From 'Freedom of the open road' to 'cocooning': understanding resistance to change in personal private automobility.

Abstract

This review paper takes the perspective of cultures of automobility in an historical context to understand resistance to attempts to alter the personal automobility paradigm with more sustainable alternative mobility concepts. The paper seeks to urge caution upon those that identify 'peak car' or an imminent socio-technical transition to sustainable mobility and a re-emergence of public transportation modes. The paper argues that cars as cultural objects have shifted from embodying the ideological philosophy of personal freedom to that of cocooning. In so doing the paper seeks to inject a note of caution into the debate over emergent post-automobility societies through reflection on the character and impact of cultures of automobility. Despite the possible declining functionality of cars as a means of transport, it is concluded that their appeal as personal space remains and may even be enhanced by future technological changes.

1. Introduction

The cultural status of the car has undergone significant changes from the physical manifestation of the aspirations of consumerist modernism embodying the ideological philosophy of personal freedom, through to being a necessary commodity of everyday life in which the distinctions of status are prominent (Nelissen and Meijers, 2011).

With the alienation of younger segments of the population from traditional cultures of automobility, and the increasing inability of older segments of the population to participate due to physiological or economic reasons (Engels and Liu, 2011), there would appear to be substantive grounds to expect automobility to have peaked in many countries. However, we argue (along with Cohen, 2012) that such an analysis may be misplaced due to the shift in automobility culture from individualism and freedom to dynamic seclusion in a securitised state (Wood, 2009) made possible at the individual level by the physical and psychological comfort offered by contemporary cars. At the societal level, there is some evidence to suggest that particular technological developments, such as the introduction of electric vehicles or of Internet connectivity, may act to exacerbate prevailing inequalities (Cass et al., 2005; Wells, 2012) and to further emphasise the role of the car as a personal security pod. The car as an extension of the self is already understood (Sheller and Urry, 2000); though perhaps rather less emphasis has been given to its role as a protective cocoon within which people can express themselves more freely than they would in the presence of others (Parkinson, 2001). In other words, this paper seeks to bring to bear insights into the cultural aspects of automobility against the more 'technological' focus of mainstream socio-technical transitions theory.

The paper is structured in the following manner. First there is a brief foray into the burgeoning socio-technical transitions literature, with a particular focus on the theme of sustainable mobility. The contention here is that the cultural status of the car has been given insufficient attention, and in turn this lack of understanding has resulted in an unwarranted degree of 'technological optimism' in terms of expectations of displacing contemporary patterns of automobility. This section is followed by an exposition of the emerging 'peak car' debate, in which it is argued that there is some evidence for this idea, but it is far from proven. We then move on to review some of the literature on cars and culture in terms of both the car and self, and the car and society. As such, the purpose is to provide some foundation for the subsequent discussion on shifts in cultures of automobility that we structure as a transition from

'freedom' to 'cocooning'. The discussion is wide-ranging, but is brought to life and contemporary practice by the inclusion of examples of 'cocooning' by vehicle manufacturers in their marketing literature. Finally the concluding section offers some observations with regard to the need to integrate a 'cultures of automobility' perspective into understanding (the lack of) sustainable mobility transitions, and highlights some potential areas for further research.

2. Transitions to sustainable mobility

The purpose of this paper is to inject a note of caution to the perspective that there is an emergent post-automobility era characterised by sustainable mobility (Dennis and Urry, 2009; Mitchell et al. 2010). One important strand of this debate has been the theoretical stance to be found within socio-technical transitions. Transport modes formed an important case application for early work on socio-technical transitions by some of the leading protagonists, notably shipping (Geels, 2002) and cars (Geels and Schot, 2007). The emergence of alternative mobility forms, whether technical such as electric vehicles or organisational such as car-sharing schemes may be interpreted as niche applications with the potential to destabilise existing socio-technical ensembles (Geels, 2012). The growing engagement of the socio-technical transitions community with policy and practice has in turn stimulated a growing awareness of and interest in the significance of regulatory conditions in providing framing contexts for socio-technical change.

Herein lies a deep-seated problem if sustainable mobility transitions are to be achieved: the relatively neglected cultural 'baggage' that is attendant upon the car needs consideration. There are different strands discernible in the literature in regard to sustainable mobility transitions, with varying degrees of radical change involved. The least disruptive is arguably the use of alternative fuel vehicles to achieve carbon reduction and / or local air quality improvements but without significant challenge to the prevailing practices of car production, distribution and marketing, purchase, ownership and use. Occupying an intermediary position are car-sharing schemes and car clubs

(discussed briefly in the following section) that retain the car as a personal (albeit shared) transport mode, and which may intersect with alternative fuel technologies such as battery electric vehicles (Kent and Dowling, 2013). Such intermediary social innovations may on the one hand be able to incubate profound behavioural change, but equally may serve to reinforce entrenched practices. More fundamental changes are envisaged in policies that seek to switch mobility modes away from car use, or challenge the 'need' for mobility generated by spatial structures and contemporary lifestyles (Spickermann et al., 2013; Birtchnell and Urry, 2013).

The transitions literature has its roots in several disciplines or streams of thought, including systems theory, evolutionary economics, long wave theory, path dependency and, more recently, the realms of organisational theory. Embedded within socio-technical transitions analysis is the recognition that behaviours, practices, norms and values are all shaped by and in turn help shape technologies – and indeed can be an important part of the self-regulating dynamic stability exhibited by socio-technical systems (Klinger et al., 2013). However, while issues of governance, regulation, technology, political contestation and market framing are given attention in the literature, the cultural meanings and normative practices with regard to material objects are rather less well developed (Marletto, 2014; Walks, 2014). Hence in this paper we bring to bear on the question of the transition to sustainable mobility an initial and exploratory outline of the ways in which cultures of automobility have shifted over time and place, the empirical manifestation of which is a continuing commitment to mass car ownership and use.

3. The indications of post-automobility

The apparent reduction in the preference for automobility noted by some observers does require some explanation, but also some care in how conclusions might be drawn. It is not clear in the first instance whether the protagonists of the post-automobility thesis are contemplating the decline and fall of the automobility era in its totality, or some lesser state of automobility relative to the prevailing peak. Neither is it clear whether the thesis arises out

of an analysis of the increasing multiple personal, social and environmental costs of automobility as currently experienced, or from a futures-orientated perspective in which the demise of automobility is seen as either desirable or inevitable.

The apparent reduction in automobility requires care when drawing conclusions. One example cited of emergent post-automobility is the reduction in the proportion of young people (say under 25 years old) with a driving licence, or owning or having access to a car (Kuhnimhof et al., 2012). This suggests car ownership is no longer important to the urban young who are less likely to embrace automobility later. In many countries a higher proportion of the population is expected to be urban in the future, which would presumably restrict car ownership and use. However, for many of the older industrial economies this is also an era of prolonged youth unemployment. Young people may emerge from education in debt, or with no income, be forced to live with their parents, and be unable to afford car ownership. Changes in youth mobility may rather reflect the more pervasive truth that the automotive industry is subject to influence from economic cycles and conditions. It is hard to interpret the slight reduction in youth engagement with the car as a rejection of automobility per se, or indeed of the cultural status afforded to mobility in general. As Collin-Lange (2013) argues, novice drivers may understand activities such as 'cruising' with cars to be important aspects of the more general desire to find a place in society.

Similarly, older generations appear to retain cars for longer than was hitherto the case; vehicle manufacturers are designing cars for the elderly (Herriots, 2005), and many innovative technologies such as automatic parking systems and collision avoidance systems are important enablers of continued motorisation for the elderly; while the continued use of a car is taken as a key indicator of personal welfare, especially in a deteriorating economic context (Gagliardi et al., 2010; Nordbakke and Schwanen, 2014).

Another example cited to support the 'peak car' argument, is the reduction in miles driven: claimed as an indication that the utility of driving has reduced. However, an alternative explanation is that, perhaps, other factors are also influencing the use of driving. It could be that short-haul flying has started to displace automobility for example, a development that can hardly be interpreted as environmentally beneficial. There is some evidence to suggest that, at least for business travellers, some substitution from other modes into air travel is occurring (Kopsch, 2012).Perhaps cars are being used for more but shorter trips within urban areas, in situations where the eco-efficiency of the car is at its lowest. Alternatives to travel, such as online social networking and telework, may have substituted some driving trips, as may home delivery services from supermarkets (Lu and Peeta, 2009; Sivak and Schoettle, 2012). In reality, it is hard to be definitive about such issues. For example, Denstadli et al., (2013) showed that for business air travellers there was a high correlation with usage of video conference facilities, so it is not immediately apparent that substitution has occurred. As Strengers (2014) argues, this is a complex issue because the human body is itself an important means of communication and so virtual contact is not always a substitute.

The real purchase cost of cars, adjusted for inflation, has fallen considerably over time (Wells et al., 2012) despite the enhanced features found on successive generations of car. As a result, it has become less costly to keep an underused vehicle on the driveway despite continuing high levels of value depreciation year on year. Enhanced reliability and durability has also meant that those purchasing used cars can do so at lower cost and with greater confidence in the functionality of the vehicle than was hitherto the case.

A third example that may be cited as evidence of peak automobility is the growth of car-sharing schemes (see Späth, 2012) in which individuals forego the personal ownership of cars, but rather access them through a shared pool of vehicles or other mechanisms such as peer-to-peer rental and car commute sharing schemes (Cairns and Harmer, 2011). The observation made is that as a result the number of cars required for a given population is rather fewer than

would be the case if cars were individually owned (Firnkorn and Müller, 2012). However, the reduction in cars may be offset by increased intensity of use per vehicle: cars may remain in circulation for a shorter time with a higher replacement rate. It is not always clear that those using car sharing schemes would have otherwise bought their own car, or that they do not continue to own their own car. It may even be that car sharing schemes allow into car ownership and use those that had previously been excluded. Firnkorn and Müller (2011) report that in their study some 25 per cent of respondents said they might forgo ownership of their own car if the scheme were offered permanently. Perhaps some car sharing schemes such as the Daimler Benz Car2Go are marketing strategies as much as meaningful commercial opportunities in their own right. The confluence of electric vehicle experimentation and car sharing schemes is thus more indicative of a learning opportunity than the end of automobility.

For some groups in society 'post-automobility' is nothing new and hence despite the argument that our societies have experienced a growing penetration (and then possible modest decline) of automobile use there remains a substantial minority excluded from this process. The post-automobility perspective rather ignores that many households have long been excluded from car ownership, including the young, the elderly, the disabled, and the poor. Geels (2012) using UK Department of Transport data shows that the proportion of households without a car was 80 per cent in 1955, but over a period of some 50 years car ownership penetrated mainstream society. In the UK, according to the RAC (2013) in 2012 there were 35.2 million licensed drivers (72 per cent of people aged 17 or over); an increase from 31.4 million in 2000. While some 25 per cent of all households do not own a car, 32 per cent have two or more. Some 49 per cent of the households in the lowest 20 percent of the population by income do not have a car. At the same time, however, many individuals do not see any logical benefit in car ownership, particularly for new cars where the rate of depreciation is of the order of 50 per cent over three years. It is illustrative that research by Hagman (2003), in Sweden, came to the conclusion that car users understood the advantages and disadvantages of car use differently. Advantages were seen to accrue in

definitive and personal ways. On the other hand, disadvantages were understood as happening to others, and as relative, distant and questionable.

If the high tide of automobility and the heroic status of the car is to some extent receding in those countries that have long experienced mass car ownership and use, and the evidence for this needs to be treated with some caution, then at a global level vast swathes of the population are enthusiastically embracing automobility for the first time. Almost certainly, many of the countries concerned will not reach the levels of car ownership and use experienced in North America; equally it is to be hoped that the patterns of automobility that emerge will be less wasteful, less socially disruptive, and less pervasive. There is good reason, however, to be cautious in these hopes, and to place more emphasis on the high levels of inertia built into the automobility trajectory at global level.

Sivak and Schoettle (2012) found eight countries out of 15 where the proportion of young drivers was falling (USA; Sweden; Norway; Great Britain; Canada; Japan; South Korea; and Germany), but seven where the proportion of drivers in all age groups was rising (Finland; Israel; The Netherlands; Switzerland; Spain; Latvia; and Poland). As Cohen (2012: 377) summarises with respect to emergent indicators of de-automobilisation:

> "Although these developments suggest some instability in the socio-technical system, the lock-in of key features and the paucity of practicable alternatives suggest that declarations of a pending transition are premature."

4. Cultures of automobility

The concept of automobility cultures is relatively new, and has arisen as researchers have sought to understand how distinct forms of mobility have come to be embedded in society (Urry, 2004; 2007; Sheller and Urry, 2006). In an industry dominated by economies of scale and the increasing exploitation of multiple national markets with similar models there might be an expectation that such universalism would swamp the significance of national cultures on driving behaviour, but Edensor (2004) argues that despite some apparently similar cultural manifestations of automobility, these national cultural characteristics remain an important determinant of automobility cultural differences, precisely because of an un-reflexive grounding in everyday practice.

There is a rich history of work exploring the many facets of the relationship between American society and the car (Berger, 1979; Flink, 1976; 1990; Lewis and Goldstein, 1983; Ling, 1990; Volti, 2004; Wollen and Kerr, 2002). In contrast, academic or wider cultural treatments of walking –especially in a car dominated society- are notably scarce (Jones et al., 2012, Moran, 2006), as is recognition of the contribution of automobility in the UK (Law, 2012).

4.1 Cars and Self

For many individuals the car has come to be defined as an extension and public expression of the self, and as such tends to generate powerful emotive content (Sheller, 2004) such that it is attributed with the ability to convey and confer social meaning, reflecting divisions within society (Vanderheiden, 2006; Wells, 2006; Anderson, 2008). McCracken (1986: 71) summarises this point well:

> "Consumer goods have a significance that goes beyond their utilitarian character and commercial value. This significance rests largely in their ability to carry and communicate cultural meaning".

Wang and Waller (2006: 665), drawing partly on McCracken (1986), clarify that consumer culture only emerges:

> "…when a large portion of a society avidly desires to consume goods and services for symbolic and sensory reasons, rather than functional reasons".

To many observers, the car is the core product in consumer culture. The public display of car ownership could in fact be seen as the ultimate expression of personal apparel. Jackson (2004: 13) in a comprehensive review of theories relevant to sustainable consumption puts it thus:

> "There are few places where the insight that material goods have symbolic value is more naked to the popular scrutiny than in the case of the automobile, which has long been recognised as far more than a means of getting from one place to another".

People can have relationships with their cars, and the character of those relationships may have an influence on many aspects of mobility including the preference for driving or the willingness to change from one vehicle to another. It has been argued by Chandler and Schwarz (2010) that personalising the relationship with objects may act to increase the likelihood that objects will be retained and cherished for longer – a rather unexplored facet with potential implications for issues such as product longevity. Equally, while individuals may have a view that a brand of car conveys certain attributes, it is interesting to note that according to Effendi and Whitfield (2012) external observers may also confer those attributes to drivers.

4.2 Cars and society

Cultures of automobility can equally be understood as the manifestation of embedded regimes in which core technologies are dialectically positioned in and around the purposive actions of vested interests. Car cultures thus come to be shaped by the technologies of the cars, by the road and support

infrastructure, by legal frameworks and the degree of enforcement around such frameworks, and by issues such as climate and topography. At a social level, cultures of automobility are informed by the age structure of the population, absolute and relative wealth, religion, education, historic precedent and more. Countries develop distinct automobility cultures and sub-cultures.

A defining feature of the situation in the USA was the early transition to popularism pioneered by Ford (Wells, 2007) and more intensively by General Motors in which low price, ease of driving, size, and (significantly for General Motors) fashion, were the key characteristics of the market structure (Raff, 1991). Cars came to be characterised over time as having large engines with automatic transmission, power assisted steering and brakes, and similar enhancements. Also, compared to European markets, US cars boasted relatively early widespread adoption of features such as electric windows, air conditioning, powered seat adjustment, etc. (Mom, 2008). Berger (2001) explains how in the early years of the car in the US there were many 'self-help' books to explain how to drive and maintain cars, but also how distinct cultural phases developed such as the 'hot rods' of the 1930s and 'muscle cars' of the 1950s to 1980s. Importantly, car use for almost all trips became the norm – a feature that started and remains fundamental to automobile dependency in the USA to this day (Buehler and Pucher, 2012). In contrast, for many years the situation in most of the European continent was characterised by cars being the preserve of an elite in society (think of the character of Toad in *Wind In The Willows* (Grahame, 1908)). According to Lethbridge (2013) in Britain in 1911 the number of coachmen and chauffeurs was almost equal, but by 1921 coachmen had virtually disappeared but there were (according to census data) 5,200 chauffeurs. These drivers had to be trained to operate the car and to maintain and repair it, as these were skills not necessarily accomplished by the wealthy owners. Interestingly, this perspective reinforces the historical status of wheeled vehicles as bearers of aristocracy and religious or political leadership (Helms, 2010). Cars came to be characterised by either luxury defined partly by size but also by comfort and styling features, or by high performance and driver involvement. The decidedly English concern with

motor racing, somewhat glamorised in the 1920s, arguably also reflected a portrayal of the quintessential English character (Boutle, 2012). The consequence is characteristically different driving cultures of which echoes remain to this day. The roll call of what the Americans today like to call 'premium' brands is largely European: Audi, BMW, Mercedes, Rolls Royce, Aston Martin, Ferrari, Maserati, and Bentley are all examples; while from the USA after about 1960 only Cadillac and to a lesser extent Lincoln could claim a place on this particular pantheon – and only for the market in the USA. For decades the automotive industry in the USA neglected technological sophistication and build quality in favour of low price and market expansion; a strategy that was highly successful until the low cost fuel bubble burst with the OPEC-induced oil shock combined with the peaking of USA oil production in the 1970s. In contrast, European cars for mass market applications, including those in the UK, were already sensitive to issues such as fuel economy, particularly in the era from 1945 onwards. In the USA the history of the car is interwoven in interesting ways with that of important social changes such as women's participation in the labour force or the civil rights movement (Walsh, 2011); arguably the car has a less dominant socio-cultural role in the UK but played a significant part in defining rurality in the 20th century (Jeremiah, 2010).

The car enjoyed a huge cultural status (in the USA but also e.g. Australia, see Luckman, 2010), with films, television, songs and other cultural forms of expression (e.g. Grushkin, 2006). Distinct sub-cultures emerge around particular types or brands of car, and particular types of motoring practice, such that the car continues to act as a status signifier to others (Miller, 2001; Nieuwenhuis, 2008). It is a paradox that the growing status of the car as a means of personal mobility and expression, and as a cultural object, resulted in the continued and expanding desire of ever-greater proportions of the population to own and use cars, and that this very growth in the end starts to erode the functional utility of the car. In turn, this process resulted in a redefinition of the cultural role of the car, from freedom to security as discussed in the following section.

5. Cultural transition: from freedom to security

It is a truism to say that the car has been, for many years, the symbolic and real manifestation of the individual freedom to travel independently (Wollen and Kerr, 2002; Gartman, 2004; Wright and Curtis, 2005), particularly and originally in the US (Weber, 2004; Moeckli and Lee, 2007; Brown, 2013). Individuals have constructed their lives around spatial structures that have increasingly come to reflect the potentials and characteristics of the car. As a consequence, people express the 'need' for a car in the face of obvious financial or functional challenges. Loderick (2012) reports on research by a UK insurance company to the effect that:

> "Almost a third of motorists are sacrificing food in exchange for keeping their cars on the road, according to new research... The savings motorists are making on food are being used to fund rising motoring costs such as fuel and car insurance."

It is worth noting that some 44 per cent of respondents in the survey also said that they had reacted to rising motoring costs by seeking to use their cars less, but the apparent willingness to cut back on food expenditures to preserve some motoring capability is startling. Equally revealing but in a rather different way is the news that in 2012 a resident of inner Boston paid US$560,000 for two parking spots at an auction (see http://www.bbc.co.uk/news/world-us-canada-22910579).

Car owners and users live with their dependency against almost insurmountable pressures. An example is an IBM survey into traffic congestion in cities around the world, the results of which revealed that despite some significant improvements in road infrastructures many motorists were deeply unhappy with their commuting experience (IBM, 2011). For example the report claimed that:

"86 per cent of the respondents in Beijing, 87 per cent in Shenzhen, 70 per cent in New Delhi and 61 per cent in Nairobi report traffic as a key inhibitor to work or school performance... globally 69 per cent of those surveyed indicated that traffic has negatively affected their health in some way. Some 42 per cent of respondents globally reported increased stress and 35 per cent reported increased anger."

Specifically regarding the last point, cars and roads as altered social spaces have an altering influence on our emotional experience and expression, unique to the driving environment (see Parkinson, 2001). Road rage can therefore be seen as a unique exchange where the car/driver unit interact with other such units on the road, and add to the complexities of everyday driving. Certainly there is a suggestion of pathological behaviours here. This aspect was very clearly illustrated by Cabral (2012) reporting for the BBC from Sao Paulo. One person interviewed faced a daily commute across the city of two hours each way, saying:

"It's like a war, because everybody seems to become very selfish once they are behind the wheel of a car."

Therefore, even where the people concerned are hardly enjoying the experience, and can hardly find any positive aspects of driving, there is often a sense that there is no other way, with each individual trapped within a growing (but increasingly static) sea of cars.

The following two sections focus in on safety and security technologies in the car, and how these both reflect and help to create shifts in cultures of automobility. There is a collective and cumulative impact from myriad innovations in technology and materials, and shifts in the cultural role of the car, layered into the strategies of companies and the differences of time and place such that as a consequence it is difficult to be precise about identifying

'pivotal moments' in the unfolding history of the car. The liberty associated with the car has not entirely disappeared, and vehicle manufacturers are hardly passive observers of trends to which they are subject, but it is possible to sketch the broad outlines of historic change.

5.1 Safety

Since at least the 1970s, vehicle security against crime and for occupant safety have proven powerful marketing tools for the industry, reflecting and shaping an automobility culture in which fear rather than freedom has come to dominate. The 'safety' message is a difficult one, because it risks undermining the overall integrity of the product. In the US manufacturers such as GM have been somewhat reluctant to emphasise safety issues perhaps for this reason, but also perhaps because of the rather different legal, social and regulatory context of the US market. The treatment of safety is thus one difference between the US and European experiences: the 'live free or die' cultural attitude of New Hampshire extends to the refusal to wear helmets or safety belts in the US more than in the EU. Alternatively, it was the Swedish company Volvo that originally introduced the three-point safety belt in 1959, and the company has since then been associated as a brand that emphasises safety despite making the patent available for the entire industry at no fee. Safety became a success story that vehicle manufacturers could present to consumers – at least in Europe. So powerful has this message been that in Europe the attainment of (unofficial) EuroNCAP (see www.euroncap.com) crash performance ratings has become a vital stimulus to further investment in safety technology (Koppel, 2008) because of the negative market impact of low scores. It is not surprising therefore that it was Mercedes who, in 1981 first introduced the 'airbag' driver restraint system in their top of the range model the S Class – aimed at the US market where it was known that the wearing of seatbelts still met with resistance from consumers. Interestingly, it was also an S Class that in 1978 became the first production car to have electronic ABS (anti-lock braking) fitted.

Safety has become increasingly pervasive, to the point where driver autonomy is potentially eroded by safety technologies of increasingly intrusive form (Merat et al., 2012). As the burdens of control are reduced for the driver, so it becomes increasingly possible for 'drivers' to be engaged in other tasks – ultimately of course expressed in the form of autonomous vehicles of the type being developed by Google (Markoff, 2010). Interventionist or 'active' safety systems include automatic distance-keeping; emergency braking; traction control and braking control systems, person and bicycle recognition systems; lane-keeping systems and other measures designed to rescue the vehicle and its occupants from a potentially catastrophic situation. A slightly different stance is taken with driver monitoring systems such as those intended to detect drowsiness or intoxication from alcohol (Yang et al., 2010). These systems do not relieve the driver of any responsibility, but may in some applications prevent the car from being driven or bring it to a halt.

Currently, multiple new technologies are being 'clustered' by vehicle manufacturers into semi-autonomous vehicles in which the emphasis is on safety, and finding their ultimate expression in the desire to bring to market vehicles that can achieve zero collisions in use. These developments find their parallel in the 'vision zero' initiatives, emanating from Sweden, to construct road infrastructures that prevent road traffic deaths and injuries (see http://www.visionzeroinitiative.com/en/Concept/).

5.2 Security

Security is distinct from safety in that it is about the protection of the person and their property from deliberate attack. The cultural position of the car has changed to being a protected personal space within which to traverse an implicitly hostile urban environment (Hiscock et al., 2002). Enhanced vehicle security may offer part of the explanation for measured declines in crime rates (Farrell et al., 2011). On the other hand, recent research in psychology has found a reciprocal effect of the car on its occupants, and their perception of their environment: in a series of experiments, Gatersleben and colleagues found that the same environment was perceived as more hostile and

dangerous by car passengers, compared to cyclists or pedestrians passing through the same scene (Gatersleben et al. 2012). This finding suggests a distorting effect of cars on passengers' perceptions of the security of their surroundings, though of course a discourse on risk can be used by drivers as a form of post-hoc rationalisation for their actions.

One interesting aspect of the wider security agenda is the focus on public spaces, including public transport, as venues for terrorism (Elias et al., 2013). Such events reinforce the sense that high-volume public spaces (aka travel systems) are particularly difficult to defend against a terrorist threat.

The technologies of car security are related but also different to those associated with the safety agenda. The technologies include, for example, immobilisers, automatic door locking; laminated and tinted glass; and mobile connectivity, including emergency call-out. As with other aspects of automotive technology, it is often the 'prestige' cars that see the early applications of innovation. Hence in such vehicles one may find to a greater or lesser extent 'advanced' security features such as armour-plating; bullet-proof glass; puncture resistant tyres; reinforced door locks; and remote tracking systems.

Issues of in-car security can be traced back to earlier times. Vehicle reliability was in itself an important contributor to security, as well as a reinforcement of the emotional bond between the car and the driver. This was classically illustrated by the 1987 VW Golf advertisement 'Changes' in which a woman is shown leaving her husband, posting her wedding ring back through the letter box, and throwing away her mink coat and pearl necklace but keeping her car keys – with the strap-line 'If only everything in life was as reliable as a Volkswagen'. If your car did break down, then salvation was at hand, as evidenced by a series of advertisements in the UK for the AA during the 1990s with the strap-line of 'The 4th Emergency Service' (Jenkinson and Sain, 2003).

Some of the earliest innovations in cars were concerned with making them easier to use, or extending the scope of their functionality. Hence the starter motor (first used on a Cadillac in 1912 thereby establishing the reputation of the brand as a test bed for innovation) was a major step forward in this regard, while items such as lights, windscreen wipers and all-round glazing provided for the car to be used in a wider range of conditions. The post-1945 introduction of automatic transmissions, along with features such as hydraulic power steering can similarly be understood as enabling technologies that acted to deskill some aspects of driving, thereby serving to broaden the appeal of the product to a greater range of potential users. Such 'assistance' technologies continue to be introduced, with features such as self-parking systems. On the other hand, these technologies help to create a 'distance' between the user and the technology, as it was no longer necessary to understand issues such as engine speed and gear ratios when driving a car with automatic transmission. It is symptomatic that contemporary cars have decorative engine covers, but are almost impossible for ordinary people to maintain or alter without specialist tools and knowledge.

5.3 Cocooning

Equally important, however, is the growing presence of 'cocooning' technologies (Bijsterveld, 2010; Walsh, 2010), that may be part of the 'surprise and delight' features with which vehicle manufacturers seek to embellish their cars (Hoffmann, 2011). Cocooning technologies can be traced back to a range of 'assistance' technologies that to some extent can be said to have reduced burdens on drivers and / or passengers. Hence features such as electric operation of windows, seat adjustments and in-seat heating and cooling, self-closing doors and boots, sunroofs, etc. all act to heighten the sense of individual control or power over the immediate environment.

Examples include control of so-called NVH (noise, vibration, harshness) to insulate occupants from the unpleasant associations with movement; double-glazing to cut out external noise; thermal glass; interior thermal management systems including climate zones for different occupants; pollen filters; in-car

entertainment systems that render the external space increasingly irrelevant; mood lighting; electro-chromatic mirrors; and a wide array of soft-touch interior finishes to convey a tactile sense of well-being. This is a distinct shift from earlier phases of automobility. According to Squatriglia (2010) ambient lighting in cars, for example, contributes to positive perceptions of quality and safety in consumers (see also http://www.volkswagen.co.uk/technology/comfort-and-convenience/ambient-lighting for the view from VW).

In-car entertainment and connectivity compensate for the problems of congestion and time 'lost' while driving (Davidson, 2012; Hoffmann, 2011). Early car radios appeared first as 'aftermarket' items that consumers could fit for themselves, and then as factory-fit items in some models (e.g. Studebaker in 1932). In essence, these developments marked the first steps in transforming the car into a mobile office or living room – trends that have continued to the present era with for example mp3 players and DVD screens. Mapping and navigation systems, increasingly able to integrate real-time information on road and weather conditions, allow drivers a seamless melding of the virtual and the actual as they experience movement through space (Thielmann, 2007). Autonomous vehicles are a further step in this direction (Mitchell et al., 2010). In regard to cocooning it is worth noting the prevalence of the concept in both the advertising messages of vehicle manufacturers (particularly prestige brands) and the reviews of automotive journalists. Some samples that give a flavour of the messages involved are given here with a focus on the 'prestige' brands but the significance of the overall idea is well expressed in an interview by Tony Markovich for the Complex Rides website in which two Ford interior designers describe their definition of 'dynamic sanctuary' (Markovich, 2013).

Bentley Continental GT: "Our interior designers have skilfully evolved the car's cabin to produce a stylish yet cocooning space. Incredible attention to detail has gone into making the cabin as quiet and refined as possible." (http://www.bentleymotors.com/models/continental_gt/interior_design/)

Jaguar XK8: "The upright dashboard of the XK8 has been replaced by a gently sloping fascia, and it is the better for it. Taller drivers can now get comfortable behind the wheel: there's a good range of wheel and pedal adjustment, and acceptable head and legroom. It feels spacious enough, but remains cocooning, like a good GT should." (http://www.autocar.co.uk/car-review/jaguar/xk/interior)

Jaguar C-X16: "The C-X16 is a car designed for performance, itching to be driven. If you want to take a passenger, well, that's up to you. By deliberately creating as cocooned a space as possible around the steering wheel, the driver is shrink-wrapped into the cockpit, sitting right at the centre of this world." (http://www.jaguar.ie/about-jaguar/concept-cars/c-x16/cx16_interior.html)

Jaguar XJ: "Create your ideal space in the XJ cabin – a calm environment that's designed to stimulate all your senses. Relax in total luxury, cocooned by glove-soft leather, contemporary surfaces and an array of fine details, many of which you can select yourself. Start with a choice of interior color themes and combinations. Next, consider the broad sweep of lustrous wood veneer accents." (http://www.jaguarusa.com/all-models/xj/overview/index.html)

Rolls Royce Phantom Drophead Coupe: "The latest expression of Phantom Drophead Coupé demonstrates a more relaxed and less formal side of Phantom. It displays a sociable character and its convivial interior evokes the feeling of being aboard an elegant motor yacht. It offers both driver and passengers a dual experience - intimate and cocooning or embracing the elements depending on whether the roof is raised or lowered. Inspired by the J-class racing yachts of 1930s (known for their performance and use of natural materials) the result is a car that epitomises romantic, performance motoring." (http://www.rolls-roycemotorcars.com/phantom-family/phantom-drophead-coupe/)

Rolls Royce Ghost: "The principle of delivering simplicity out of complexity runs throughout Ghost and Ghost Extended Wheelbase. Everything is designed, engineered and crafted to be so invitingly approachable, so simple, it encourages you to regard either car as appropriate for any occasion. Inside it's like being cocooned in your own convivial private sanctuary that leaves you relaxed and unruffled after the longest journey." (http://www.rolls-roycemotorcars-michigan.com/ghost).

Maserati Quattroporte S: "Passengers are cocooned in a luxurious and pure interior. The interior of the Maserati Quattroporte S allows occupants the extravagance of a luxurious drive. The dashboard is set out on three levels and is dominated by a broad centre section that adds a renewed sense of space and lightness. In the middle of the dashboard is the large Maserati Touch Control touchscreen that can be used to manage the car's many entertainment and information systems." (http://www.maserati.com/maserati/en/en/index/models/quattroporte/quattroporte-S/quattroporte-s-interiors.html)

Audi R8: "Even before you start the Audi R8's mighty V8 engine, the vehicle starts making promises it can keep. The sports seats, for example, have been designed for comfort, safety and practicality. They hug the sides of your body, cocooning you as you enjoy every corner and, when you're accelerating, you'll appreciate the firm yet luxurious level of support they give. For a more racing-car feel you can upgrade to bucket seats as an option. But whatever you decide, you'll find the R8 is perfect for long-distance cruising, town travel and, of course, on the track." (http://www.audigurgaon.in/r8interior.php)

BMW 5 Series: "Supportive front seats instil a connected feeling between the driver and the car. This lets you exploit the graceful balance of the BMW's handling to the full and many will be surprised such a luxurious and cocooning car can turn in an instant into an amazingly competent sports saloon. This is

what BMW's 5 Series has been doing for generations and the latest is no exception." (http://ukcoty.co.uk/cars/road-test/bmw-5-series/)

The changes exemplified above increasingly satisfy things beyond functional needs, and add sensory and mental value to the car, while removing control and independence. While the brands and models listed are clearly among the most expensive available on the market, it is generally the case that technologies and concepts are first applied in these elite markets where a premium can be charged, before the growth in volume allows a reduction in price and hence a wider market penetration. These vehicles are in a sense aspirational, or perhaps leading indicators of future more widespread changes.

In passing it is worth noting that there has been something of a bifurcation of markets into a substantial 'elite' or premium segment, and a growing 'bargain' or 'value for money' segment, with an erosion of the traditional mid-size and mid-value saloon car. In part, the value for money segment achieves its aim through what the industry terms 'de-contenting' and the implied erosion of cocooning values. It is also worthwhile to consider how far cocooning speaks to the values and attributes of incumbents. It appears that cocooning has been a relatively comfortable and indeed profitable concept for the incumbent industry (see for example Benson et al., 2007). On the other hand, the logical extension of the safety agenda into autonomous vehicles may create a market space for new entrants offering very different propositions to the baroque vehicle designs that cocooning seems to require.

6. Conclusions

Those concerned with energy policy, sustainable mobility and the process of socio-technical transitions have naturally tended to focus on the 'big' technology choices in vehicle engine, transmission and fuel systems and, more recently, structures. In so doing they have neglected a hidden revolution over the last thirty years or so in technologies that individually are minor, trivial even, but which collectively act to cosset drivers and occupants to a degree not

found previously, and which are difficult to replicate in public transport. Allied to manufacturing systems that are increasingly able to deliver a high degree of variety, and hence customisation to individual taste, the argument here is that the immersive experience of cocooning is a powerful means of bonding people to cars in a manner that has little to do with functional mobility. Perhaps the public advent of the autonomous car will increase attention on these themes.

If the continued preference for private automobility is a consequence of both functional dependency and broader cultural factors then it is clear that any form of transition needs to be concerned with both issues. Kent (2014) re-iterates the importance of 'freedom' but also underlines the point that the narrow functionality of cars in terms of moving from one location to other with efficiency (defined as least time) is not necessarily their most important attribute in the contemporary urban environment. Ironically, the more that pedestrians, cyclists and other road users are marginalised the greater the sense of fear for individuals who are compelled to walk or ride and the more complete the resort to the car. Positioning the bicycle as the 'vehicle of advanced liberalism' (Letell et al., 2011) may represent one dimension of a culturally-grounded alternative framing of the automobile. The contemporary car may offer a moment of seclusion in an increasingly crowded and urban world, a moment for which people are prepared to pay substantially.

Equally, we probably need a more profound understanding of how new automobility cultures (including alternatives to automobility) and sub-cultures might be nurtured (Brand, 2007). It seems unlikely that economic distress alone is sufficient to induce a profound and enduring shift in automobility habits or the cultural standing of cars in modern societies (Pooley, 2010); and in any case a resumption of economic prosperity may well stimulate a resumption of the old patterns of automobility culture. As Cohen (2013) has observed, there may be a time-lag effect between a shift in concrete conditions (economic, environmental) and a corresponding shift in social attitudes. Put another way, older cultural norms may persist: and this may apply to automobility as much as any other area.

These features and enhancements mirror greater societal changes from freedom to connectivity and cocooning -including in our homes. Transitions in automobility naturally mimic those in broader society -such as in our living and working spaces--towards more interconnected, controlled, insulated but also pampering environments. The co-determining character of technology and culture may occur in many aspects of life. Possible examples of this interaction giving rise to historical shifts in both the ubiquity and the cultural place of technological artefacts are many. In the case of the telephone initial applications in the home were limited, and in the houses of the wealthy telephones were installed in the entrance hall and answered by the butler, in effect treating callers as guest visitors (Pitcher, 2006). The absolute penetration of the mobile phone into everyday life means there is virtually no domestic or social setting where its presence is denied. In the case of gardens there has been a transformation from places in which to raise productive vegetables, to the status of 'outside rooms' or leisure areas with low-maintenance design, patio heaters, hard landscaping, and outdoor hot-tubs (Bhattia and Church, 2000; 2004). In the case of kitchens there has been discussion of the demise of home cooking alongside the parallel and rather contradictory rise in the popularity of cookery programmes on television, and of lavishly equipped semi-professional kitchen spaces that imply rather more than a microwaved meal for two (Osten, 2006). In the case of bathrooms there has been a transformation from the ethic of cleanliness and a quasi-scientific fight against bacteria and germs, into a domestic version of a spa, with again an emphasis on pampering, well-being, and the creature comforts (Quitzau and Røpke, 2008; 2009). In the living room the transformation into small-scale replications of cinemas is almost complete, with surround-sound systems and vast plasma screens providing a close approximation of the immersion experience, but within the privacy of personal space. These possible examples hint at changing standards and expectations, and changing wants and needs, in relation to technological possibilities with profound sustainability implications (Kemp and Van Lente, 2011). There are clear echoes, and some differences, in what is happening at a domestic or household level in terms of the culture-technology nexus, and what is happing with regard to cars and the wider issues of mobility.

Acknowledgements

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