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# Hyperautomobility and its Sociomaterial Impacts

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## Abstract

In the latter years of the 20th Century in the developed world, auto use has reached a new level--"hyperautomobility." Hyperautomobility is characterised by a high intensity of car use. It underlies a new focus in the environmental management of car troubles--"landspace" consumption and degradation. This shift challenges the traditional "technological fix" approach to car troubels (i.e., catalytic converters for air pollution), because landspace consumption and degradation are effectively controlled through the regulation of car use, not through the technological enhancement of cars. The landspace impacts of hyperautomobility are sociomaterial in nature (i.e., the impact of increased traffic upon community). An application of Life cycle Assessment to the material infrastructures of hyperautomobility could be a useful tool for calibrating decision-making in transport planning.

## 1. Introduction

The diffusion of the car as the prime means of daily transport in the most developed nations over the course of the 20th Century has led to the creation of auto centered transport. Auto centered transport has been, in turn, in the last years of the Century, the basis for an extension of car transport to a new and higher level--hyperautomobility. Hyperautomobility is characterized by both a high extent (density) and a high depth (intensity) of car use. Hyperautomobility is having a growing impact upon landspace in two ways. Firstly, the increased scale of auto-generated material infrastructures (roadways, car parks, etc.) has consumed greater land (at ground level) and space (above and below ground level), and often the most desirable landspace (i.e., located near population concentrations). This consumption by auto centered transport has subtracted (for landspace is, after all, a zero-sum and a finite resource) from other uses, including greenbelts, farms, parks, and forests. Currently, auto centered transport is documented to consume anywhere from 10 percent--in the Rhine-Ruhr agglomeration--to 60 percent of land--in the Southern California agglomeration (Button and Rothengatter 1989:42). Additionally, auto centered transport has led to the development of car-friendly commercial and social enterprise, and the subsequent transformation of community. Thus, for example, the construction of megastores, shopping malls (including cinemas and other recreational sites) on the outskirts of built-up areas has led to the decline

of village, town, and city centres.

Secondly, the increased intensity of car use is having a feedback effect: Further increases in landspace consumption by auto centered transport. More vehicular traffic is leading (guided by conventional auto-friendly planning) to expansion of the system through widening of roadways, the creation of by-passes, etc., and through the spill-over of car traffic onto secondary and tertiary roadways. The latter has made many country lanes in the English home counties difficult to navigate for their traditional users--pedestrians, cyclists, equestrians, farm vehicles, and livestock.

As well has having social effects, the car's consumption of landspace adds to its environmental impacts:

> Roadbuilding is disruptive of the natural environment and requires large quantities of stone, aggregate and bitumen, the extractions of which generate their own negative environmental effects. From a French study (cited in Lamure, 1990), it is also clear that maintenance of infrastructure is a major consumer of energy--accounting for as much as 30 per cent of the undiscounted total energy cost of road infrastructure, including construction and its use by vehicles, over a 25-year time horizon. Excessive use of transport has, therefore, major backward multiplier linkages on the natural environment through the mechanical and civil engineering based industries and on back to the extractive industries (Button and Rothengatter 1993:24).

Roadways also impact ambient land: "Besides raising questions of exploitation of non-renewable land resources, [transport infrastructure] also has serious implications for such things as drainage and water ecology" (Button and Rothengatter 1993:42). A more general environmental impact of increasing car use is that transport, and auto transport in particular, is both energy and material intensive: "This means that the trend towards increased car use has had very significant impacts on the material intensity of transportation services" (Jackson 1996:137).

The traditional concerns with the car's negative effects-- pollution, energy consumption, and accidents--have been addressed by technological fixes, including seat belts, catalytic converters, etc. While there are limits to such technological fixes (for example, while standardized death rates from car

accidents have fallen, absolute rates remain unacceptably high), they have resulted in substantial improvements in the emission controls, energy efficiency, and safety of individual cars. However, hyperautomobility's stepped-up intensity means that the absolute effectiveness of these technological fixes may fall behind the sheer increase in auto use. So, while we have less polluting, more fuel efficient, and safer cars, we are also likely to have continuing high levels of pollution, energy consumption, and roadway deaths and injuries.

Most importantly, the new car troubles of landspace consumption and degradation are not readily amenable to technological fixes. Thus, the most advanced contemporary reforms in transport have moved towards the control of the demand for car travel--towards regulation and restriction of auto use. This is because landspace consumption and degradation can not effectively be limited by improvements in individual car technology; they can be addressed only by controlling the intensity of car use.

## 2. The Sociomateriality of Auto Centered Transport Systems

Auto centered transport systems involve particular forms of vehicle-platform technology as well as techniques that facilitate safety, the smooth flow of traffic, etc. It is important to understand how these technical practices are socially patterned. In order to appreciate the full range of consequences of technologies, it is critical to distinguish between their material properties and the social organisation of their use (Fischer 1985). Sclove (1995:17) argues that "the use of technologies do not merely affect societies or states, they also constitute a substantial portion of societies and states." The social organisation of the use of technologies involves systems of social relations as well as forms of subjectivity. As such, they are a species of social structure and need to be analysed as such. It can be argued that the basic elements of auto technology, e.g., the internal combustion engine, are not as critical to understanding automobility as is its social organisation; that is, how technical elements are used in society (Feenberg 1990). This distinction is not always made in discussions of technology, resulting in an implicit technological determinism.

The new problem faced by society is not the individual car and the valued flexibility and mobility which it provides, but auto centered transport systems that make all travelers dependent upon the car as the sole means of negotiating distances (Freund and Martin 1993). Auto centered transport systems penalise

those who can not drive, those who do not wish to drive (for some or all of their trips), and those who can not afford to drive, for it offers them no reasonable alternative transport.

Unlike the railroad that preceded it, the auto is dependent upon public space and the provision of an infrastructure by the public purse. It is:

> . . . an engineering industry carried on, not privately within the walls of a factory, but in public spaces where people are living, working, shopping and going about their daily business. The noise, smell, danger and other unpleasant features of large, fast-moving machinery are brought close to people, with potentially devastating consequences for the human environment (Thomson 1974, cited in Button and Rothengatter 1993:20).

The problem is thus neither "the automobile" nor "auto culture" but auto centered transport systems in which auto dependency is high, alternative modes of transport are non-existent or neglected--systems in which the car dominates mobility and its infrastructures dominate landspace. A key sign of extensively developed auto centered transport is a high level of travel that is generated merely in order to maintain participation in the system. In the US, while auto trips that are functional or recreational comprise the majority of all trips, the fastest growing category is transport-generated trips. This "transport work" includes trips for servicing the auto and for chauffeuring non-drivers.

Auto centered transport systems are not only constructed in social (or public) space, they are materially embedded. Their infrastructures are thoroughly integrated within our built environments; indeed, the auto and its myriad accouterments have come to be the prime movers in the construction of built environments--"sprawl" is an example. Vast areas of our landspace are now encrusted with the concrete, steel and asphalt infrastructures of an individual consumer good--the private auto. Auto use on the scale practiced in the most developed societies requires an elaborate and expensive sociomaterial infrastructure of roadways, traffic controls, policing functions, parking facilities, repair and fueling sites, etc.

As auto use has grown, the sites of the daily round of social life have become more dispersed, making the car a necessity. It is in this way that it contributes to what Sachs (1990:150) has called an "exploding radius of activity" in contemporary life. Thus, the expansion of automobility, coupled with its intense sociomateriality, have greatly enlarged the "ecological footprint" of transport--so

much so that the United Nations, in a contemporary effort to develop international indicators of land use points out that "strong links exist with the transport sector, in particular in the area of spatial planning for transportation infrastructure in urban areas" (United Nations 1998:26).

## 3. The Emergence of Hyperautomobility

The development of automobility is currently in a new stage. Since 1955, auto consumption has reached maturity in the most developed nations, which is now a replacement market. Thus, for example, in the US between 1985 and 1995, auto consumption grew by a relatively modest 6 percent, the lowest since the Great Depression/World War II years of 1935-1945. The news with regard to the auto is that we have entered an era of mass motorization and individualization of movement. While earlier mass automobilisation was highlighted by extraordinary growth in the consumption ("buying") of autos, mass motorization and individualization of movement represent extraordinary growth in the use ("driving") of autos--the extension of automobilisation to more and more journeys. Thus, hyperautomobility represents a shift from the extensive development of auto transport, in which more people have to own cars, to its intensive development, in which people have to use cars more. [The threshold of hyperautomobility may be benchmarked by the consumption rate of more than one car per driver, which has been gauged to have been reached in the US in 1990 (Gilbert 1998:22).] Key to this transition has been the creation of a sociomaterial infrastructure that mandates increased automobility.

Hyperautomobility can be dated in the US from the years of the late 1970s/early 1980s, coincident with and a vital component in a restructuring of the economy. Between 1970 and 1980, annual growth rates in auto consumption outpaced increases in auto use by a factor of 1.2, but since 1980 the relationship has been inverted. Between 1980 and 1990, annual increases in use outpaced increases in consumption by a factor of 2.8; between 1990 and 1994, by a factor of 13. Thus, between 1977 and 1990, the number of cars per person increased by a modest 13 percent, while the daily car trips per person increased by 30 percent and the daily car miles per person by 39 percent. (The average occupancy for all car trips declined from 1.9 to 1.6 persons.)

The new pattern of hyperautomobility is becoming evident in Western Europe as well. One source has reported that car ownership was up by 35.0 per cent in

the UK between 1980 and 1990 but that car traffic was up by 56.2 per cent (Banister 1994:10). Other data indicate the same pattern. Between 1970 and 1985, vehicle-kilometers per capita increased by an annual average of 2.7 per cent in the UK; these annual increases were up sharply between 1985 and 1992. Road traffic intensities (measured in vehicle-kilometers per $1000 of GDP) in all OECD countries rose by only about 1 per cent in 1980-85, and by about 2 per cent in 1985-90, but by about 15 percent in 1990-95. A similar pattern is observed in increases in traffic per network length. These large increases in auto use have occurred at a time when auto densities (measured in vehicles per capita and per roadway network length) have only moderately increased in OECD countries.

The dating of hyperautomobility is consistent with an analysis of shifting technoeconomic paradigms by Lo (1994), who places a transition as occurring between 1980 and 1990. Also, the dating is supported by a recent analysis of changes in transport $CO^2$ emissions in the US. The researchers found that:

> . . . the fast growth of passenger transportation became the dominant driving force for the growth of transportation energy use and $CO^2$ emissions in the 1980-91 period. At the same time, population growth was replaced as the primary engine of growth by the growth in propensity to travel (Lakshmanan and Han 1997:13).

Finally, the dating is supported by a comparative analysis of auto fuel use in eight developed nations. In all the nations, there was a noticeable increase in distance traveled per auto between 1980 and 1991 (Schipper 1993:1182).

## 4. Old and New Car Troubles

While critiques of the auto have been around as long as the auto itself, they were isolated and sporadic until the 1960s. Since then, there has been a growing body of work devoted specifically to addressing "car troubles." This work has focused on the adverse environmental impacts of mass auto consumption, primarily in the form of air pollution and intensive consumption of non-renewable energy (e.g., Gordon 1991). However, it is the impact of auto transport on landspace that is the focus here. Auto centered transport is seen as the prime agent in the reconstruction of our sociomaterial landscapes, which in turn bears significantly on group relations and on the constitution of communities. Auto centered transport also greatly expands the ecological footprint of transport, with

potentially serious consequences for natural environments.

The impacts of hyperautomobility flow from its consumption density and its use intensity. Density refers to the extent of the auto, as measured by its consumption rates--registrations which ensue from buying an auto, standardized for human population. Even in the most auto-saturated nation in the world, the US, auto consumption rates are still growing modestly; thus, the scale of consumption remains an issue, especially with regard to pollution of the air. Intensity refers to the depth of auto use, as measured by vehicle-kilometers, standardized for vehicle or human population, or for length of roadway. The growing problems of traffic congestion and landspace degradation are examples of the issues associated with the intensity of auto use.

With regard to many environmental impacts of cars, much has been learned since the 1960s about resource depletion and about environmental degradation (in the form of pollutants, including noise). Much has also been learned about the safety and health impacts of auto use--the injuries and fatalities resulting from road accidents. These problems have been economically assessed as the external costs of automobility. Amelioration in the form of technological fixes (e.g., reformulated fuels, seat belts) and of individual behavior modifications (e.g., greater control of drunken drivers) has followed increased knowledge about these environmental and safety impacts of automobility. However, much remains to be learned (and researched) about the sociomaterial impacts of hyperautomobility.

## 5. Spatial Contradictions of Auto Ecology

Hyperautomobility and its sociomaterial intensity have an impact on the social organisation of landspace; for example, in dispersing and severing settlements, and in producing specifically spatial counterproductivity such as congestion (Bowring 1995). As Beckenbach (1989:80) points out, some of the social costs incurred by contemporary society lie in its organisation and use of landspace: "One of the social costs is the increase in traffic (and all its subsequent problems), which is connected with the separation of living, working and leisure activities."

Social relations, while not determined by spatial contexts, are always spatial and they exist in "certain produced frameworks of spatialities" (Harvey 1996:112). Auto centered transport systems facilitate the commoditisation of landspace and

the erosion of sociospatial matrices in which civil society can thrive in a democratic fashion. For example, the dominance of the auto in traffic contributes to a decline in street life. Thus, auto use crystallises an important connection between landspace and social life; it amounts to a new level of separation among people. This separation is dramatically demonstrated in the arrival on the social scene of roadway-generated interpersonal conflict (i.e., "road rage"), attributable in large measure to the stresses and the depersonalisation of navigating through increasingly congested auto centered transport landspace. The socioecological influence of automobility leads to severances in social landspace:

> Communities are often divided by major infrastructure developments, especially in residential urban areas, which can result in social fragmentation. While some elements of the adverse effects his has on local environment are encapsulated in such things as accident statistics and the state of the local atmosphere, there are also often significant social implications in terms of the quality of life which segmented communities can enjoy (Button and Rothengatter 1993:42).

(Of course, severances created by auto infrastructures also partition the natural habitats and ecosystems of non-human lifeforms; "road kill" is the most dramatic expression of this.)

Activity sites and communities are increasingly more segregated from each other because of the exploding radius of activity encouraged by auto centered transport, which fosters both the homogenisation and fragmentation of landspace. Roadways also separate areas that are proximate, dividing adjoining communities. Indeed, roadways have become the major delineator of community boundaries in auto centered landspace. For example, Davis (1990) argues that freeways serve as moats separating racial and class territories in contemporary Los Angeles. Automobility also fosters hierarchically structured landspace and, ironically (given the claims that the auto embodies freedom), abets the penetration of governmental power into the spatial contexts of everyday life (Soja 1989). Automobility is, after all, the most extensively and intensively state-regulated activity of our daily lives.

## 6. A New Politics of Landspace?

Public concern about auto safety, emissions, and energy consumption has

resulted in significant reform since the 1960s. This burst of regulatory control can not be separated from the general social movement activity of the period, especially the emergence of an environmental movement. The new regulations led to safer, cleaner, and more fuel efficient cars, achieved through improved technologies. Thus, the logic of the technological fix--achieving the "good life" through the consumption of ever-improving technology--was reinforced, and public concern about the auto abated.

Consolidation of this period of reform and the end of the fuel supply crisis of the early 1970s set the stage for the contemporary increase in auto use--hyperautomobility. While air pollution, safety, and fuel efficiency remain major problems and the paramount concerns of both the general public and policy makers, there are now a new set of auto-generated problems, based on the new scale of auto use. The increasing frequency and length of auto trips, especially of autos carrying only their drivers, is the basis of the next generation of auto troubles. Thus, hyperautomobility shifts the ground of political mobilisation in a significant way. Auto use is less amenable to technological amelioration on the production side, as in the abatement of emissions achieved through unleaded fuel and catalytic converters. Thus, the regulation of auto use shifts the focus of state control away from the realm of production and towards the realm of consumption.

The politics being generated at this new level of auto troubles are based on the embedding of auto centered transport systems within built environments (the sociomaterial basis for hyperautomobility) and their resultant impacts on social groups and social relations; it is a politics of landspace. The political protest propelling current auto critiques is based in grass-roots mobilisations against the siting of roadways and other infrastructures of auto centeredness, including megastores, towers for mobile phone systems, etc., to the detriment of neighbourhoods, communities, and open spaces. Thus, coincident with the emergence of hyperautomobility is growing local activism around transport, social justice, and civil rights (Bullard and Johnson 1997). The auto has become a significant issue with regard to social space because its supporting material infrastructures now dominate our built environments and bear heavily upon the quality of our habitat (not just the quality of our air), as well as on the quality of our movement.

Thus, the contradictions of auto centered transport have opened up a contested

terrain (sociopolitical and material terrain) within which social protest has emerged. This protest includes anti-roadway groups, grass-roots groups concerned with road safety and traffic pollution, cyclists and pedestrians contesting the car's domination of transport space, and consumer groups pushing for more readily available and affordable alternatives to auto transport. Conflict centered on landspace is at the heart of these popular protests. Transport policy is now increasingly being challenged by activists of various stripes--environmentalists, consumers, green-reds, and green-blacks. New single-issue groups devoted to landspace issues blossomed in the late 1980s and early 1990s in both the US and the UK; they include Alarm UK, Critical Mass, and Reclaim the Streets. Additionally, more generalist environmental groups, including Friends of the Earth, Greenpeace, and Earth First, have increasingly taken up landspace issues. Thus, the sociomaterial contradictions of auto centered transport have served to articulate environmental issues with issues of social justice.

## 7. Conclusion: Consuming Transport

In the most developed world, energy efficiency, pollution abatement, and auto safety have all improved since the 1960s. Yet, these problems remain at unacceptably high levels because many of the gains in air quality, fuel efficiency, and safety are being offset by increased auto use. At the same time other problems are being generated by automobility. Despite counter tendencies, in the US, an auto centered transport system continues to push the envelope--to a hyperautomobility which furthers and deepens the contradictions of auto dependence. In Western Europe, rail, cycling and walking are more valorized and there are better developed infrastructures for their use. While auto dependence is not as intense and pervasive and the evidence for hyperautomobility is not as clear as in the US, Western Europe apparently is headed in the same direction.

Despite a recognition in Western European nations of the problems involved in the path taken by the US, it is proving immensely difficult to control the ongoing expansion of automobility. In the UK, for about a decade policy framers have been cautioning the government and the public that technological improvements alone will not be sufficient to manage the environmental and social impacts of increased traffic growth (Department of Environment, Transport and the Regions 1998; Royal Commission on Environmental

Pollution 1994, 1997). Despite this "new realism" since about 1990 that the demand for road space must be reduced, and despite widespread popular protests, roadways continue to expand incrementally. According to Steensberg (1997:322), "environmentally-friendly urban transport policies are now frequently presented, but implementation in practice is still lagging far behind agreement on principles."

Such an "implementation in practice" requires better empirical data about the environmental costs of hyperautomobility. Thus, it is probably overdue for a tool such as life cycle assessment to be more systematically applied to the material infrastructures of automobility. Thus far, LCA, when used, has focused on the production of individual automobiles (for example, see Freemantle 1995). The material intensity of increased car use, and of the production and maintenance of car infrastructures, merit more attention from LCA practitioners.

LCA applications to the issues of hyperautomobility will require a shift in the traditional focus of car troubles. From the perspective of the conceptual framework for decision-making for sustainable development (Cowell, Hogan and Clift 1997:4), sustainable development decision-making lies at the conjuncture of the natural and physical sciences ("scientific") sphere, the micro-economic and technology ("business") sphere, and the social and macro-economic ("societal") sphere. It is the first two spheres and their overlap that have been the focus of decision-making for the older car troubles of pollution, energy consumption, and accidents. The newer car troubles centring on the degradation of landspace demand greater attention to the third sphere--the societal. This is because any reduction in these newer car troubles will require a refocusing away from car-road technological innovation and application, and towards social control of car-road use. The specifications of such a refocusing demand more attention from current research, including LCA.

There are a number of compelling reasons for looking at hyperautomobility as a mode of consumption, and at the sociomaterial contradictions that it generates. The mass production and mass consumption of autos (with their attendant economies of scale) continue to function as engines for contemporary economies. Just as a mode of production permeates and influences everyday life, so does a mode of consumption. It is not only production time ("work") as praxis that organizes a sociomaterial existence, so does consumption time

("lifestyle"). Automobile consumption and use carry the potential to have enormous and far-reaching effects on the material--particularly the spatial--conditions of everyday life.

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