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MODERNITY AND MOBILITY. TOWARDS A SOCIOLOGY OF CARS[1]

1. The Leading Object

In a highly suggestive manner, Henri Lefebvre has argued that no other object has been able to programme everyday life like the motorcar. It is *'the epitome of "objects", the Leading-Object ... . It directs behaviour in various spheres from economics to speech'* (Lefebvre 1971:100). In his abstract outline of a sociology of cars, Lefebvre points to the ability of the car to shape the structure of social life as well as to be a symbol. *'The motor-car's roles are legion: it is the sum of everyday compulsions, the prime example of the social favours bestowed on mediator and medium and it is a condensation of all the attempts to evade everyday life because it has restored to everyday life hazard, risk and significance'* (p. 103). While Lefebvre overstates his case with determinisms, he nevertheless brings forward a very interesting call for a further development of a sociology of cars. This paper is an effort to contribute to that.

In quantitative terms, the motor-car holds an awesome position in modern societies. The car industry is the largest in the world, and it is estimated that there is 555 492 000 cars in the world, among them 423 384 000 private cars.[2] Most of these vehicles are found within the OECD area, reflecting the unequal global distribution of wealth and command of resources. The motor-car also stands out as a political problem. It drains energy resources while at the same time creating large environmental problems (Bleviss 1990). Some 200 000 people are killed annually in car-related accidents, and far more are hurt. On top of this, the increased incidence of traffic jams in most cities of the world

[1]This paper was presented at the workshop "The car and its environments. The past, present and future of the motorcar", Trondheim May 6-8 1993. The work has been supported by the Norwegian Research Council through the programmes "Kultur og tradisjonsformidling" ("Mediation of culture and tradition") and "Samfunn, miljø og energi" ("Society, environment, and society").

[2]Opplysningsrådet for veitrafikken (1991): *Bil og vei. Statistikk 1991*, Oslo, p. 117.

makes the car far less efficient as means of transportation than it was supposed to be (Renner 1988, Lowe 1990).

The dramatic and harmful nature of the car invites dramatic and critical discourses. To the responsible social scientist, the only proper way to analyze cars appear to be to disclose their dangerous properties, their relations to the great economic and political powers of modern society, and to argue the need for alternatives - possibly of a public nature. The question is whether the exploration of such an agenda of problems will produce new insights. Already, we know a lot about the problematic nature of cars in our modern societies. To some extent this knowledge has even instigated transportation and environmental policies that aim to increase the cost of driving private cars through gasoline taxes, toll roads, etc. and at the same time setting stricter standards for emissions.

However, these policies seem to have limited effects. Driving does not appear to be very much affected by the present level of tax increases, and stricter emission standards are probably not sufficient to solve the environmental problems. To rethink the role of the car raises the issue of understanding the role of the car in the first place. How should we interpret the car as a sociological phenomenon? Why does it seem to have such a strong position in our modern societies? What would be the consequences of trying to reduce this position? We have tried to address such issues with an open, but not necessarily empty, mind. Being aware of the important social and environmental problems caused by cars, we wanted to concentrate on the social integration of cars. We believe that this is a better window to understand also the parallell, but less manifest, processes of disintegration since the integration has been made invisible in many discourses which take the car's popularity and diffusion either for granted or as a result of some wicked plot.

Historical studies of the integration of the car into society show that several interpretations are possible. Obviously, the large car-manufacturing corporations emerging from an initial stage of small-scale production have played a major role. The use of the name of one of the companies to summarize the basic properties of production and consumption of a whole period of modern capitalism as 'fordism', is at least strong metaphoric evidence of this impact. The car companies made cars cheaper and more generally available, they put a lot of efforts into advertising them (Tedlow 1990), and they lobbied for more and better roads (Flink 1988). The car became a part of political programmes (Ling 1990), and it became a constitutive part of modern urban planning (Bottles 1987, Wachs and Crawford 1992, Thomassen 1992). Also, from the early period on, the car has been an object of desire, an infatuation of modern man - and woman (Sachs 1992). We also know that the car has been integrated into the arts and popular culture, both as a stage for human actions and as a sort of actor itself (Dettelbach 1976, Lewis and Goldstein 1983).

There is a history of the car, but - strictly speaking - no sociology. The characteristics of the car as a sociological phenomenon seem to be either too powerful to handle or too unclear to allow analysis. We may study the car in terms of social effects, but this leads to determinisms and mono-causality (see, for an illustrative example, Allen 1957). We may concentrate on the social shaping of the car, but this limits our possibility to understand its broader social relations. The problem is of course that the car *as such* is not a very interesting sociological unit. Instead, we have to look at cars as they become or have become parts of different networks: the household, the city, the highway programme, institutions of transportation, regulatory bodies, sport, culture, etc. What are their roles in these networks, and what would happen to the networks or the cars if the networks were changed to delete cars? The search for such an understanding leads us to the constructivist sociology of technology (Latour 1987, 1992, Bijker & Law 1992).

In this paper, we want in particular to discuss car networks in terms of *modernity*. Modernity is an abstract concept from social theory used to characterize present industrial societies. In social theory, the modern is contrasted to the traditional. One may emphasize different aspects of this difference, like the role of rationality (Weber) or the nature of solidarity (Durkheim), but in most concepts of modernity, *change* is the most prominent feature. Modern means dynamic, the modern society is continuously changing, and modernity refer to general qualities of institutions and behaviour in such societies (Berman 1983, Giddens 1990, 1991).

Anthony Giddens discusses present societies in terms of *high modernity* where he emphasizes three sets of dynamic qualities:

a. *separation of time and space* which he sees as the condition for the articulation of social relations across wide spans of time-space, up to and including global systems.

b. *disembedding mechanisms* which consists of symbolic tokens and expert systems, and which separate interaction from the particularities of locales.

c. *institutional reflexivity* which characterizes the regularised use of knowledge about circumstances of social life as a constitutive element in its organisation and transformation.

In Giddens' account of high modernity, technology plays a basic but unexplored role. The clock, electronic communication and the car are mentioned, but not analyzed. Instead, he moves on to sweeping analyses of self identity and reflexivity. We are still left with important puzzles: How is high modernity possible, and how is it concretely experienced? Such questions are highly relevant with regard to the Leading Object. The dynamic character of modern societies depends on communication, not only symbolic but also bodily. It seems rather obvious that the structure of a modern society cannot be understood without taking into account the private car and its ability to perform flexible, but demanding, acts of mobility. Following the programme of the

sociology of technology outlined by Latour (1992), what we need to do is to map out the socio-technical texture of the high modern society with an emphasis on the role of private cars.

Basic to our efforts to perform an analysis along these line is the idea that cars are objects which have to be *domesticated* to become integrated into a culture. Domestication, in this sense, is a set of multi-level and multi-dimensional processes related to the appropriation of cars and the material, political and symbolic activities that have to be performed in order to make it possible for the cars to perform their functions. Silverstone et al (1992) discuss domestication related to what they call the 'moral economy' of the household. We perceive domestication as being performed also by public and private institutions, government, etc. In some sense, present Norwegian society reflects the domestication of the Leading Object at the level of the nation-state.

The use of the concept of domestication designates an intention to analyze the integration of the car into Norwegian society as a process of two-way changes. The result, the Norwegian car and Norwegian car-based society, cannot be understood in terms of simple cause-effect relations. Norwegian car culture is no linear reflection of foreign car cultures, even if the car as a physical object is imported. (Norway has no car manufacturing.) But it is neither a linear continuation of pre-car Norwegian culture. What we have to explore is reciprocal contingencies.

Our efforts to do so will be focused on the mobility aspect of private motor-cars in Norway. First, we shall present some quantitative indicators of mobility and discuss some implications. The second part will be concerned with questions concerning the social meaning of car-ownership and mobility needs. These issues will be pursued in an analysis of individual domestication of private cars and of how physical mobility through private cars is achieved and experienced at an individual level.

2. Method

The paper is mainly based on two sources. One is statistical information regarding transport and related issues collected by the Norwegian Bureau of Statistics. We have analyzed relevant publications, some produced annually, some at longer intervals.

The second set of data is interview material collected through the study "Car use and car culture in Norway" through 1992 and the first months of 1993. Some 30 interviews have been conducted in or near Trondheim (Norway's third largest city). The questions span a large set of themes related to car ownership and car use, and the interviews lasted 1 1/2 hour on the average. All interviews were taped, presently only some of them have been transcripted. The analysis in this paper represents a first effort of using these

data. Later, the material will be supplemented with interviews from a rural area as well.

Both men an women have been interviewed, and we have concentrated on three different age groups: First, those around 70 years of age, who have led their life in a society that, when it comes to cars, have changed very much. They grew up in a period were cars were extremely rare, today they live in a society where cars are taken for granted. Second, those around 40-45 years of age, who in their childhood experienced the rapid transformation of Norway into a car-based society, and finally the youngest group, around 20-25 years of age, who have lived their entire life in a society with a high car density.

3. Mobility in high modern Norway

Norway has 4,3 million inhabitants living on 324 000 km^2. With 13,9 inhabitant per km^2 it has one of the lowest population densities in Europe. From this point of view, it could be argued that the private car is particularly suited for Norwegian communications, partly because one need to travel a lot to cater for daily needs, partly because the low population density makes it difficult to construct an efficient and satisfactory public transportation system.

These assumptions are not confirmed when we compare the average annual amount of driving per car across countries. Norway's 14 100 km per car is less than for example Denmark with 17 700, Great Britain with 15 282 or the Netherlands with 15 190.[3] With respect to the number of inhabitants per car, Norway is an average European country.

When we look at historical changes, the most striking fact is of course the dramatic growth in car ownership - from 1946 to 1990 with a factor of 30! (see table 1). A parallel fact, often overlooked, but no less impressive is the large increase in the amount of travelling performed by the average Norwegian. From 1946 to 1990, the average number of kilometres travelled by a Norwegian has grown from 1 450 to 11 810, a factor of 8. Of the 11 810 km travelled in 1990, 76 per cent is by private car.[4] The increase in mobility represents an annual growth rate of 5 per cent over a period of 44 years. This is dynamic mobility - not to say dynamic automobility!

The development is described in somewhat greater detail by table 1. It shows the number of private cars, the average number of kilometres travelled by private car by Norwegians, and growth rates of average travelled distance by private car. We observe substantial growth rates for each decade, although

[3]Op. cit., p. 90.

[4]NOS: *Historisk statistikk 1978*, tables 3 and 206; NOS: *Samferdselsstatistikk 1990*, table 12; NOS: *Statistisk årbok 1992*, table 13.

the 1980s appears to be a period where car-ownership and car use levels off. In fact, from 1989 to 1990 there was a small drop in the average distance driven by Norwegians, even if the total number of private cars increased a little.[5] The steady growth of automobility in Norway may have come to an end, but this is not certain.

Table 1. The number of private cars, the average number of kilometres travelled by private car by Norwegians (all ages), and growth rates of average travelled distance by private car.[6]

	1946	1952	1960	1970	1980	1990
Number of private cars (in 1 000)	53	77	225	694	1 233	1 613
Average number of kilometres travelled by private car by Norwegians (in 1 000 km)	0,34	0,48	1,3	4,6	7,4	9,1
Estimated annual growth rate of average distance driven (previous period)		6 %	13 %	13 %	5 %	3 %
Passenger kilometres travelled by private car in per cent of total travel	23 %	24 %	41 %	69 %	75 %	76 %

Table 1 tells us that Norway in the post-war period has been constructed as an individualized auto-mobile society, evidenced by very strong annual growth rates in terms of the number of private cars as well as travelled distance. In the same period, there was only a two-fold increase in the total length of public roads, but the quality of these roads has changed dramatically. The resulting communication system is based on public infrastructure and individualized

[5]NOS: *Samferdselsstatistikk 1990*, tables 12 and 82.

[6]Sources: Opplysningsrådet for vegtrafikken: *Bil og vei. Statistikk 1991*, p. 4 and 6; NOS: *Historisk statistikk 1978*, table 9 and 206; NOS: *Samferdselsstatistikk 1990*, table 12; NOS: *Statistisk årbok 1992*, table 13.

transport, in contrast to visions of public transportation systems, fashionable among Norwegian planners in the 1950s and environmentalists today.

The automobile society has often been perceived as the ultimate expression of consumerism, linking car ownership to increases in average private income. Traffic planners often use econometric models where income is the most important variable to predict car ownership. However, for a sociology of cars it is unsatisfactory to accept this simple relationship because it represents a determinism, an assumption that there is a natural relationship between wealth and cars. Instead we need to explore why this relationship is produced, and what its preconditions are. What is an automobile society?

In analog with Bruno Latour's (1988) idea of "Pasteurization of France", we could argue that there has occurred a "Fordization" of Norway - attributing the idea of mass automobility to Henry Ford. This assumption should not be dismissed, but one need to be careful with such concepts to evade a view of the process as frictionless and teleological. In Norway, the political climate was not very favourable to cars until the 1960s. Even if the highway directorate was very car-friendly from the turn of the century and on-wards, Norway had restrictive import quotas on cars from 1934 to 1960. Besides as a burden on the trade balance, private cars were not even a part of the vocabulary of the economists and politicians responsible for post-war reconstruction of Norway. Consequently, it was taxed as luxury.

In a sense the car forced itself on the politicians throughout the late 1950s and 1960s. By then it was difficult to develop Norwegian society without perceiving the private car as a cornerstone of modern life (see Bjørnland 1988, Østby 1991). The car-selling industry was not a very efficient promoter of the transformation of Norway to an automobile society, although the motor-trade obviously had an obligatory role to play in this process (see Sørensen 1991). Maybe Norway was too small a market. Anyway, urban planners, highway engineers and transportation economists appear as the spearheads of making private cars into the dominant mode of transportation in Norway.

The proposition which we will explore in this paper, is that the idea of private automobility was consistent with, and even facilitated, other basic aspects of modernity: mobility, individuality, urbanism and comfort. Because the car in some sense combined all these values, it became an obligatory point of passage to a good life as perceived by a majority of Norwegians. A basic expression of this fact is the increase of private expenditures related to cars. As late as 1958, the average Norwegian household spent only 2,5% of their net income on cars - compared to 3,2% on public transport. In 1967, the figures were 11,4% and 2,8% respectively, and in 1973 14,3% and 3,3%. Since then,

car expenditures of Norwegian households have fluctuated between 14,5% and 17,3%, comparable only to expenditures on food and housing.[7]

The increase in expenditures related to housing and housing maintenance is observed later than in the case of private cars, namely in the 1980s. This part of average household budgets rises from 12,2% in 1977-79 to 21,8% in 1988-1990.[8] What emerges is a pattern of living where personalized housing and transportation is linked. Norwegians partly increase, partly stabilizes a personal space in-door. The average dwelling area increased from 85 m^2 i 1980 to 108,2 m^2 in 1988. The long-term pattern of housing is dominated by detached single family houses, and in 1988 some 60 per cent of all houses belong to this category (see table 2). This, in combination with the large increase in average dwelling area, strongly suggests that housing has been dispersed and has become more so. The private car is a key element in this kind of life-style.

The point is not to counter the familiar argument that Norway, as most other countries, has become increasingly urbanized. The percentage of the Norwegian population living in densely populated areas has increased from 50,2% in 1946 to 71,8% in 1990.[9] The important issue is what it means to be urbanized, in terms of the way the material basis of urban life is constructed. Our assertion is that the Norwegian pattern of urbanization is in accordance with scenarios of "garden cities", a product of a particular car-detached house network. Some 73 % of Norwegian households want a one-family house.[10] The role of integrating this pattern of housing into a modern society with a high frequency of interaction with other people through work and leisure has been delegated to the private car.

This delegation is basic to urban planning with its differentiation of functions, constructing the phenomenon of travel to work. The modern Norwegian city is constructed as a highly stable network of buildings and streets, of residential and industrial areas and of detached single-family dwellings. It is not easily redefined by human negotiations and interpretations. This network so-to-speak demands a certain amount of mobility which is assumed to be performed mostly by private cars. The reproduction of a high level of mobility and a high degree of dependence of private cars is delegated to the physical structure of the city. The process is reversible, but only at great economic costs. Cities have to be rebuilt, the style of living expressed in the network of cars and detached single-family dwellings has to be changed.

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[7]NOS: *Samferdselsstatistikk 1990*, table 25; NOS: *Statistisk årbok 1992*, table 216.

[8]NOS: *Statistisk årbok 1992*, table 216.

[9]NOS: *Statistisk årbok 1992*, table 13.

[10]NOS: *Boforholdsundersøkelsen 1988*, table 55.

Table 2. Norwegian private dwellings according to type of building, 1920-1988. Per cent.[11]

	Farm house or similar	Detached, one-family house	Dwellings in row or chain, two- and four dwelling houses	Houses with 5 or more dwelling, block of flats
1920	53%		47%	
1946	43%		53%	
1960	20%	26%	32%	18%
1970	15%	32%	32%	18%
1973	18%	38%	23%	16%
1981	15%	42%	22%	17%
1988	11%	49%	21%	19%

Thus, the car is in a sociological sense, a technology of differentiation as well as integration. The personal car is a basic constituent of a way of living where different aspects of life have become spatially separated. The home, the workplace, shops and leisure institutions are increasingly located in different areas. This modern spatial separation demands a high level of mobility to reproduce social relations, and this implies that the personal car is a prime example of an integrating technology. However, the car integrates in a manner very different from telecommunications and telematics because it allows human interaction face-to-face. The high level of mobility observed in table 1 is thus also an indication of the importance of such interaction. The car and the telephone are not functionally equivalent artifacts.

To understand the modern car-based mobility, it is necessary to explore the social processes through which the car becomes a part of everyday cultural practices. How is mobility produced, and how is the car culturally shaped?

[11]Sources: NOS: *Historisk statistikk 1978*, table 317; NOS: *Boforholdsundersøkelsen 1973*, table 1; NOS: *Boforholdsundersøkelsen 1981*, table 1; NOS: *Boforholdsundersøkelsen 1988*, table 3. There are some variations in the categories used to classify other than single family houses, but the interpretation of general trends is not sensitive to these differences.

4. Domestication: The enculteration of private cars

The car is not merely a means of transportation. People are using cars in a number of different ways through which they become vehicles of social practices of various kinds. The activities are closely linked through their dependence upon cars and through the fact that they constitute different aspects of chains of action characteristic of the constitution of the modern self. The analytical challenge is to be able to describe and conceptualize these links, the resulting networks and their contingencies.

The concept of domestication is a tool for structuring empirical data to meet this challenge, but it is also useful in organizing material for techno-semiotic analysis. Our interest for the concept, however, is broader. Through the different dimensions of action that are embedded in the concept, we aim to highlight different acts that the users of technology perform in relation to the artifacts. Some of these activities might be detected through technosemiotic analysis, through the reading of the scripts embedded in the artifacts (Akrich 1992, Latour 1992), but this form of analysis exaggerates the ability of designers to influence or direct the actions of users. Users may be configured, but they usually retain a substantial creative space to make their own techno-cultural routines (see Sørensen 1993a). The advantages of the domestication perspective is that it emphasizes the role of the user, and thus enables us to describe the rich details of "impacts".

Domestication implies a lot of different activities which users perform when they integrate artifacts. As with animals, artifacts have to be recognized, taken into possession, interpreted, and tamed. This interactive process should be assumed to be quite open. It is not determined how this set of tasks should be performed. At the same time, these activities have to be performed with reference to the physical properties of the artefact, as well as to sociocultural dimensions like economy, sets of values and knowledge.

Domestication has material, political and symbolical aspects. In the analysis of the way Norwegians domesticate their cars, we have found it useful to borrow from Silverstone, Hirsch and Morley's (1992) analysis of what they call 'the moral economy of the household'. They emphasize four non-discrete elements in the dynamics of this moral economy as it is constituted in the transactional system of commodity and media relations: Appropriation, objectification, incorporation, and conversion. Our concept of domestication involves all these elements.

Appropriation is characterized by activities directly connected with the purchase or obtaining of cars. *Objectification* occurs when the user takes the artifact into possession and define its local role, place, and purpose. These processes might be of an almost ritual character - the user concentrate his or her attention on the artifact and tries to get to know it (McCracken 1990). A common element is that the user is aiming to control the technology. This

aspect is also found in the *incorporation* element: The car is put to use by delegating to the car a position and a role in everyday life. Usually, we expect that the resulting praxis gets an increasingly routinized character. Finally, *conversion* is the process through which the car and its use is employed as means to communicate attitudes and values. The car is converted into cultural symbols. This way, the user tries to extend and clarify his or her personality and social position.

The analysis of *appropriation* of cars is concerned with actions or chains of actions where the user/owner is in an exchange position to the market. The most immediately important aspect relates to the financial side: Which car may one afford to buy, what level of operating expenditures is acceptable, and - as an economic-cultural aspect - to what extent is one willing to give the car economic priority vis-a-vis other sides of the private consumption. Another important dimension concerns the way cars are presented through the marketing and advertisements. The persuation to buy is embedded in a process of representations.

We know from surveys of household expenditures that cars are a heavy load on the economy of households. Most Norwegians today seem to accept this, but nevertheless they are cautious not to spend too much money. One of our informants expresses the argument in the following way:

> *I would never dream of buying a new car, as long as I know how much they lose in value the first years - and later they keep up pretty good. It isn't very much wear and tear during the first 50 000 kilometres. If I had bought a new car I think I would have felt that I had thrown away a lot of money.* (Man, 45 years)

To a lot of people, the price is in fact the most important characteristic of a car. A 44 year old woman who was a single parent with one kid and earnings below the national average, described to us that when she was looking for a car:

> *I looked at ads for used cars before buying. I didn't look for special models, but more after how old the cars were and the price. The most important factor was the price, and that the car wasn't too big.*

Others are in an economic position that allows them to present more specific demands on the qualities of a car. We find the whole range here, from those who claim that the price is the factor of overall importance, to those who claims that price doesn't really matter. The quality of car is constituted subjectively out of a host of possibly important characteristics. Many emphasize symbolic qualities:

Of course the colour means a great deal, when you pay that kind of money I think it is important that the car look good too. I don't know, I don't think I would have bought the car if I didn't like the colour. (Man, 30 years)

It is interesting to note that none of those interviewed has mentioned the practical use of the car as a motivation for buying a car, and their actual choice of model. This indicates the role of the private car as one of the basic commodities of modern Norwegian life where its uses are taken for granted. However, the aspect of daily use and the resulting needs are probably present in the calculations linked to the appropriation element, but too obvious to be talked about.

Objectification is the element of domestication where the appropriated object is so-to-speak made 'visible' to its owner/user. When it comes to the car, objectification means activities like washing, polishing, minor repairs, fitting up extra equipment, styling and so on. We also find activities like the construction of spatial arrangements for the car, e.g. building garages.

The car is a gendered artifact. Our interviews show that male concern with the symbolic aspects of the household very often is articulated through artifacts like the car. Objectification is one way of gendering the car by arranging relations of power and significations within the household. Spouses who formally have the same rights in terms of ownership, may nevertheless have a quite asymmetric relationship to the car and the processes within which it is involved:

We were both involved in the decisions when we bought it. My wife? Well, I suppose she think of it as our car as well. In a way, maybe she thinks of it as mostly mine, but it gives us both pleasures. But of course I use it most often, and I do most of the maintenance and so on. She isn't very interested, as long as it is running ... . (Male, 42 years)

The content and meaning of ownership is confirmed, further developed and recognized through activities linked to the car, and which extend beyond the use of it as mere means of transportation. Users perform more or less ritual actions, all serving to define and visualize the car. The attention is explicitly directed towards taking it into possession - to make it one's own. In the objectification processes there lies a strive to make the car an *object*, a part of your life. Possession rituals vary a lot. One of our informants told as that:

The first thing I do after having bought a car is to look it over, and to wash and polish it. That's the best way to get to know the car. (...) No, not just body surface. Often me and my wife do it together, and

then I usually take the outside and my wife the interior. (Adds, jokingly:) *I have actually been wondering if I shouldn't ask if I could try to wax and polish the car before I buy it, the way it feels is of great importance to me.* (Male, 47 years)

The relationship this informant had to his car was characterised by a kind of caring and 'nursing' which in a sense was as important to him as its ability to transport him. He told us that he had previously owned a car which had been very difficult to wax and polish. Fragments of wax had a tendency to be left over at places with difficult access, and he experienced this as a very irritating quality. Relatively soon, he decided to replace it, and the problems of waxing was a significant cause to sell the car.

The possession rituals related to the objectification of the car is very often concerned to 'smarten up' the car, to give it a 'personal touch'. Some just put their own things in the glove compartment, others decorate the interior, while a few buy styling equipment to shape their car in a particular way. Work is always performed to change a house into a home, and similar activities is done with the car - although usually at a far more modest level. Cars are usually 'furnished' and thus less demanding in terms of possession rituals than a house.

Conversion is the process through which cultural signals are constructed and produced in relation to the artefact. In the case of the car, this occurs in daily use - through patterns of use and manners of driving, as well as through the visual (and auditive) presentation of the artefact itself. 'You are what you drive' is an implicit understanding of modern Norwegian society, although the symbol system is not a straightforward one.

The female informant who emphasized only the purely financial aspects of buying a car, said she had no feeling of any 'presentation of self' through the vehicle:

What I feel I express through the car? Do I really signal anything? Maybe that I'm a single mother with an old Fiat and badly off. I suppose you'll have to have a quite different kind of car in order to express anything substantial through it. (Woman, 44 years)

This statement suggests that cars, when used consciously as symbols, primarily communicate high status and wealth, but also that cars more generally might be read as signifiers of their owners. Anyway, several of our informants daydream about expensive cars, like a BMW or even a Ferrari or Lamborghini. However, this is not primarily because they want to be perceived as rich. In a way these cars are perceived as sexy - by men as well as women. They are fast, elegant and special.

A couple who owns two cars, a Mercedes (his!) and an Opel Cadet (hers!), sees the Mercedes

at least as something robust and reliable. And maybe as rather no-nonsense ... . Audi and BMW have perhaps a more affected and yuppish quality, at least a BMW. (Man, 31 years)

The Cadet they define as small, practical, and easy to drive. It is a car for everyday activities. A number of informants states in a similar vein that they regard their cars as utilities. Some of them want to express just that kind of 'soberness' through their choice of model. Most prefer to explain their choice in rational terms: safety, capacity, and so on, but the kind of concepts they use reflect to some extent gender and cultural class. The car is a flexible cultural sign, able to convey several different messages at the same time.

This is also evident from the advertising of cars. Karlsen (1992) who has studied the marketing of cars in Norway, show that cars are advertised through a conscious use of symbols as an effort to differentiate the model from other models and to appeal to particular groups. For example, Citroen has tried to establish itself as the brand for Norwegians who are attracted by French habits and lifestyle. In this way, advertising offers support to the conversion efforts of car-owners, but it is not clear to what extent this support really hits the mark. Marketing research conducted to sell cars in Norway appears surprisingly primitive in relation to the symbolic aspects of car ownership.

Gender should be expected as a basic dimension of the conversion process. The popular belief is that the car is a male domain, even if more and more women both own and drive automobiles. However, Scharff (1991) documents how the early electric cars came to be identified with femineity, and Hubak (1993) shows how certain models are advertised in Norway in a way which constructs different female identities. Still, when a whole family is presented, men are usually represented in a more active role than women. Moreover, the dominant mode of advertising is either completely without humans or it pictures the man and his car.

Our material indicates that women give more rational accounts of their relationship to cars than men. They have cars to get somewhere, not to be or feel something. However, there are exceptions. Some women want to have spectacular cars, while many male narratives about their cars are just as 'rational' as the typical female ones. Since there is a strong tendency towards equality between the sexes in quantitative terms, like having a driver's licence, being a car-owner, and in the amount of driving, the car as a gendered symbol is changing. The result will certainly not be a gender-free car, but probably that more women will express themselves consciously through their cars.

5. Incorporation: The private car as praxis

The use of private cars is perceived as such a well-known, obvious quality of modern society seldom talked about. Surveys of travelling habits are conducted regularly, producing a discourse of driving which is highly instrumental and often oriented towards economic and planning aspects of transport. We get to know how many people who use the car to get to and from work, to and from shops, to and from leisure activities and holidays, and so on.

A general picture of the way private cars are used in Norway is given in table 3. Driving between the home and the workplace and as a part of the job is a substantial part of the total, as we should expect from the previous reasoning about urban planning differentiating work and living, but it is relatively decreasing. In fact, most of the increase in mobility observed from table 1 for the same period (around 2 200 km) has mainly been caused by driving related to daily care and leisure, including visits to friends and relatives. Surveys of travelling habits also document thoroughly how the private car is incorporated in many main sets of daily life activities (see e.g. Stangeby 1987). To an increasing extent, these activities have come to be reliant on cars to help people perform them.

Table 3. Driven distance of cars and vans according to purpose of journey. 1 quarter 1974, 1980 and 1987. Per cent.[12]

	1973/74	1980	1986
To and from work	24	23	26
Driving as part of work	20	15	11
Driving related to holidays and week-end trips	20	15	14
Other daily trips	36	47	49

We should expect that the increased mobility implies that Norwegians spend more time travelling. However, table 4 shows that the growth in the past twenty years has been moderate. In fact, the greatest change is in the time spent on travelling by car. In 1990-91, 2/3 of time spent travelling is by car. Thus, given the increase in mobility in terms of kilometres (see table 1), the time budget surveys suggest that a main effect of the incorporation of the car

[12]Source: NOS Eie og bruk av personbil, quoted from Næringslivets hovedorganisasjon: *Miljø og transport*, Oslo 1990.

in Norwegian households has been to increase mobility by making transport more time-efficient. Even if cars move slowly in congested urban traffic, it is usually much faster than walking or even biking. Moreover, urban traffic in Norway is not usually that congested, and in rural areas the flow is pretty fast. Table 4 also confirms that the amount of travels in connection with leisure time activities has increased substantially in the 1970s and 1980s, while work-related and housework/care-related travels have not changed very much.

Table 4. Time spent travelling. Hours and minutes 1971-72, 1980-81, 1990-91.[13]

	1971-72	1980-81	1990-91
Journey to work	0.18	0.18	0.20
Travels in connection with household work and family care	0.13	0.10	0.13
Travels in connection with leisure time activities	0.23	0.26	0.32
Other travels	n.a.	0.12	0.11
Total	n.a.	1.07	1.16
Travelled by private car	n.a.	0.35	0.51

In our interviews about driving habits, the data suggest that the instrumental aspects of driving are routinized. Most people who own a car, drive to get to work, to do shopping and to enjoy leisure.

> *I drive to work every day, and also when I shop. Quite often I drive to City Syd or Rema Stavset* (shopping centres on the periphery of the city) *to do my shopping. In between I go for a small trip in the afternoons, and in the summer we usually go up north* (Woman, 44 years, divorced with one child)

Driving to work has become more complicated, however. One retired man remembers that:

[13]Source: NOS: *Tidsbruk og tidsorganisering 1970-1990*, tables 4, 51 and 52.

When I stopped to drive to work, it was mainly because of rush-hour congestion. It wasn't faster by bus than by car, we didn't have any bus-lanes then, but at least you didn't have to concerned with the driving also. It was much more comfortable and relaxing that way. However, gradually buses became so crowded that it might have been more comfortable to drive, but then one had become more conscious about emissions and such things. (Man, 73 years)

Driving patterns are gendered. Women drive less than men, even if the difference is decreasing. In part, this reflects differences in relation to work. Women work closer to home, and they work part-time. Hjorthol (1991) shows that in families with one car, this is most often used by husbands. However, when they have pre-school children, women use the car as much the men. To women, distance affects their use or non-use of cars, less so with men. Thus, men and women incorporate the car to construct gender-specific patterns of transportation.

Tables 3 and 4 emphasize the private car as implicated in the way Norwegians organize their leisure. In fact, it seems that this is the part of their driving pattern that people enjoy to talk about. In relation to work and shopping, the car has made it possible to change the spatial relationship between the home, the work-place and the shops. For most people, the nature of work is independent of car-use, although cars may through increased mobility increase the number of jobs practically available and thus extend the potential labour market. Shopping is an activity where the use of a car facilitates a pattern of buying where it is easy to transport goods, even if they are large or in large quantities. However, shopping is mostly routine and no let-out. In this respect, leisure is far more important, and it is in this respect that car-ownership has come to mean freedom in terms of greatly increased mobility and independence of rails and other public means of transportation which demand planning and structuration of leisure and holidays.

Thus, it should not be surprising that the Norwegian summer holiday is constructed as car-based, as is shown in table 5. 2/3 of Norwegians that go on summer vacation, travel by car, and this has changed little over the period 1970-86. Even when going outside the Nordic countries, 21 per cent go by car.[14]

The use of private cars for holidays led to the invention of camping. Belasco (1981) describes the US development from primitive and un-organized tenting to the more comfortable motel-based travelling between 1910 and 1945. In Norway, camping took off in the late 1950s when a great number of camping sites was established all over the country:

[14]NOS: *Ferieundersøkelsen 1986*, table 39.

The amount of camping (in the late 1950s) *was really incredible. At that time the summer-weather was a bad as today, and we had a kind of migration from middle Norway down south to the Oslo-fjord. It was like if you owned a car, you 'had to' go down to one of the beaches in Vestfold and those areas. Many had sort of permanent spots on the camping sites, and it was so crowded that it was nearly impossible to pass between the tents. (...) Quite early, we began to drive to Sweden also. I believe it was quite common that people in a way extended their range of action: First, areas close by, then down East, gradually some began to go to the Western parts of Norway.* (Man, 73 years)

Table 5. Persons on holiday trip, according to main type of transportation. 1970-1986. Per cent.[15]

	1970	1974	1978	1982	1986
Railway	10%	7%	7%	7%	5%
Airplanes	5%	8%	10%	14%	19%
Private car/taxi	68%	67%	70%	67%	65%
Other	17%	16%	13%	10%	11%
Per cent taking vacation	61%	74%	77%	74%	78%

The incorporation of the car in a household means the development of a particular set of leisure practices. On a general level, there is a 'lexicon' of standard practices: the trip to see friends, the week-end excursion, the sunday trip to outdoor areas, the boy's football match, the girl's riding lesson, on so on. Several aspects are involved here. First and foremost, there is the increase in range of activity. It is possible to go to the mountains and back, just for the week-end. The sunday trip may be varied, a different place to go next time, and it is possible to seek solitude even for city people: You do not have to go in the tracks of everyone else.

Second, the car is a sort of equalizer. You may get around, even if you are a small child, a handicapped person or elderly, because the work of transportation has been delegated from your legs to the vehicle. Also, more important, it does not matter whether you live in rural or urban areas. Everyone has large

[15]Source: NOS: *Ferieundersøkelsen 1986*, tables 6 and 38.

outdoor areas at her or his disposal, as well as urban activities like restaurants, cinemas, museums and galleries.

Third, since the car makes you less dependent of distance, you may choose from a larger repertoire of leisure activities and these activities may become more specialized. This aspect is most important to Norwegian children whose leisure activities has been transformed through the diffusion of private cars. This diffusion has meant increased traffic and greater risk in their neighbourhoods, but also that their parents accept to drive them to and from the organized activities of their choice. Football is less a spontaneous operation performed at a vacant lot near by, it has become organized and so-to-speak professionalised with leagues etc. Similar transformations may be observed with many outdoor playing activities.

The incorporation of cars is not just related to driving. Cars need looking after, they have to be maintained and they may also be rebuilt. Most of our informants say they do little or nothing with their vehicles:

> *I really do as little as possible with car myself. To me it is mainly a means of transport. I can't be bothered by having the car as a hobby also. (...) The most important is that it works, and if it doesn't move, there is usually little I can do about that anyway.* (Man, 24 years)

On the other hand, the same man says that:

> *Some things are easy enough to do oneself, also it is pretty expensive to have it done. I couldn't imagine paying to change tires, for example. But otherwise I have my car serviced.*

In a sense, the car demands certain actions related to control and maintenance:

> *Before we go on holidays I usually look the car over to check that it is all right. I typically bring along a little bag with some tools, fuses, bulbs and other trifles. It's rather hopeless if you get stuck at some isolated place ... of course, it isn't very much repair work I'm able to do on my own, but at least it provides me with a feeling of security.* (Man, 47 years)

The ability to care for and maintain a car depends on the individual skill and interest. As cars have become common and a fine-meshed infrastructure has been set up to cater for them, there has probably been a deskilling of drivers in terms of ability of technical repairs. Still, quite a few men do a lot of work on their cars. One of our informants tells that he has:

... changed brake blocks and brake bands, repaired a hole in the silencer, mended the clutch once together with my pal, mended some damages of the paint. ... I have replaced spark plugs and pins, changed fan belts a couple of times. And such things as wiper blades and tires. But that is the kind of things that most people do themselves, isn't it? (Man, 28 years)

This kind of repair and maintenance work may be an occasion for male socializing, to have a friend over to help or to discuss the problem with colleagues or neighbours. The above informant says he has a pal who is knowledgeable about cars and sometimes help him out with more demanding tasks.

Another aspect of the incorporation of cars is related to the way people drive and the resulting traffic culture. Here is a very interesting field because it is a cross-section of different actor-networks related to cars. We have the car manufacturers who through their scripts stage certain aspects of driving, like the signal system, the speeding process, etc. We have the highway and traffic engineers who stage driving through the shaping of roads and road systems. They delegate to the roads to influence speed through bumps and narrow passes and to the traffic lights the role of managing flows of traffic. We have the traffic safety network who try to affect driving through the training of drivers, information campaigns, speed limits and manual and automatic traffic control.

The result is not one programme of action like in the situation analyzed by Latour et al (1992), but several programmes, partly aligned, partly contradictory. This may make the situation for drivers *overdetermined*, sociotechnically speaking. They are not able to comply with nor protest against all programmes. They have to construct their own style, which probably is a main reason than many of our informants perceive driving as substantially idiosyncratic.

5. Morality and mobility

In the last 10-15 years, the study of travelling habits has been concerned with the possibility that people could shift from private cars to public transport. To many Norwegians, this places them in moral dilemma. They know that they *ought to* use public transport because private cars cause environmental problems. They are reminded that to drive their own vehicle is sinful.

The importance of the moral aspect of the car is also indicated by the fact that most Norwegians are prepared to explain why they have a car. Even if cars are a very common part of modern life, close to be a matter of course, they are not the same kind of basic necessity like a house. Nevertheless, some informants are quite blunt about the issue:

How important it is to me? Well, I couldn't do without it. I haven't got the time to manage without a car. And then you get used to it, and becomes dependent in a way.

What is dependence? A 44 year old women, badly off in terms of economy, told us that:

I've always had a car. I guess I'm pretty much dependent on it. (...) Dependent may be a little strong. But then again, I really don't know. The way things are with public transport now, I'm in a way dependent. When you work shifts, you sometimes work at hours when there is no buses at all, Sunday mornings ... (Interviewer: How often is that?) *Oh, let us see, it varies - but it may be around every seventh or eighth week that I'm working early Sundays.*

The bottom line is that the argument about the car as a strict necessity does not seem that compelling.

Moreover, in the final instance, most people find that they could do without a car if they really had to, but they see this as a pretty awkward situation. The car makes life easier, and in a sense it belongs in the household:

I believe the kids would have objected if we had got rid of the car. It is something about that this is something one should have. It isn't that they use it so much, they are too young to drive themselves, and we don't have to drive them ourselves so much any more. The point is that it belongs to the family, not exactly the car we have now, but some car ... . (Man, 47 years)

There are a lot of norms and rules concerning cars. Traffic rules, including speed limits and parking, technical requirements, insurance requirements, etc. have been set up to regulate car use to make it work. Traffic should flow, but it should also be safe. The breaking of such rules have become an important part of risk-taking and management of everyday morality. Judging from the official statistics of registered dismeanours, the car is an instigator of increasing immorality. The large increase in the total number of traffic dismeanours is produced by the growth in car ownership, not in growth of dismeanours per car. The category of traffic dismeanours does not include parking tickets after 1970, and are further measurement problems. However, the general trend should not be very sensitive to this.

The quite significant number of traffic dismeanours is partly an effect of the previously noted phenomenon that there are several, non-aligned programmes to regulate driving and car-ownership. The number of traffic dismeanours, which is only the proverbial tip of the iceberg, shows that one

important kind of anti-programme on the behalf of users is not to comply with the rules. Most drivers probably brake traffic rules quite often, but without being caught or giving rise to accidents. There is good reason to believe that in a legal sense, the car is the most important moral problem of high modern societies.

Table 6. Number of traffic dismeanours and traffic dismeanours in per cent of all dismeanours. 1946-1990.[16]

	1950	1960	1970	1980	1990
Number of traffic dismeanours (in 1000)	6	24	61	101	150
Traffic dismeanours per car	0,09	0,11	0,09	0,08	0,09
Traffic dismeanours in per cent of all dismeanours	n.a.	n.a.	n.a.	81%	88%

To drive a car is risky, to the driver as well as to innocent bystanders or by-drivers. A great number of people are killed or maimed in traffic accidents every year. This has been seen as the most problematic aspect of private car-based mobility. In some sense, it is puzzling that the risk of private cars are accepted.

However, most of our informants are not very concerned with this aspect. They know driving may be dangerous, and many of them tell about dangerous situations they have been involved in. Some of them, in particular men, are also rather proud of their ability to manage risky situations. The point is that risk is not something that people want to avoid. In fact quite many see some risk as positive, probably because it represents challenges and a break from the everyday life routines within which they are otherwise solidly embedded. The role of the car as so-to-speak instigator of risks and rule-breaking behaviour, may have a very interesting and quite important function as a crystallization point of 'immoral' action in a well-regulated and otherwise quite safe society. However, at this stage of our research, this remark is suggestive rather than descriptive.

[16]Sources: NOS: *Historisk statistikk 1978*, table 338; NOS: *Statistisk årbok 1982*, table 432; NOS: *Statistisk årbok 1992*, table 153.

6. Mobile sociology?

What should be meant by a sociology of cars? How should we proceed to develop such approaches? The present state of sociology of technology does not allow any unambiguous answers to questions of this nature. This is due partly to important disagreements within the field, partly to the present emphasis on research, development and design of technology (see Sørensen 1993b). What may be learnt from the efforts in this paper?

Some of the present debates within social studies of science and technology focus on normative issues. With regard to our subject, we could ask if a proper sociology of cars should be *a priori* critical of private cars and consciously elaborated to demonstrate the problematic nature of this mode of transport to politicians and the general public? We have tried to explore a different route, not because we see ourselves as 'car-friendly', but because we cannot see that an explicitly 'car-critical' strategy gives any interesting a priori suggestions that allows fresh insights into the role of cars in modern societies. As mentioned in the introduction, the critical literature on cars puts to much emphasis on describing the problems with this mode of transport and gives too little room for reflections about what cars means to modern men and women. In political terms, it means that in our opinion, car critics usually are too eager to argue *why* the use of private cars should be restricted, while they neglect the sine qua non of political strategy, namely how to proceed to implement such restrictions. Of course, such implementation calls for legitimation, but the real challenge is to develop scenarios of societies less dependent on cars and an understanding of what it takes to get people to accept and even struggle for such scenarios (Sørensen 1993b).

A main point of our sociology of cars is that this artefact cannot be analyzed as external to a high modern society like the Norwegian. On the contrary, private cars are so integrated into its socio-technical texture that it takes a large-scale socio-technical change - some might say a revolution - to be able to reduce the use of cars in a substantial manner. We have tried to highlight a few aspects of this integration. One is the physical or socio-technical shape of society, the outcome of planning of urban and rural districts in terms of the spatial relationship between residential, working, shopping and leisure areas. Another, related point is the preferred way of living in terms of the single family dwelling and private car-complex. This also includes the shaping of leisure activities through the use of private cars as means of transport, the importance of face-to-face contact in spite of considerable physical distance, etc.

Consequently, the result of the large-scale, multi-level *domestication* of cars in Norway in the 20th century has important material as well as political and cultural features. To reduce the role of private cars, one need not only change individual values and habits, but also the physical and political

infrastructure. Analytically, one has to deal with the perception of cars as a basic necessity. This perception cannot be easily dismissed. Even if surveys show that a substantial number of Norwegian think they can do without a car by using public transport or walk/bicycle, most of them would in practice spend more time on transport and they would probably have to change living, working and leisure habits. Many would probably also want to relocate their homes. The costs in terms of money and loss of mobility are so large that we cannot expect them to be incurred on an individual basis. To reduce the role of cars in modern Norway is a far more radical project than assumed by those presently arguing this change as an environmental necessity.

Earlier, the social study of cars was performed in terms of 'impacts': What were the consequences of a large-scale introduction of cars? Recent constructivist efforts produces a basis for reformulating the problem (Latour 1987, Bijker and Law 1992). The cause-effect relationship between cars and society is replaced by an effort to study the non-human actors (cars) in interaction with humans (society). This paper is based on this approach. However, it is used with some leniency.

Within constructivism there is disagreement about the role of artifacts in the shaping of socio-technical relations. Collins and Yearly (1992 a, b) argue that the outcome of scientific work (and by analog, technology) is negotiated by human actors and them alone. Callon and Latour (1992) maintain that also non-human actors (actants) should be included as an independent part of the analysis. What is at stake here, is whether or not technology matters. While previous efforts of social studies of technology have assumed that technical artifacts and systems did - to some extent, at least - direct human action, it has proved difficult to differentiate the material and the social influences.[17] Collins and Yearly are correct in their call for attention to the problem of observing so-to-speak the voice of artifacts. On the other hand, their solution is intuitively unsatisfactory because it makes it difficult to understand how sociotechnical patterns are sustained but also destabilized through artifacts.

In our analysis, we have not directly confronted the challenge of mapping out the potential roles of cars as non-human actors. However, we have assumed that the technical part of the socio-technical texture has an important bearing of what the resulting system can do. The further development of a sociology of technology needs to clarify such issues also.

A main point is still what should be recognized as a sociology of technology. Here, we want to emphasize the importance of using cars as a sort of peeking-hole to understand modern society. The introduction of Giddens' analysis of modernity in the introduction of the paper was meant to open of a broader agenda for the sociology of cars than just studying vehicles. We

[17]See Sørensen 1993a for a more detailed discussion.

believe that we have demonstrated that to study cars, in the way we have done in the case of Norway, opens up a new possibility of an empirical understanding of what modernity is all about, in particular the meaning of the revolution in mobility.

The car very much examplifies the mechanisms of disembedding and reembedding which are central to Giddens' (1990) ananlysis. Mass automobility represents a decontextualization of social relations because of the introduction of a universalized vehicle, and because increased mobility makes it possible to transcend the localized nature of traditional everyday life. However, at the same time, the car has proven to be a catalyst of a host of new institutions. Some of these may be typical of the abstract expert systems Giddens argue as central to modern society, e.g. garages and the great number of public institutions developed to regulate cars. On the other hand, cars are domesticated in a manner which is influenced by local conditions. In particular, the symbolic functions are worked out in a local context.

Is there a modernity without cars? We would hope so, but the car is very much a vehicle of the kind of modernity with which we are acquainted: a fluctuating, ever-changing, mobile society. Perhaps the car is more of a key to a post-modern society than the much focused information technology. While this technology seems unable to bring an end to modernity, a dramatic reduction in the use of cars could.

7. Literature

Akrich, M (1992): 'The de-scription of technical objects', in W Bijker and J Law, eds: *Shaping technology/Building society*, Cambridge, MA: MIT press

Allen, F R (1957): "The Automobile", in F R Allen, ed: *Technology and social change*, New York: Appleton-Century Crofts

Belasco, W J (1979): *Americans on the road. From autocamp to motel*, Cambridge, MA: MIT press

Berman, M (1983): *All that is solid melts into air. The experience of modernity*, London: Verso

Bijker, W and J Law, eds (1992): *Shaping technology/Building society*, Cambridge, MA: MIT press

Bjørnland, D (1989): *Vegen og samfunnet*, Oslo: Vegdirektoratet

Bleviss, D H (1990): "The role of the automobile. Future transportation, environmental and energy needs", *Energy Policy*, 18 (2), 137-148.

Bottles, S L (1987): *Los Angeles and the automobile. The making of the modern city*, Berkeley: University of California Press

Callon, M and B Latour (1992): 'Don't throw the baby out with the Bath school!', in A Pickering: *Science as culture and practice*, Chicago: Chicago University press

Collins, H and S Yearly (1992a): 'Epistemological chicken', in A Pickering: *Science as culture and practice*, Chicago: Chicago University press

Collins, H and S Yearly (1992b): Journey into space', in A Pickering: *Science as culture and practice*, Chicago: Chicago University press

Dettelbach, C G (1976): *In the driver's seat. The automobile in American literature and popular culture*, Westport, Connecticut: Greenwood press

Flink, J (1988): *The Automobile Age*, Cambridge, MA: MIT press

Giddens, A (1990): *The consequences of modernity*, London: Polity Press

Giddens, A (1991): *Modernity and self-identity. Self and society in the late modern age*, Stanford, CA: Stanford University Press

Hjorthol, R (1991): 'Reisen mellom hjem og jobb. Ektefellers arbeidsreiser - fordeling av tid og transportressurser', in R Haukaa, ed: *Nye kvinner, nye menn*, Oslo: Ad Notam

Hubak, M (1993): 'Bilreklame og kjønn', *Sosiologi idag*, 24 (2-3), 75-102

Karlsen, M H (1992): *Den forførende bilen. En analyse av markedsføring som sosioteknisk handlingsfelt*, STS-report 16, Trondheim: Centre for technology and society

Latour, B (1987): *Science in action*, Milton Keyenes: Open University Press

Latour, B (1988): *The Pasteurization of France*, Cambridge, MA: Harvard University Press

Latour, B (1992): "Where are the missing masses? The sociology of a few mundane artifacts", in W Bijker and J Law, eds: *Shaping technology/Building society*, Cambridge, MA: MIT press

Latour, B, P Maugin and G Teil (1992): "A Note on Socio-Technical Graphs", *Social Studies of Science*, 22 (1), 33-58

Lefebvre, H (1971): *Everyday Life in the Modern World*, London: Allen Lane

Lewis D L and L Goldstein, eds (1983): *The automobile and American car culture*, Ann Arbor: The University of Michigan Press

Ling, P J (1990): *America and the automobile. Technology, reform and social change 1893-1923*, Manchester: Manchester University Press

Lowe, M D (1990): *Alternatives to the Automobile: Transport for Livable Cities*, Worldwatch paper no 98

McCracken, G (1990): *Culture & consumption. New approaches to the symbolic character of consumer goods and activities*, Bloomington, IN: Indiana University Press

Pickering, A (1992): *Science as culture and practice*, Chicago: Chicago University press

Renner, M (1988): *Rethinking the Role of the Automobile*, Worldwatch paper no 84

Sachs, W (1992): *For love of the automobile. Looking back into the history of our desires*, Berkeley: University of California Press

Scharff, V (1991): *Taking the wheel. Women and the coming of the motor age*, New York: The Free Press

Silverstone, R, E Hirsch and D Morley (1992): 'Information and communication technologies and the moral economy of the household', in R Silverstone and E Hirsch, eds: *Consuming technologies. Media and information in domestic spaces*, London: Routledge

Stangeby, I (1987): *Reisevaner i Norge*, Oslo: Transportøkonomisk institutt

Sørensen, K H (1991): 'The Norwegian Car', in K H Sørensen and A-J Berg, eds: *Technology and everyday life: Trajectories and transformations*, report no 5, Oslo: NAVF-NTNF-NORAS

Sørensen, K H (1993a): 'Domesticating technology', forthcoming as *STS working paper*, Trondheim: Centre for technology and society

Sørensen, K H (1993b): 'Constructivism and the analysis of technology. A pragmatic approach to a sociology of technology', forthcoming as *STS working paper*, Trondheim: Centre for technology and society

Tedlow, R S (1990): *New and improved. The story of mass marketing in America*, New York: Basic Books

Thomassen, Ø (1992): *Bil i by. Trafikkplanlegging i Trondheim i 1960-åra*, STS report no 14, Trondheim: Centre for technology and society

Wachs, M and M Crawford, eds (1992): *The car and the city. The automobile, the built environment, and daily urban life*, Ann Arbor: University of Michigan Press

Østby, P (1991): 'A steel Phoenix - Some aspects of Norwegian car politics 1950-1970', *STS working papers*, 3/91, Trondheim: Centre for technology and society