just help us to get cheap workers. There is no public transport necessary, just high speed transport. Because with high speed transport we can reach easier their areas and we are quicker to get resources from them .

This is it, the outcome of these kinds of goals. Other measures would be contradictory to these kinds of goals. But if we change our policy, we will have to introduce an effective policy, we have to start with effective measures to escape from the slavery of the machines. We have to introduce an efficient control of car traffic, we should build no more new motorways but we have to recruit streets from racing trucks back to places of social contact. It means a repair of streets.

We have to improve the existing cities and not expend them, because we have a tremendous amount of very badly constructed cities. Instead of great concentrations, these goals lead directly to dispersal with more chances for small units, farms, shops and freedom for the individual. We introduce at the same time fair chances for the Eastern countries by accepting their own way of life. At the moment it seems that the former eastern countries say: "Well, in the west everything is wonderful and you have to do it in the same way." Which is absolutely crazy.

You have an ideal situation in the public transport but you do not have ideal situation in other things. We should try to keep the high level like in Switzerland. Switzerland has very high public transport rates. You see, a very rich country has the same figures, which are very close to the Eastern European ones. So, there is a contradiction in what people say. We have to introduce area-wide public transport and not high speed rail public transport. We have to modernize and construct the railway network with moderate speeds.

About one and a half year ago I published in the "Rail international" an article where I showed that the moderate speeds are faster in the area than the high speeds of some few tracks in some sections. It is a very simple calculation, but nobody had done it before.

We have also to help the people change their behavior. We have to introduce the real costs for the cars, but the real costs means that you pay the real price for parking in the cities, about 5 000 schillings per month. This is a market price for a parking place, because if you hire a house you will have to pay a certain market price for renting the apartments in the house and two meters in front of the apartment you can park free, which is absolutely crazy.

Then the speed - the basic speed is that of pedestrians. There is no scientific reason to drive faster. Then we will have to introduce market economy in car traffic and also in goods traffic. It means that a truck driving through Austria from Germany to Italy on the motorway should pay about 6 000 schillings per trip. This means that the railway is always cheaper.

Then we have to bring the people their freedom of modal choice. Today the people have no choice because have to use the cars. We have to support the pedestrians, the cyclists, we have to introduce cooperation and coordination between all modes of public transport. You see, much more is necessary if we accept this kind of policy. And this is just a small sector of all these measures that are necessary and these measures are much more complicated. We have to be aware of the whole system, otherwise we destroy parts of the system and so at least the ecology.

Effects: The effects are very clear if we will do not change air behavior - more energy demand, more emissions, more air pollution, more short-time profit, more egoistic, more mass-production because concentration on very few places, more city space, more construction work of low level. You have more concentration, more rationalization, then you have fewer workers because bigger units can rationalize better, so it is, at the same time, a very risky scheme in social matters. You have more control over the people, more dependency of the individual, more isolation of the individual. On the other side, you have, which is also an advantage as we still think today, less changes in behavior, less humanity, less future, fewer choices for the individual, less energy and so on and no clean air.

But if we change our goals and our policy towards a sustainable development we will need less energy, less surface and so on. Less need for trucks and cars. I do not say no to cars, this is very important to remember, I do not say NO to cars, I say LESS need for cars, which is something quite different. We have less mass production but more choices for the individual and more small and different products.

The farmers can sell their own products on local level. It means, if you can cover area with small speed you will have more chances for small units. We need less city space, but have more nature. We have much more construction and engineering work in high level sectors because we cannot work on the stupid very big projects. But if the scale is smaller, we must be very clever to use the local resources. We have much less concentration and we have

more chances for small units, we have much more organization on local and regional level and we have less power in our hands and that means, if we look at this line we will have much more chances for eastern countries. We have more future, we have more changes in the behavior in the west, and we have more democracy. On the other side, we have more dictatorship of the machines and engines on men, and here you have more men dictating and organizing engines, which is quite the opposite.

We have more chances for the eastern countries in the United Europe, and the countries are under control of the people, and the other side is the country being controlled from outside and the lobbies. And the result of the analysis is interesting. It is absolutely the opposite effect.

Thank you very much.

Fig. 1:
Number of draft animals (horses and mules)
used for transport and number of cars in the USA
(empirical data and model estimates from a logistic substitution model).
(Source: Nakicenovic, 1986)

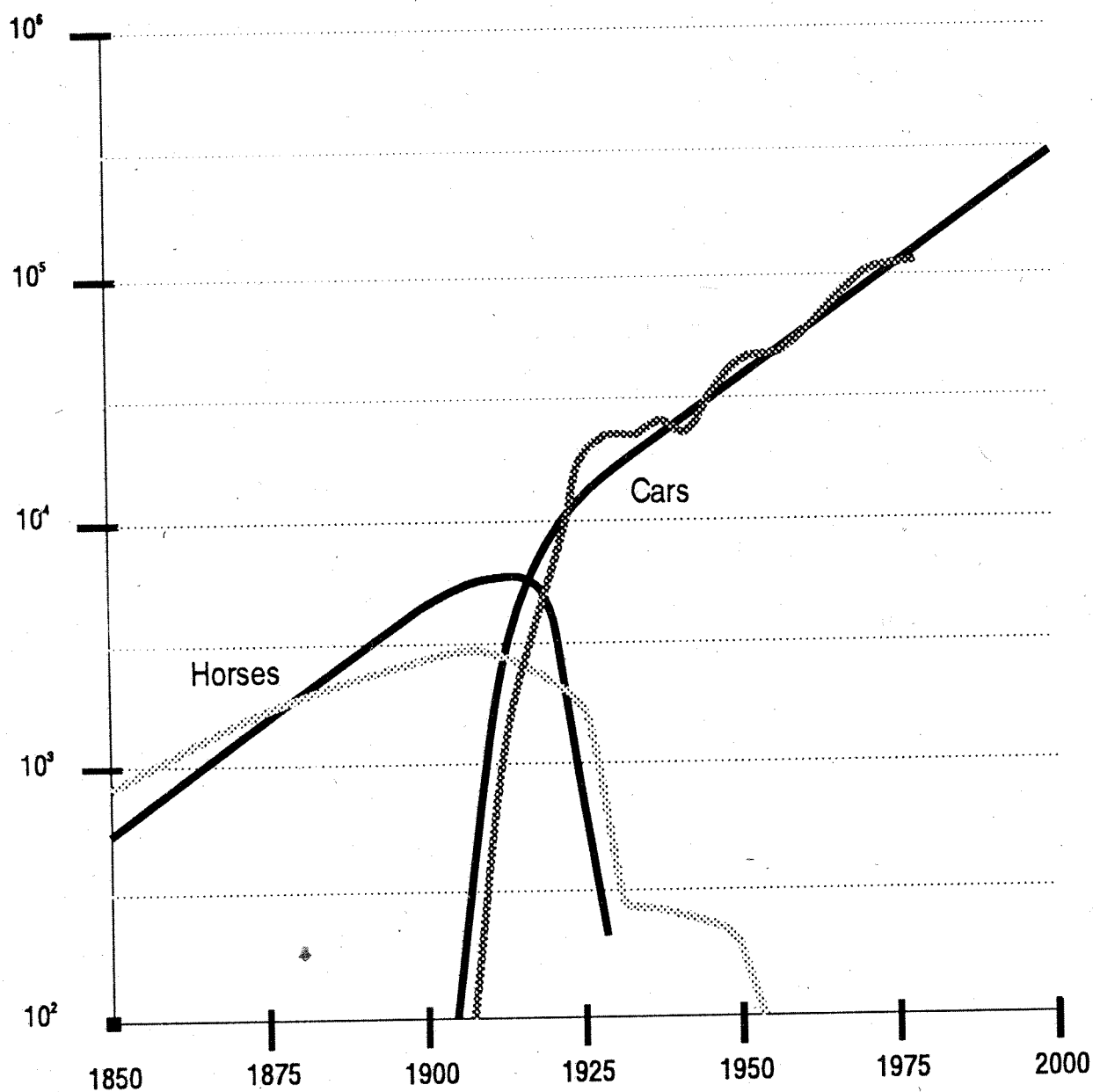


Fig. 2:
Prediction of motorization
Budapest

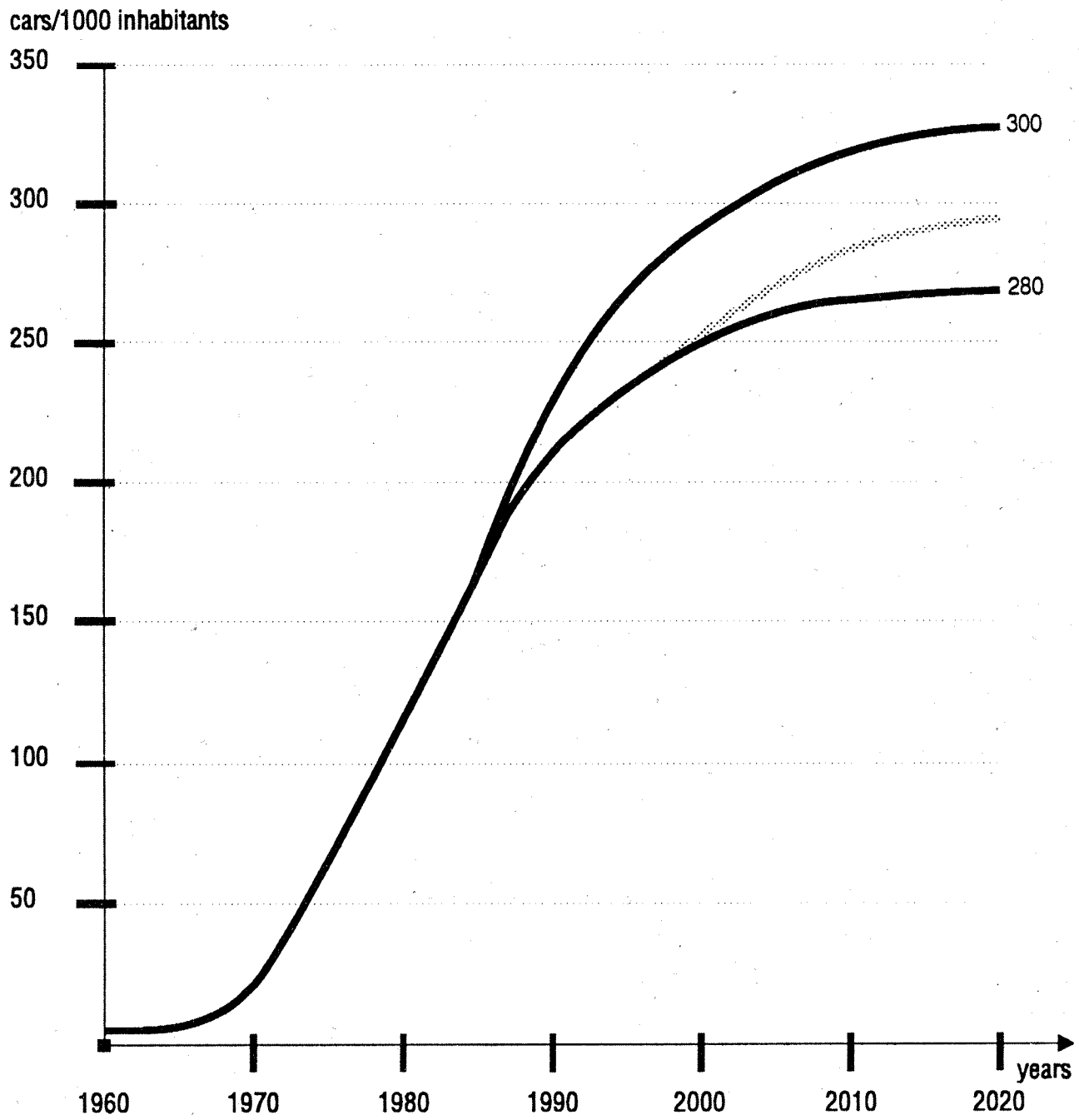


Fig. 3:
Prediction and real state of motorization in Germany

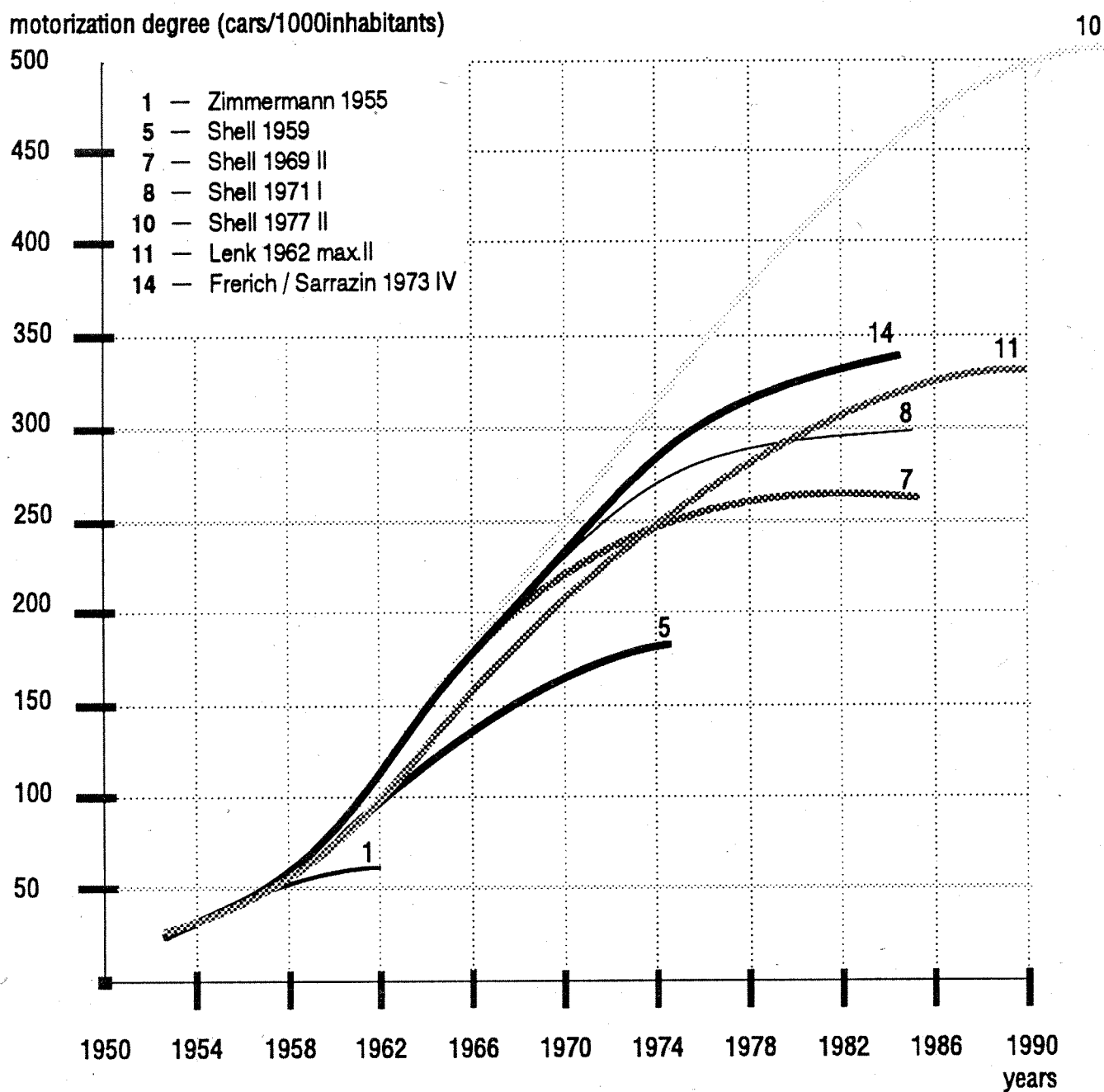


Fig. 4:
Number of inhabitants per car - development in time

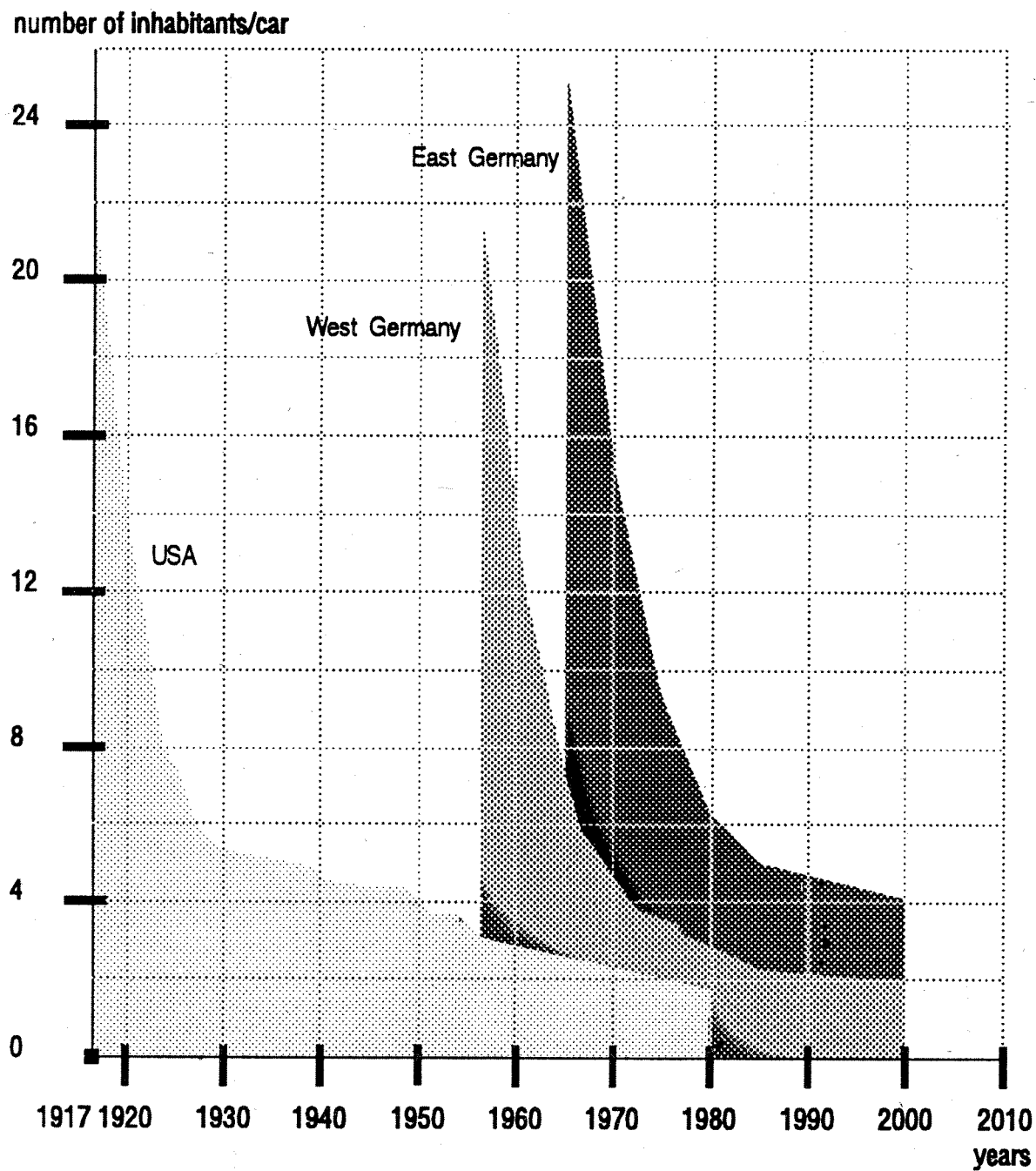


Fig. 5:
Motorway net development compared with number of
registered cars.

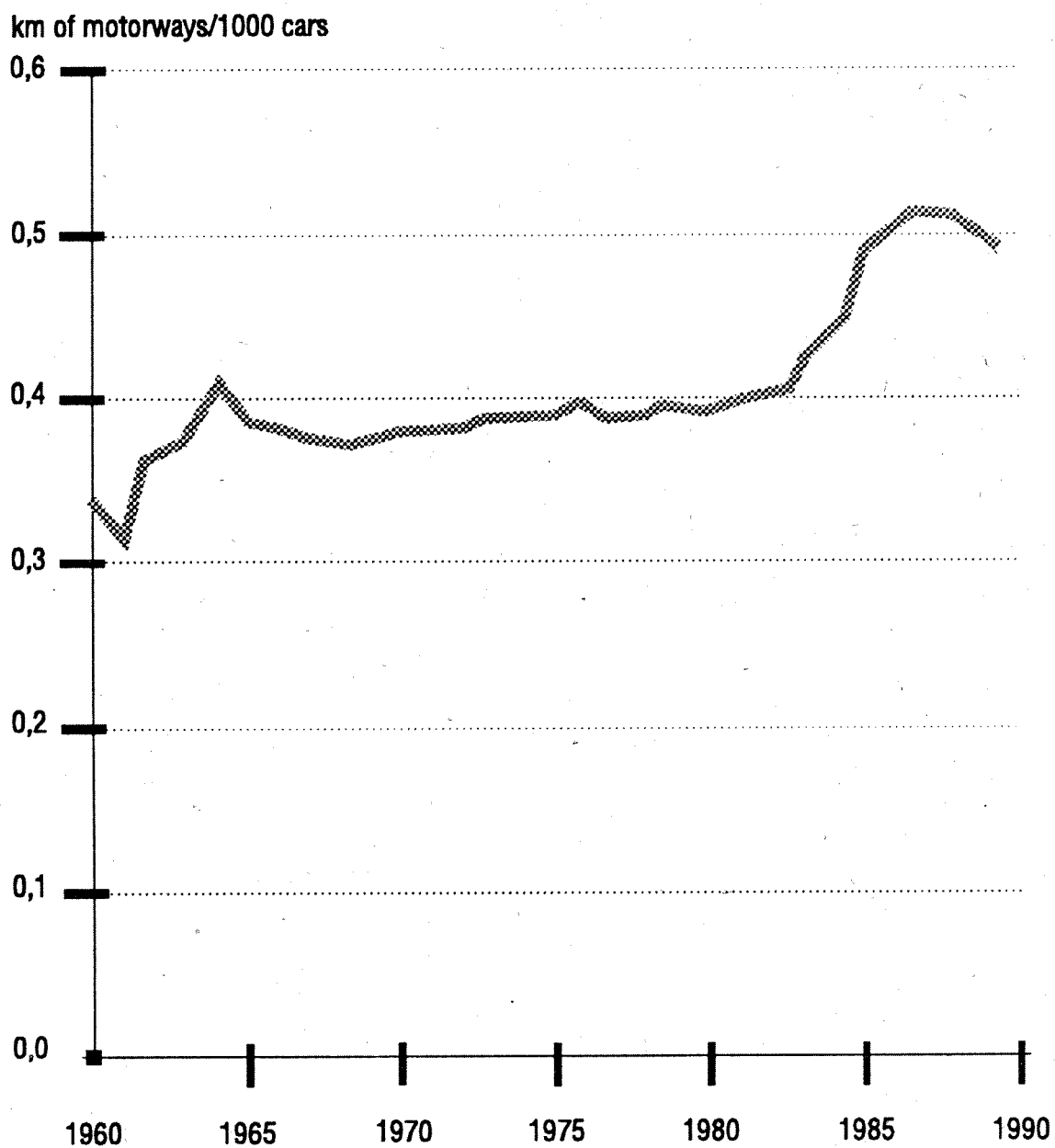


Fig. 6:
Gasoline price and month wages
Development in time

Data: ÖSTZ

litres gasoline "NORMAL" for month wage

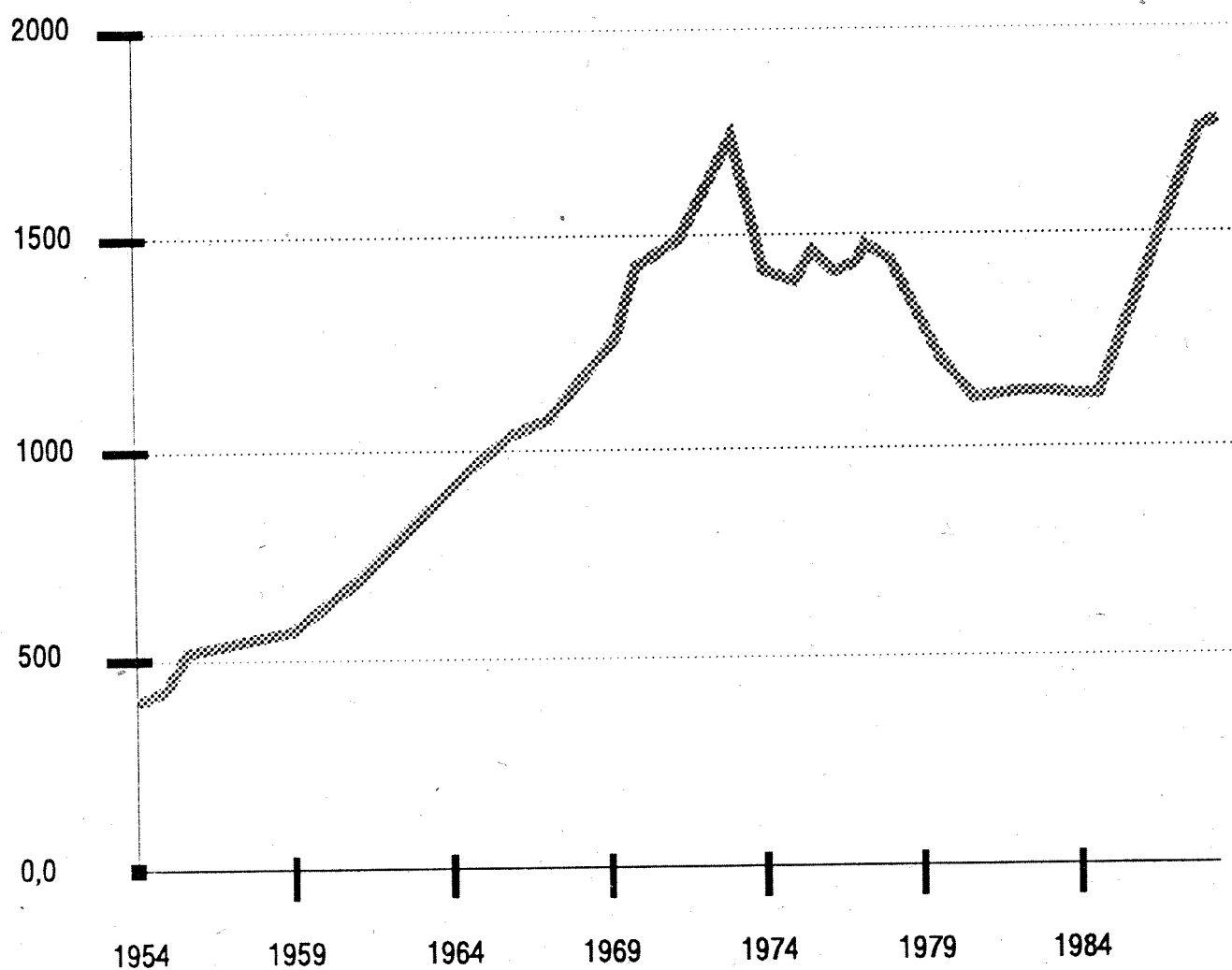


Fig. 7:
Number of species - development in time

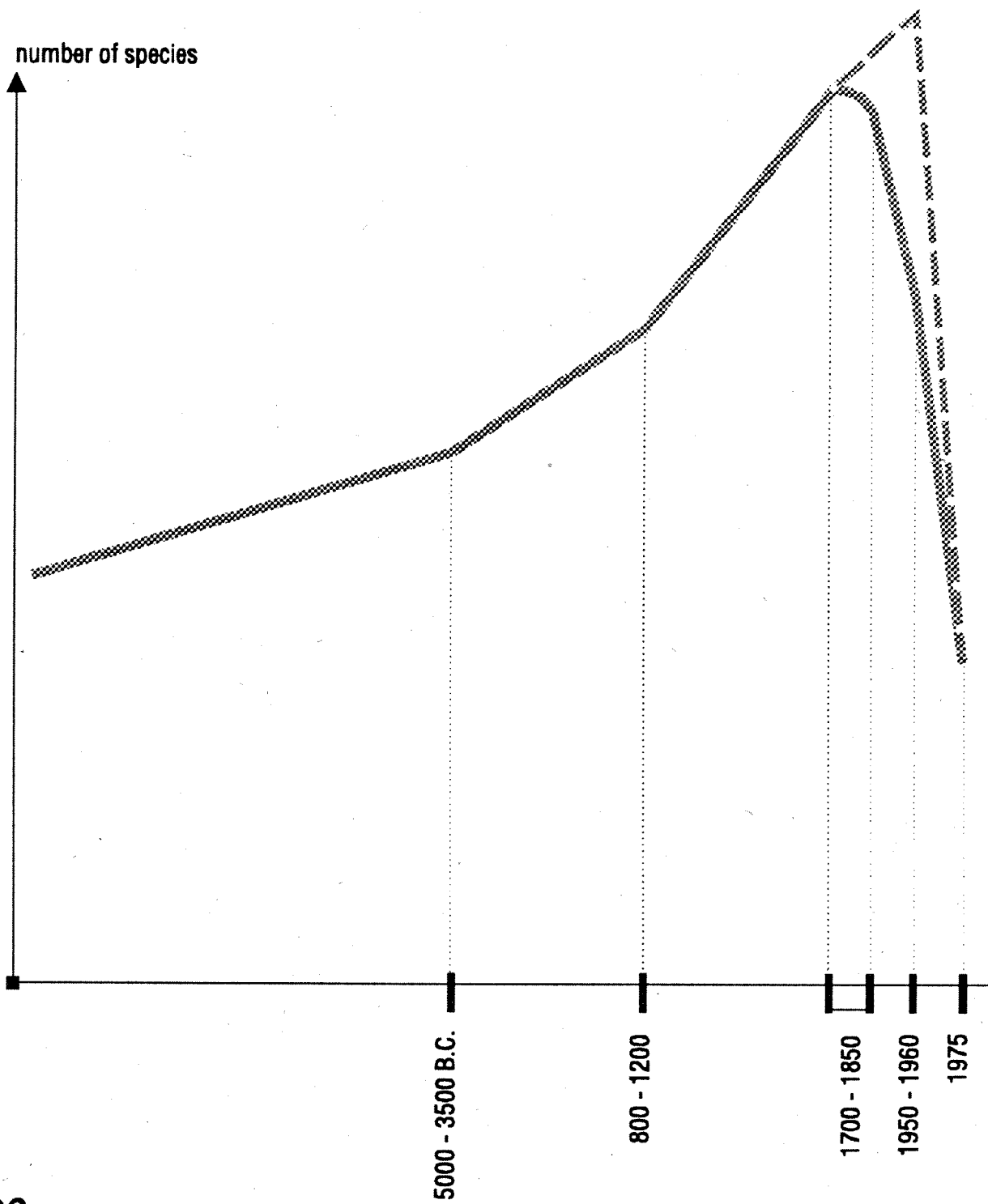


Fig. 8:

Average number of trips on workdays and motorization degree in 38 cities and regions
The mobility here is replaced by number of trips

Source: Forschung Straßenbau und Straßenverkehrstechnik Heft 231

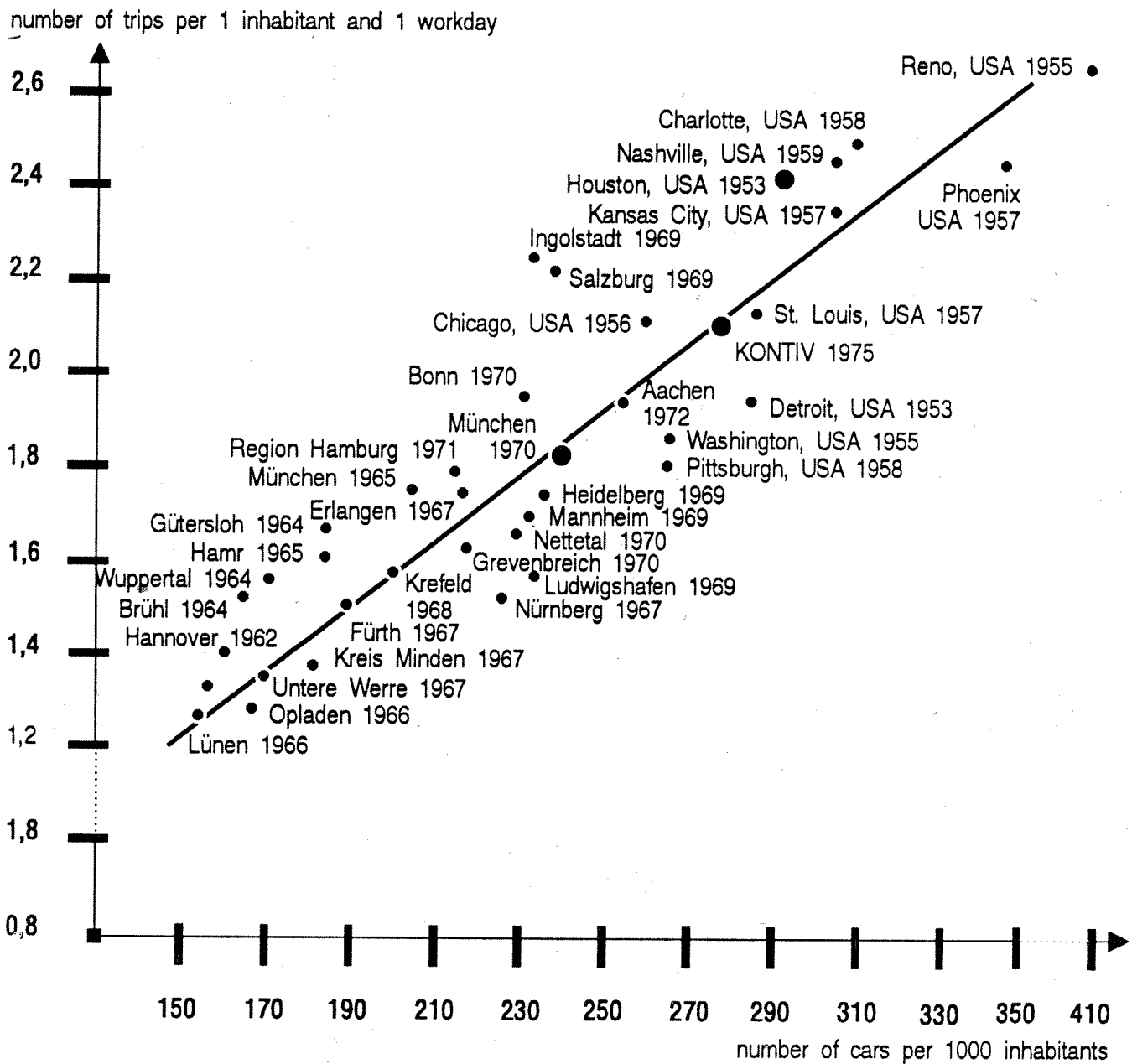


Fig. 9:

Distribution of trips after age classes and transport means

(according to questionnaire research carried out in 1991, St. Ulrich)

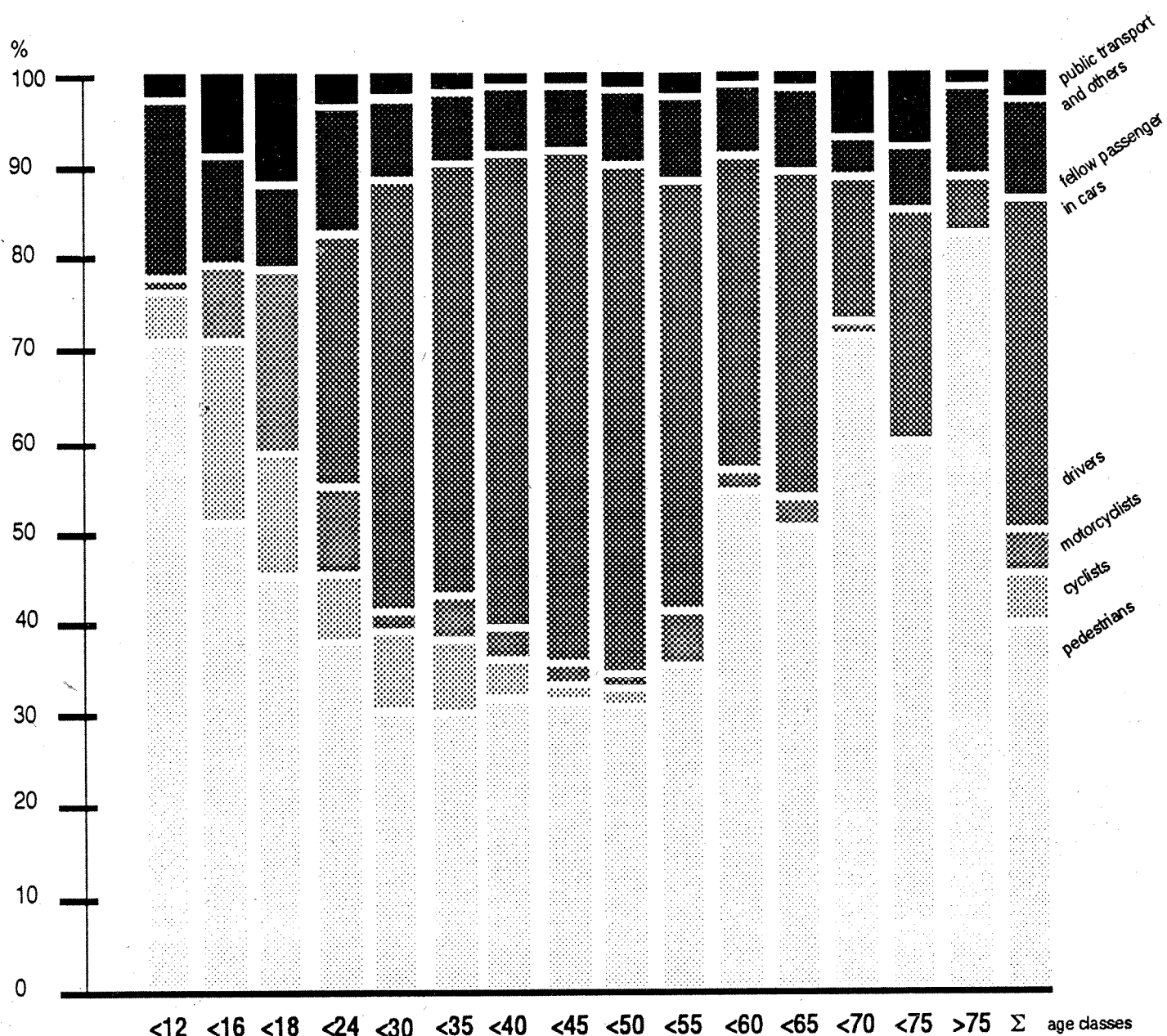


Fig. 10:
Trip duration compared with locality size

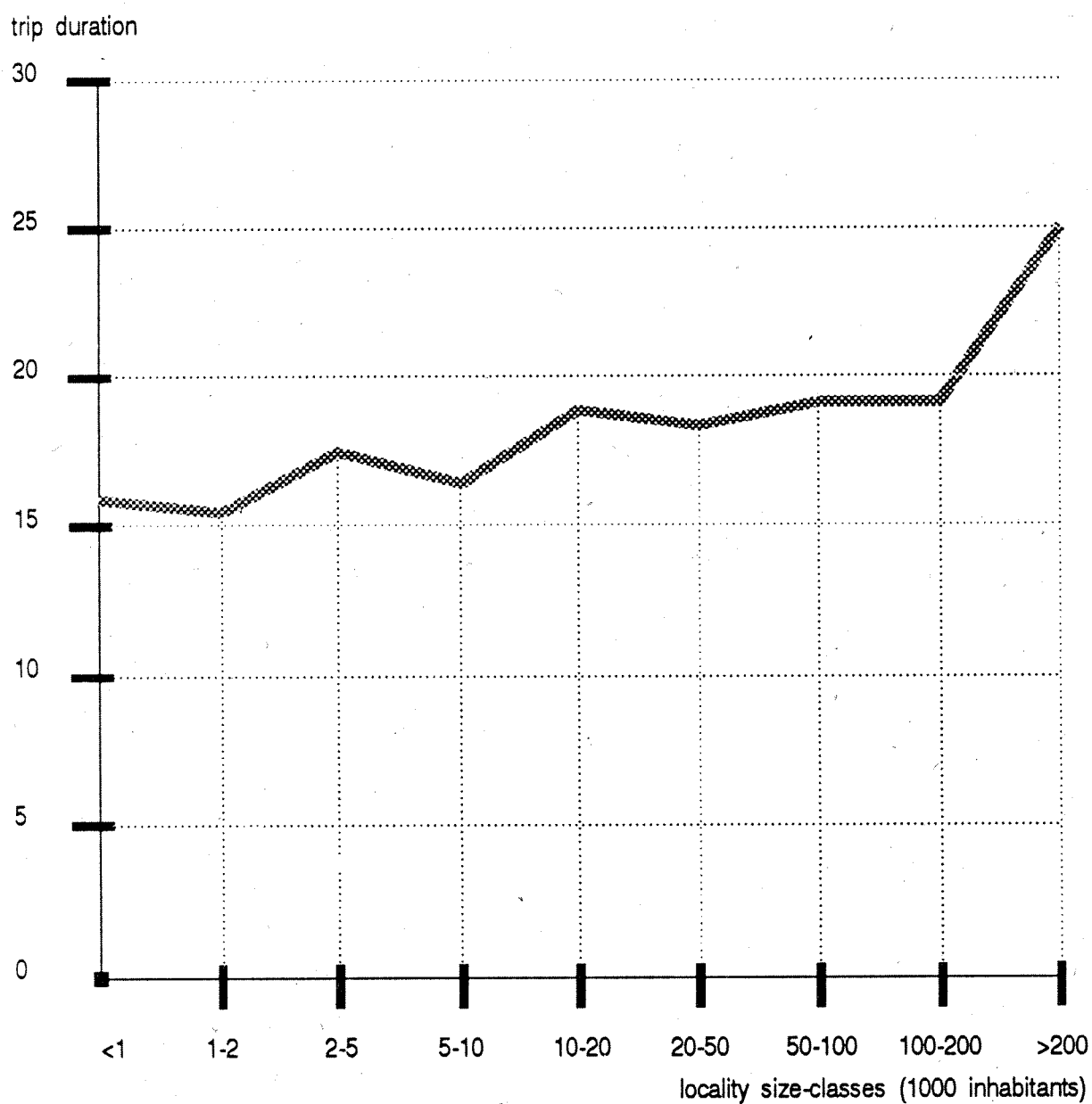


Fig. 11:
Destroying human dimension by cars, showed in relation with increased travel distance and speed.

Source: Local traffic in central area of Salzburg Traffic research to order of Salzburg's regional government.

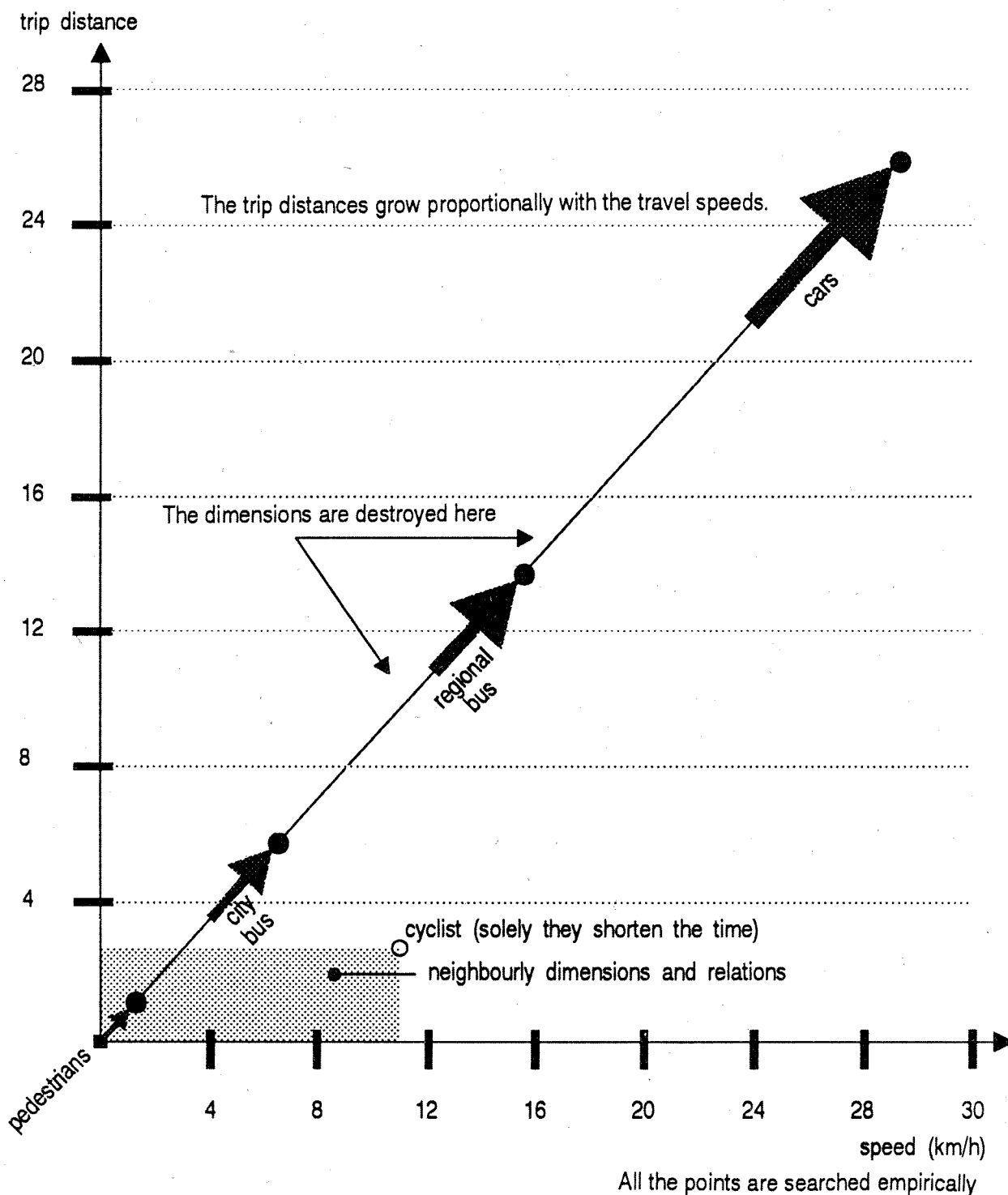


Fig. 12:

old federal roads, $v = 30 \text{ km/h}$



motorways, $v = 120 \text{ km/h}$



on foot, $v = 5 \text{ km/h}$

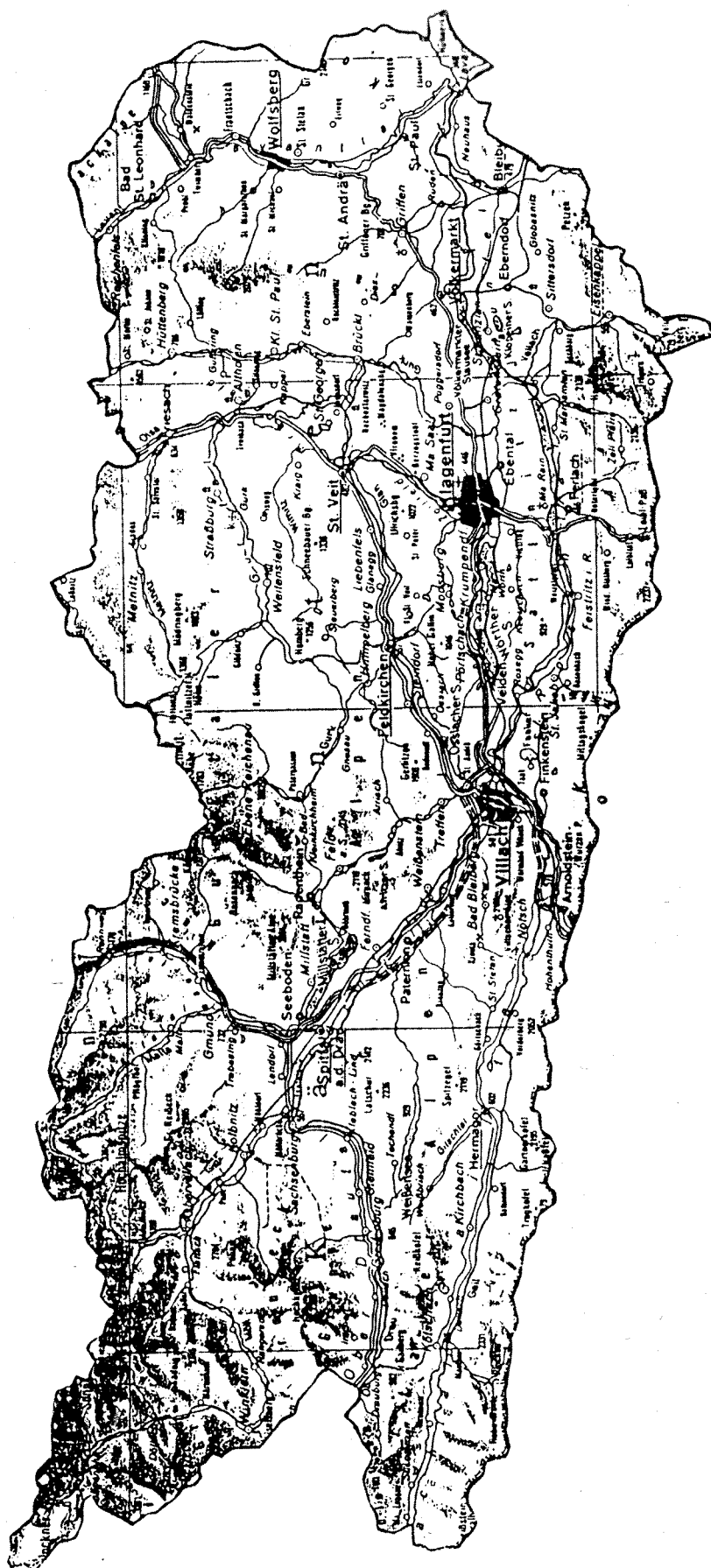


Fig. 13:
Relation gasoline price - traffic growth

change in transport intensity

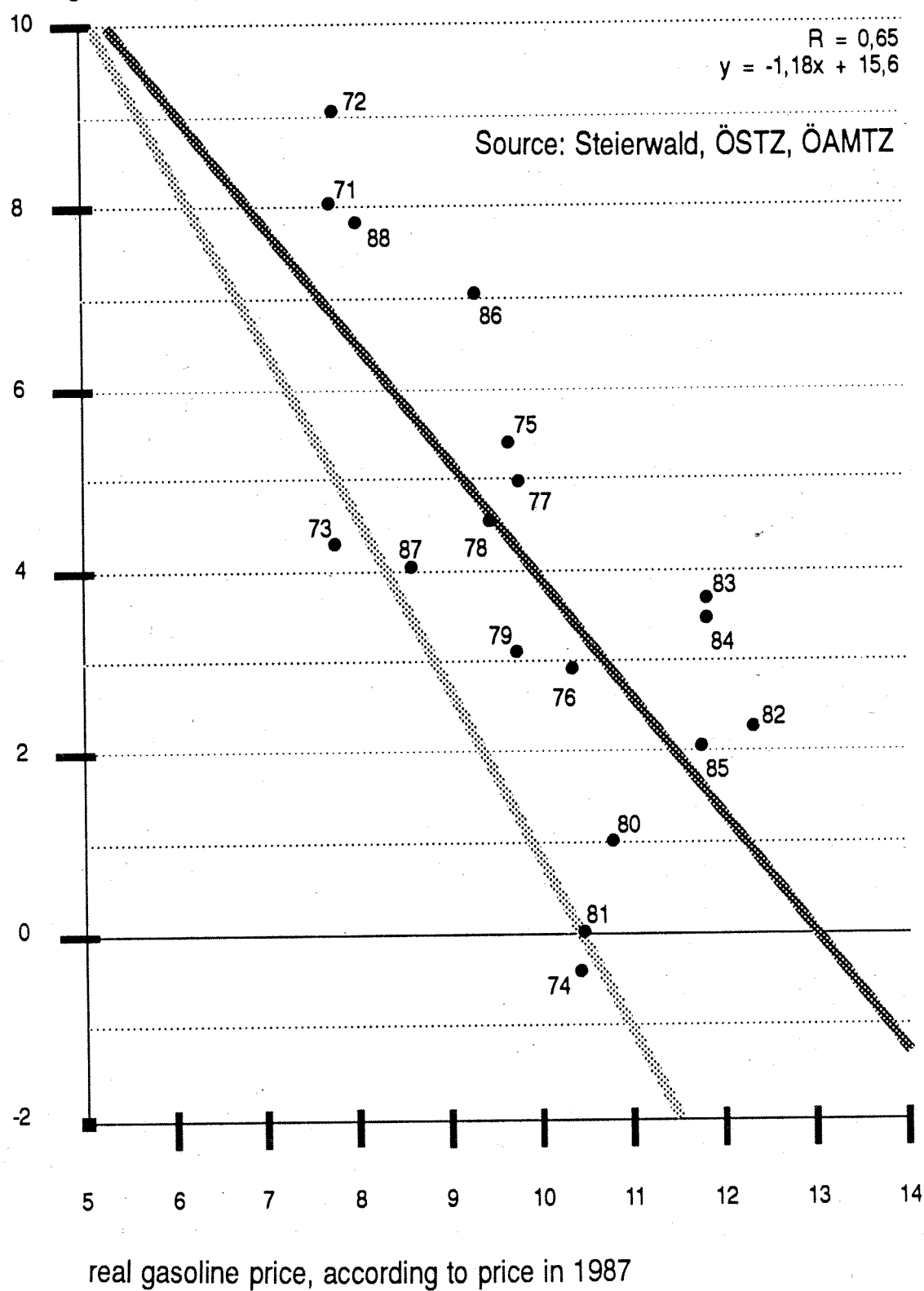


Fig. 14:
Transport development depended
on parallel systems "S-Bahn"

road transport intensity, 1975 = 100%

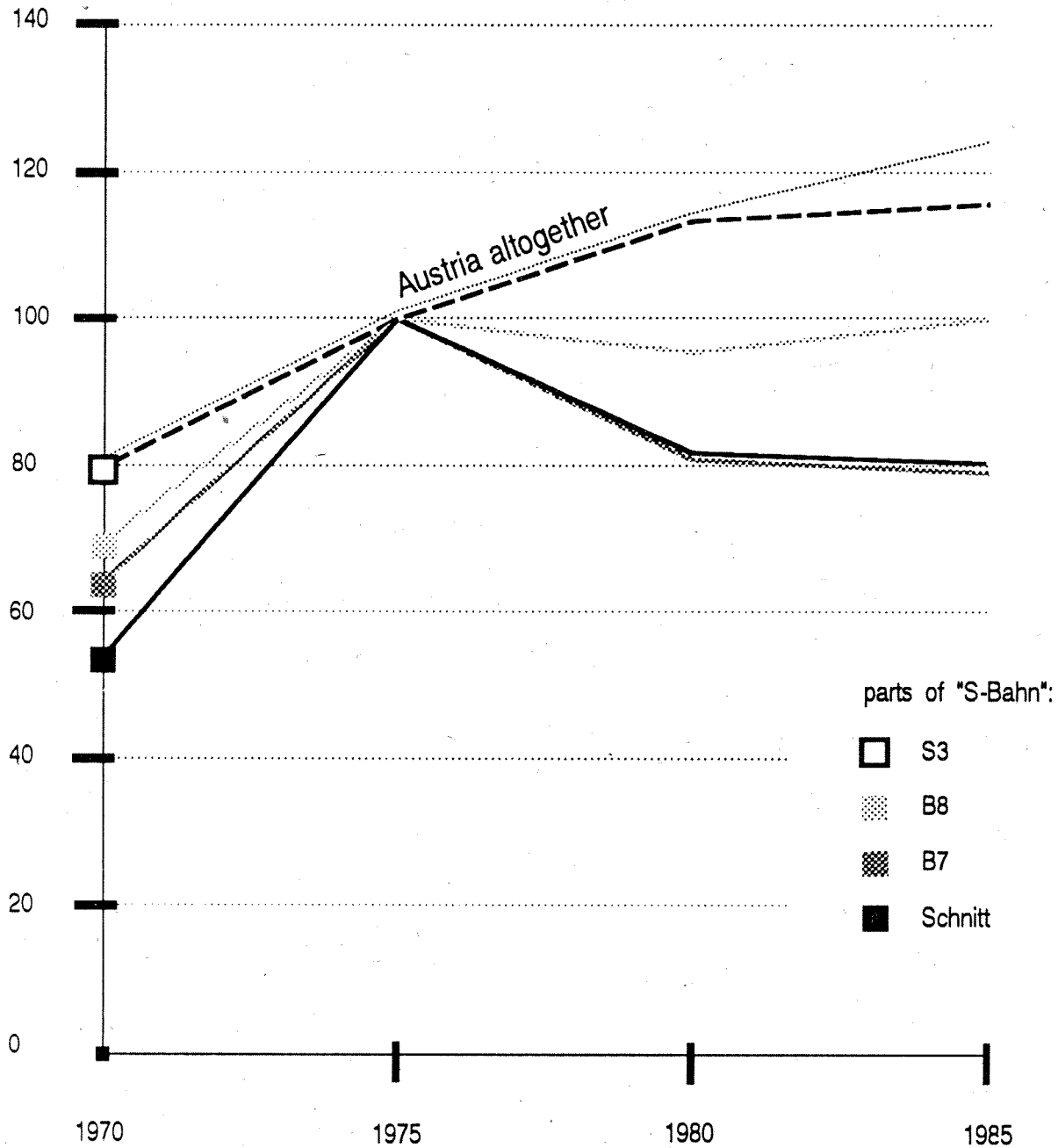


Fig. 15:

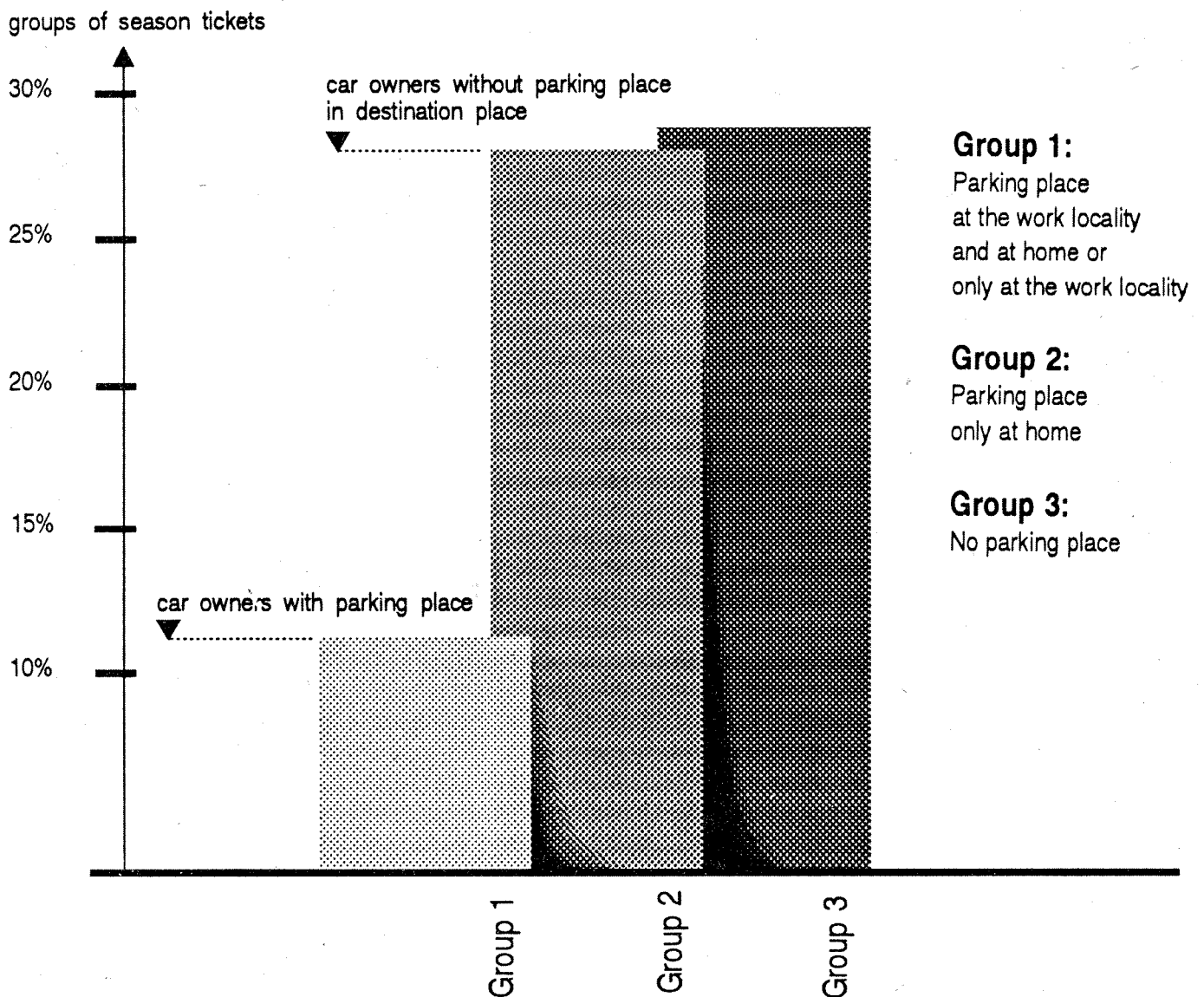


Fig.16:
Relation between the efficiency
and motorization degree in Switzerland and Germany

