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A feeling for change: exploring the lived and unlived experiences of drivers to inform a transition to an electric automobility

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Abstract

This paper assesses the contemporary 'consumption' of the motor-car in the context of an increased uptake of electric vehicles (EVs) as part of a transition to a low carbon automobility. Through the lens of affect and non-representational theory, it contributes to a seemingly neglected discourse by understanding how the feelings, experiences and knowledges of drivers 'conditioned' to an internal combustion engine (ICE) ecosystem might impact such a transition. This contribution is important, given that the contemporary socio-cultural significance of the car means an effective impetus for social change will come from drivers themselves. In-depth interviews explored unlived knowledges and opinions on EVs held by motorists driving ICE vehicles, comparing these with the lived experiences of EV drivers. Key findings point to levers and potential barriers. First, EV exposure suggests prospective electric propulsion carries no further fears than those experienced on any first 'encounter' with a vehicle, indicating that although different, it is not viewed as a leap into the unknown. Second, ICE-drivers don't regard electric cars as inferior, providing they embody an ICE car's essence of freedom, flexibility and performance. Third, EV-drivers' sensations of *avant garde* and environmental-friendliness lack the physical nature of feelings expressed by ICE-drivers, yet suggest a new automobility. Addressing this 'affectual' divide in how manufacturers design and disseminate knowledge about EVs is crucial to broadening their appeal. More broadly, whilst technical barriers to transition endure for consumers, the feelings and experiences concomitant with existing automobilities suggest cause for optimism regarding a potential low carbon vehicle uptake.

Keywords: low carbon automobility; electric cars; knowledge and opinions; affect; non-representational theory

1. Introduction

The private car uses more energy and emits more greenhouse gases per passenger-kilometre than any other surface transport mode. It is the dominant source of CO₂ emissions within transport (Schipper and Fulton, 2003; Kahn Ribeiro *et al*, 2007). In turn this suggests that the car is a key part of an unsustainable transport paradigm. Indeed, the car alone is responsible for 12% of *all* CO₂ emissions within Europe, and there are concerns about rising CO₂ emissions from road transport as the number of cars rises globally, with such emissions a corollary of engine efficiency and distances travelled due to the carbon content of fossil fuels¹ (Potter, 2003; Sims *et al*, 2014; EC, 2017b).

In addition to emissions of CO₂, road transport vehicles are a major source of what are known as 'criteria' pollutants, such as carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO₂) and ozone (O₃). Emissions of sulphur oxides (SO_x) and volatile organic compounds (VOCs) are also attributed to road transport, especially diesel vehicles (Holmén and Niemeier, 2003; Lave and Griffin, 2008; Sims *et al*, 2014). However, while governments have sought to tackle air quality issues through legislation such as the Euro 5 and Euro 6 emission standards (EC, 2010), concerns about local air pollution persist. Events such as the Dieselgate scandal² have helped to give such issues global attention.

Set against this context and the fundamental need for mobility in modern society, the pursuit of a sustainable, low carbon transport system is desirable (Greene and Wegener, 1997; Khare and Sharma, 2003; Barrett and Scott, 2003; Sims *et al*, 2014). Whilst the electric vehicle (EV) constitutes an immediate technology by which to foster such a transition, it remains a challenging prospect. The internal combustion engine (ICE) has been the dominant form of propulsion for the private car for almost a century, meaning that alternative technologies have been effectively 'locked out' (Dijk and Yarime, 2010; Ivory and Genus, 2010). This lock out, combined with an enduring set of technical and socio-cultural barriers, undermines the transition from ICE to EV mobility today, and similarly underpinned the demise of the first generation of electric cars over a century ago (Geels *et al*, 2012).

The compromises which beset the electric vehicle a century ago still possess a contemporary resonance. Without subsidy, electric cars remain more expensive to buy than their ICE counterparts (though they are potentially much cheaper to run over their lifetime). More tellingly, issues of

¹ On average, 2.4kg and 2.7kg of CO₂ per litre of petrol and diesel fuels respectively (Potter, 2003).

² The Dieselgate scandal began when Volkswagen was found in 2015 to have cheated laboratory emissions tests in the USA by means of illegal emissions software, the investigation into which revealed wider shortcomings of automotive emissions-testing and regulation, resulting in other manufacturers' vehicles also being found to have higher emissions than those claimed by official figures (Transport & Environment, 2016).

convenience and 'range anxiety' – a fear predicated upon lacking sufficient battery charge to reach one's destination – persist. Together these issues threaten a freedom and flexibility that is, or was³, innate to automobility (e.g. Urry, 2004; Kent, 2014; Broz and Habeck, 2015). The limited range of current electric cars perhaps illustrates how little battery performance has advanced in the last century (Ivory and Genus, 2010). Thus, while EVs and their supporting infrastructure have evolved rapidly over recent years, negative perceptions remain entrenched (Burgess *et al*, 2013).

The electric car is yet to inspire a "performance-symbolism nexus" (Ivory and Genus, 2010: 1118) akin to Barthes' "bestiary of power" (1957 [1972]: 88). This is illustrated both in its gendering a century ago, whereby the electric car was perceived to be clean and, therefore, perhaps somewhat feminine (Mom, 2004); and its received eco-rationale today. The innate characteristics of electric motors means that EVs provide a different kind of performance: instant torque or 'pulling-power' from standstill results in instant acceleration but less ultimate maximum velocity. However, establishing such a nexus may require a change in the way automobility is consumed, whether by dint of strategy, policy or sub-culture (*ibid*). This is not least because the rationale behind EVs e.g. amelioration of automotive environmental impacts has changed over time (e.g. Heffner *et al*, 2007), legislation upon which is one factor that is driving their development. Although the mode of electricity generation is key to their environmental efficacy, and there are concerns as to the embedded emissions associated with their manufacture, pure EVs at least have the advantage of zero emissions at the 'tailpipe' (Orsato *et al*, 2012; Givoni, 2013; Hawkins *et al*, 2013; Nieuwenhuis, 2014).

A transition to EVs should not however been seen as a silver bullet in the amelioration of the environmental impacts of automobility. Such a transition could simply lock-in current mobility patterns and car use, and concomitant issues such as congestion, road expansion, urban sprawl and green-space reduction will therefore persist (Givoni, 2013). That said, as a disruptive technology, the electrification of transport has the potential to "overturn existing institutions" (Barkenbus, 2009: 399), of which the 'lock-in' of an internal-combustion-powered automobility would be an example.

Set against this context, and with the emergence of a new electromobility, the research presented here examines if and how the essence of consumers' relationships with the motorcar might change. Such an assessment is crucial given that the knowledge, symbolism and expectations of driving are

³ It has been posited that a traditional automotive notion of 'freedom' is being supplemented, even challenged, by that of 'cocooning' – that is, a 'new' automotive notion of the car facilitating safety and personal space – as a primary driver of contemporary automobilities (Wells and Xenias, 2015).

locked-in to the historical development of the ICE ecosystem, whilst research on electromobility to date has typically focused on the technical and economic barriers to an EV transition. Drawing upon original research with motorists experienced with EVs and those driving ICE vehicles, the paper seeks to address four important research questions: (i) Will the way in which the automobile is 'consumed', regarded and experienced (for example, in the mechanical sound and 'feel' ICE drivers experience, or in actions such as maintenance or in 'tinkering'⁴ that foment automotive relationships) change as a result of its electrification? (ii) How are EVs regarded against contemporary automobiles, and how might they be perceived to 'feel'? (iii) How might motorists perceive their experience of driving an electric car compare to conventional cars, or even to their existing car? and (iv) Is an electric car worthy of consideration, at least at the moment?

2. Theorising and capturing consumer perceptions of an EV transition

In assessing consumer perceptions, regard, and potential uptake of EVs, research to date has employed both quantitative and qualitative approaches. On the quantitative side, Peters and Dütschke, (2014) explored the likeliness of adoption based on perceptions of instrumental factors such as cost, convenience and environmental efficacy. Schuitema *et al* (2013) considered hedonic and symbolic aspects upon and alongside such instrumentality, something alluded to by Skippon and Garwood (2011) in assessing reactions by those who had (briefly) experienced EVs.

A more qualitative approach was undertaken by Graham-Rowe *et al* (2012) who adopted grounded theory to assess consumers' experiences of EVs. Burgess *et al* (2013) acknowledged an affective element to such in their richly textual thematic analysis of EV drivers' interactions without developing it further, while Axsen *et al* (2013) applied a 'reflexive layers of influence framework' by means of analysis. However, it has been noted that the exploration of theories pertaining to emotions, and the link between emotions, values, beliefs and norms that may drive pro-environmental actions are lacking (Rezvani *et al*, 2015). Liao *et al* (2017) remark that emotional, hedonic and symbolic factors are rarely included in choice studies of EVs, with the majority that seek to assess the psychological factors that pertain to environmentally-friendly technologies adopting a quantitative approach. Similarly, Waitt and Harada (2012) note that many studies resort to quantitative rather than qualitative methodologies when researching the mitigation of environmental impacts of the car. Yet the consumption of the car, an artefact that is emotional and sensory, and not merely instrumental (see Sheller, 2004; Steg, 2005), warrants a 'richer', more holistic approach. This is important if we are to look beyond an automotive instrumentality, and

⁴ Following Nieuwenhuis (2008), such maintenance or tinkering may represent a sustainable consumption of the car.

consider the difference between an automobile and a *car*⁵, between the notion of a vehicle that simply moves us physically, and one which moves us in other ways. Such theorising is important, as while previous consideration has been given to practical or instrumental factors that might drive changes in a transition to a low carbon automobility, it is necessary to also consider how might motorists want to make such changes.

In undertaking research to ascertain motorists' perceptions of EVs, it is pertinent to consider the 'lived' experiences of those who have driven them. Those who have taken part in demonstrator trials are of particular interest because of their experience of driving an EV over a sustained period, in addition to that of driving their own ICE car, enabling direct comparisons to be made. It is also important to consider the 'unlived' knowledges, perceptions and attitudes to EVs held by those who own and drive ICE vehicles but have not experienced an EV. This market segment is critical to understand if EVs are to become more popular with consumers. The dual approach means that the experiences and opinion of drivers of cars using both forms of propulsion can be collated, their opinions accordingly useful in assessing a link between how the car is consumed now and how a low carbon automobility may be performed in the future. Moreover, analysis of the perceptions, knowledges and experiences of ICE and EV drivers can together address whether extant automobilities constitute a barrier and/or a lever to a low carbon automobility.

Drivers 'experiences' were appraised through a conceptual framework drawing upon and adapting the principles of affect and non-representational theory (Thrift, 2004; 2008)⁶. Exploring automobility and a potential future low carbon automobility through the theoretical lens of affect and non-representational theory is apposite because of their applicability to the visceral, experiential, and more-than-instrumental consumption of the car, assessing the nuances of perception, emotion, and experience of driving.

The origins of 'affect' are rooted in the work of the 17th century philosopher, Benedict de Spinoza which contends that emotion, or *affectus*, is not only the change of the power of our actions, but it is simultaneously the notions of these changes. Affect may be defined as the "ability to affect or be affected", whereas affection is "each state of such affect between the affected and affecting bodies"

⁵ The then BMW design chief Chris Bangle, whose occupation necessarily transcends the instrumentality of the motor car, noted in a speech at a Technology, Entertainment, Design (TED) conference in February 2002 that "*Cars are not a suit of clothes, cars are an avatar, cars are an expansion of yourself, they take your thoughts, your ideas, your emotions, and they multiply it – your anger, whatever, it's an avatar.*" (TED, 2007).

⁶ See also Ruddick, 2010; Lorimer, 2008; Stewart, 2007; McCormack, 2005; Deleuze and Guattari, 2004; Massumi, 2002).

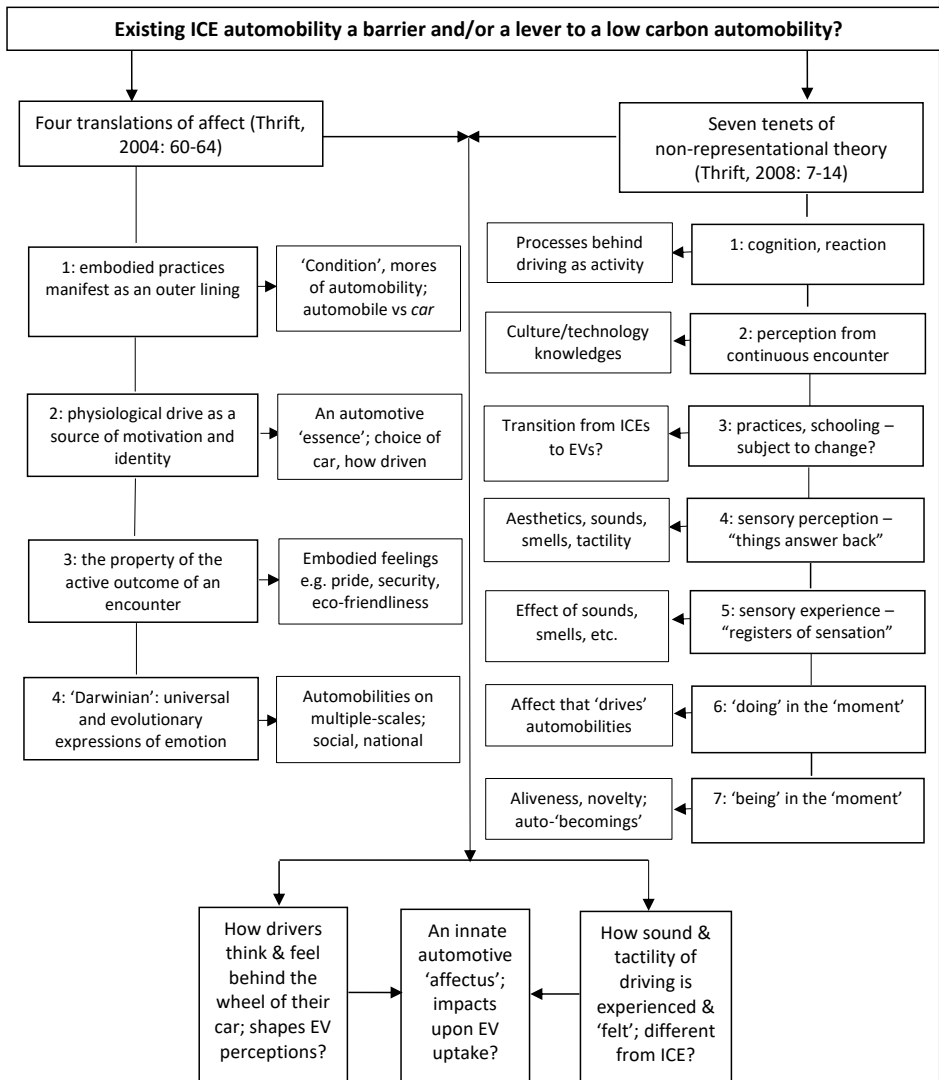
concomitant with an innate 'flow' between affecting and affected bodies that is borne of knowledges and nature (Deleuze and Guattari, 2004, vxii), Stewart, 2007). Effectively, we are possessed of our own nature, our own essence, which grants a capacity to both affect and to be affected, with and by positive and negative sources that stem from what is innate, authentic and essential to us. This in turn results in a potential or latency of affecting or being affected (Stewart, 2007; Deleuze and Guattari, 2004; Spinoza, 1996 [1677]).

Thrift's (2004) four definitions of affect explain how we are affected and/or display affection as a result of internal or external influences, and how this can be applied to the car as a 'vehicle' of the emotional outcome of affect (Figure 1, Appendix 1). Correspondingly, Thrift's observation that emotion follows affect, means then that non-representational theory, as the manifestation of emotion (*ibid*), also follows the notion of affect. Non-representational theory, effectively "the geography of what happens" (Thrift, 2008: 2), has several tenets to its conceptualisation (Figure 1 and Appendix 2). These tenets are applicable to so many aspects of car consumption, not only in terms of perception, cognition and performance but, also in terms of experience, of practice as text, understanding and knowledge.

The framework provides a new and original way to explore whether the locked-in automobility of the ICE ecosystem presents a barrier or lever to transition. This is illustrated 'affectually', in ingrained automotive mores; in how these behaviours are enacted innately; in feelings such as security, power, freedom, and flexibility wrought of individual automobilities; and the various scales upon which such feelings and mores are performed. At the same time, we can explore the non-representationality concomitant with the knowledges and processes of piloting a car, which constantly change as technology advances. For example, how driving is 'experienced' and 'felt', witnessed in the sounds, aesthetics and tactility associated with driving; and the effects and affects that manifest as the banal, fleeting, ephemeral experiences of everyday automobility.

It is in considering both how extant, 'conditioned' automobilities might shape perceptions of EVs, along with the lived experiences of driving EVs and ICEs, that we can explore how an 'automotive *affectus*' might be different in an EV, and if this might act to impel or impede EV uptake.

Figure 1: Affectual and non-representational framework



3. Methodology

In designing a method to collect data, it was considered that a qualitative approach would be appropriate to pursue the more affectual and non-representational facets of motorists' cars, and that interviewing drivers in situ, in their vehicles would be the most effective way to achieve this.

Such a technique would better facilitate the eliciting of feelings and sensations wrought by drivers' cars, and in ascertaining responses to the more cultural aspects of the car via more informal, conversational means. A total of nineteen drivers were interviewed: 12 of ICE vehicles and 7 of EVs. Interviews were semi-structured and in-depth, typically lasting one hour.

Twelve drivers of ICE vehicles were interviewed between late 2012 and early 2013 to explore how the contemporary 'consumption', or experience and regard, of the car may impact upon an uptake of low carbon vehicles. Interviews, for example, concerned opinions and knowledge of low carbon vehicles, and of policies therein, to gauge if and how any information about low carbon vehicles was received and perceived. The group comprised of eight men and four women, all aged between 25 and 54. The sample was drawn from Local Authority employees as a means of including a wide range of occupations within a bounded population. Employed in various management, professional and technical positions, these motorists were recruited via an online questionnaire (which also formed an early part of the research process), and which was promoted by means of respective local authority intranet online newsletters. For the purposes of analysis, those interviewed are referred to as ICE-drivers 1-12 (ICE_#1, etc.). It should be pointed out that two of the ICE-drivers interviewed (ICE_#1 and ICE_#6) had had previous experience of EVs, having driven one of Coventry City Council's Smart ED (Electric Drive) pool cars, while another (ICE_#10) said they had driven an electric Ford Focus while a student at university.

Seven drivers of electric vehicles (six men and one woman) were interviewed in the summer of 2012 on their experiences, feelings, and opinion of the vehicle they drove in an EV demonstrator trial. All those interviewed were professionals from a range of backgrounds; two car manufacturer employees, one power generating company employee, three academics, and one academic administrator. They were recruited to take part in this research following their participation in the CABLED (Coventry and Birmingham Low Emission Demonstration) electric vehicle trial. CABLED was part of a national Government funded demonstrator programme involving eight regional consortia, which gave members of the public the opportunity to trial a low carbon vehicle⁷ over a twelve-month contract-lease period in 2009-2010 (OLEV, 2013; Arup, 2015). In total across the country, 349 vehicles drove 1.5 million miles over 277,000 trips (5.4 miles per trip average), generating significant quantitative data from vehicle data loggers and qualitative feedback data from drivers. Thus, the seven drivers interviewed from the CABLED project had a 12-month, four-season experience to reflect on, providing a rich data source that has been drawn on here. All of the EV drivers

⁷ Such as the Tata Indica Vista, Smart ForTwo ED and the Mitsubishi i-MIEV.

interviewed leased and drove the same type of car, a Tata Indica Vista EV⁸. For the purposes of analysis, those interviewed are referred to as EV-drivers (EV_#1, etc.).

The issue of bias must be considered with regard to the data. Guest *et al* (2006) noted that smaller sample sizes are not necessarily a barrier to data quality within a given cultural context. The qualitative nature of this research accordingly facilitates a richness of data gathered that belies the sample size, providing a valuable insight into drivers' perceptions, experiences and feelings (Crouch and McKenzie, 2006; Fusch & Ness, 2015 – see also Dibley, 2011). The number of interviews undertaken, the majority in situ with drivers and their cars while parked and subsequently transcribed manually and subject to thematic analysis, has generated a depth and granularity of data that enables testing of the theoretical framework in a way that more numerous questionnaire data could not provide. This is consistent with Crouch and McKenzie who suggest that “a small number of cases (less than 20, say) will facilitate the researcher's close association with the respondents, and enhance the validity of fine-grained, in-depth inquiry in naturalistic settings” (2006: 484). A second potential source of bias to consider is an implied positivity towards EVs concomitant with EV-drivers' volunteering to take part in the trial. Participation in trials such as CABLED may arise from curiosity, or something more innate, affectual even. Any resultant bias should also be borne in mind.

4. Findings and Analysis

In utilising the key dimensions of the affectual and non-representational framework presented in Figure 1, findings concerning drivers' perceptions, feelings, and experiences of EVs are interrogated under three sub-headings: (i) How drivers think & feel behind the wheel of ICEs; shaping EV perceptions; (ii) How sound and tactility of driving EVs is experienced and 'felt' differently from driving an ICE? and (ii) How an innate automotive 'affectus' impacts upon EV uptake. Three headline findings emerge from this structured analysis. First, exposure to and experience of EVs suggests that the prospect of electric propulsion carries no more fears for drivers than those experienced on any first 'encounter' with a vehicle. This indicates that although new and different for most contemporary motorists, electric propulsion is not seen as alien or a frightening step into the unknown. Second, and more problematically given the limits of current battery technology and recharging infrastructure, ICE-drivers don't necessarily regard electric cars as inferior or, a '*lesser perfection*' (Spinoza (1996 [1677])), providing they embody an ICE car's essence of freedom and

⁸ The first-generation Tata Indica was sold in the UK between 2003-2005 by the Rover Group as the CityRover. The Indica used in CABLED was based on the second-generation Tata Indica, not available on the UK market and which, by dint of the installation of its electric powertrain, could almost qualify as 'hand built' at Tata's research facility at Warwick University.

flexibility. Third, and perhaps unsurprisingly, EV drivers' sensations of environmental-friendliness and of being *avant garde* lack the visceral, or physical nature of feelings expressed by drivers about their ICE cars. Recognising and addressing this 'affectual' divide through the ways in which manufacturers of vehicles design and disseminate knowledge about EVs is crucial to broadening their appeal to mainstream ICE drivers and in breaking the ICE lock-in.

4.1 How drivers think & feel behind the wheel of ICEs; shaping EV perceptions?

There are two perceptual aspects of EVs to consider here – the instrumental, that is how ICE drivers perceive EVs regarding use and convenience, and the affectual, how ICE drivers thought EVs might make them feel. Both aspects are necessarily influenced by how motorists have become 'conditioned' to the car, that is, what and how a car 'should' be.

Table 1: ICE drivers' instrumental perceptions

Noise	
<i>'I believe that ... some manufacturers are actually putting noise into the vehicles to make people feel happy about it' (ICE_#7)⁹.</i>	1 st translation of affect – condition, mores of automobility
Smoothness	
<i>'I know they can be driven differently because of ... they don't suffer quite the same from inefficiencies, you know, fast acceleration, things like that' (ICE_#5)</i> <i>'...smoothness ... that I've heard about, just the way they deliver the power as soon as you accelerate, I think, quite smooth and linear' (ICE_#8)</i> <i>'...with electric motors, you've got, you know, it's just a huge wave of torque' (ICE_#12).</i>	1 st translation of affect – condition, mores of automobility
Convenience	
<i>'...you'd have to be more aware of ... call it fuel issues ... a bit more organised because the infrastructure isn't really there as such' (ICE_#3)</i> <i>'...it's not instant, is it? If you run out of diesel, you fill it up and away you go again, and if you need to top up an electric vehicle, it isn't a pull in, pay ... it's a 'right what are we going to do now then' unless it's a fast charge of some sort' (ICE_#6).</i>	1 st translation of affect – condition, mores of automobility
Environment	
<i>'...it must be better from an air pollution point of view, certainly in the vicinity of the car' (#1)</i> <i>'...there's still electricity that you have to burn' (#11)</i> <i>'...[EVs] just seem so much cleaner' (#10).</i>	1 st translation of affect – condition, mores of automobility

⁹ There is an EU proposal to this effect (EC, 2014).

Most ICE-drivers anticipated that their driving experiences would differ in an electric car, with a lack of noise posited as the main change (Table 1). Another perceived difference related to smoothness and linearity in the way that EVs deliver their motive power, albeit tempered by a lack of ultimate performance. This is in contrast to an ICE vehicle which must be kept in an optimum gear to maintain smooth progress but can attain a higher maximum velocity. The potentially inconvenient need for forward journey planning with EVs was also posited by some of the ICE-drivers, even given a wider recharging infrastructure. Finally, conflicting perceptions emerged as to the environmental efficacy of EVs.

The analysis has thus far considered ICE drivers' perceptions as to the instrumentality of driving electric cars. However, given that the nature of the car will necessarily change with a move to an EV automobility, it is pertinent to look beyond such instrumentality and ask how EVs might make us feel. For example, motorists may feel differently about their cars if they were electrically powered, or a lesser mechanical interaction might render the EV as more of an appliance. To this end, ICE-drivers were asked if they might think differently about their car if it was electric, and if so, why (Table 2).

Findings revealed an even split between those suggesting that they would or would not feel differently about their car if it was electric. From Thrift's first definition of affect (Figure 1), an affectual 'flow' between ourselves and other people and/or objects is a two-way process, not only concomitant with human 'nature', our own essence, but also the nature and essence of other people/objects (e.g. Stewart, 2007). However, on the basis of the responses in Table 2, we can posit an affectual flow not only between ourselves and other people/objects, but also between ourselves and concepts and/or notions.

Table 2: ICE drivers' affectual perceptions

Feel different – yes	
<i>'I would feel a lot happier that there was less environmental impact. I don't believe for one minute that it would suddenly make me enjoy driving'</i> (ICE_#3)	2 nd translation of affect – an automotive 'essence'
<i>'I'd feel nicer as a person, as a human being ... you'd feel better than the gas-guzzler that's just burned you off at the lights ... it may not look as stylish, but you'd feel better'</i> (ICE_#9).	
Feel different – no	
<i>'...not once I got used to it ... as long as it got me from A to B like this one does now, then that's all that matters to me'</i> (ICE_#1)	2 nd translation of affect – an automotive 'essence'
<i>'...if I could top up electricity the way I can fuel ... if that's all the difference there is'</i> (ICE_#2).	
<i>'I sort of link this to, like, operating systems on computers, on Macs, whereas, like Windows push operating systems, but no-one's bothered about that, they just want a computer that works, and I think electrics [EVs] is like that at the moment – they're pushing electric, but no-one's bothered, they just want a car that does what they want it to'</i> (ICE_#12).	

The ICE-drivers who said that they would feel differently about their car if it was electric did so largely on environmental grounds. This is exemplified by ICE-driver #3 feeling happier about the reduced environmental impact of their driving and by ICE-driver #9 feeling better in themselves about this reduced impact. Such positive feelings suggest that the electric car can, somehow move us to a 'greater perfection' (Spinoza (1996 [1577])). This affectus may be borne of the essence and nature of electric vehicles, in that a reduced environmental impact is their *raison d'être*. Yet since neither ICE-drivers #3 and #9 had physically experienced electric vehicles, the positivity of an environmental affectus here would correspond with Thrift's second definition of affect (Figure 1) concerning what drives or motivates us.

It is evident from the analysis that, regarding an overall affectus, ICE-drivers don't necessarily regard the electric car as a 'lesser perfection' (*ibid*), as long as it permits the freedom and flexibility of a conventional ICE car. However, concerns over range anxiety means that EVs necessarily present a challenge to the freedoms and flexibilities traditionally afforded by the car, and this is indeed a key barrier to their uptake (Bonges and Lusk, 2016; Vassileva and Campillo, 2017). The range anxiety challenge is one that the industry is addressing as battery development and recharging technology continues to evolve. Meanwhile, opportunities for initial exposure are provided at emergent dedicated experience centres offering advice and short-term EV loans and test drives (e.g. the EV Experience Centre in Milton Keynes UK which opened in 2017). Exposure in this regard is critical, as education in, and experience of EVs can assuage range anxiety, as expectations and coping strategies are shown to develop over time (Franke *et al*, 2012; Rauh *et al*, 2015).

4.2 How sound & tactility of driving EVs is experienced & 'felt'; different from ICE?

The speculative nature of a perceived *affection* regarding the electric car can be regarded as problematic since it requires the consideration of a conceptual affectus when a true *affection* can surely only come from encounter, and not be imagined, if it is truly to be perceived. Nonetheless, such perceived affections might reveal any (dis)inclination to such a disruptive technology, whether practical or cultural, in the face of how society has become conditioned to the car as we know it. That said, the only way we can truly consider a low carbon automotive affectus is from experience, and so enquiring as to how driving an electric car made drivers feel is critical in this respect. This posed problems of its own. The usefulness of interviewing 'in place' was noted by Sin (2003) but being interviewed after the completion of the CABLED demonstrator trial meant that the EV-drivers were inevitably interviewed away from their EV. This led to a disconnection not only in space, but also in time, especially in comparison to ICE-drivers possessed of much more recent recollections of any evocations of or from their car. Nevertheless, as indicated above, the EV drivers have a 12-month driving experience to draw upon and as such had much to contribute.

Perceptions of quietness and driving characteristics were borne out to an extent by the experiences of the EV-drivers, in a way which alludes to the way we have perhaps become conditioned to the car in terms of what it 'should' feel and sound like (Table 3). Similarly, notions of environmental efficacy and perceptions of (in)convenience were also reflected in practice. However, dissatisfaction was expressed by some drivers with regard to the ride, handling and overall quality of the trial EV, although how the quality and dynamics of the Tata Indica EV compare to a mass-produced ICE Indica is a moot point. Similarly, concerns emerged regarding the trial car's cabin-heating. However, these related to the nature of the heating's installation rather than any range concerns in colder weather. This again reflects issues pertaining to the test vehicle itself rather than any compromises of electromobility per se¹⁰.

¹⁰ EV_#6 felt that while their issues with the cabin-heating of the Tata Indica EV were related to the fact that the electric motor doesn't retain and provide heat to a vehicle cabin in the same way that an internal combustion engine would, and that their attempts to counter this were compromised by heater installation of the test car; any concerns over cold-weather battery range were not mentioned by this driver.

Table 3: EV drivers' instrumental experiences

Noise	
<p>'It was quite spooky and eerie ... you turn the key but you don't realise that it's on' (EV_#3)</p> <p>'...the quietness of it was quite disturbing at first until you got used to that' (EV_#6).</p> <p>'...a remarkable sort of serenity' (EV_#2)</p> <p>'The sensation of driving an electric car ... would be a lot more high-frequency noise ... an electric noise, motor whine ... which isn't pleasing to my ear' (EV_#1)</p> <p>'...you'd be surprised how quiet normal cars are as well ... what you do hear is the tyres on the tarmac, so that argument isn't as strong as what people make it out to be' (EV_#3).</p>	<p>3rd translation of affect – embodied feelings</p>
Smoothness	
<p>'I was surprised to find myself happily driving more moderately on motorways yet still having brisk performance around town, and it was very nice to have that maximum torque from zero revs around town and the driveline silence ... very pleasant attributes' (EV_#2)</p> <p>'...much more positive, it was responsive ... [and] ... quick off the mark' (EV_#3)</p> <p>'...a much better experience ... I'm currently driving a new diesel car, supposed to be a very smooth, responsive engine, but it's rubbish after the electric engine [sic]' (EV_#4)¹¹.</p>	<p>3rd translation of affect – embodied feelings</p>
Convenience	
<p>'...a bit like having a petrol car with a one-gallon tank ... [] ...it's just the range that's the big ... I wouldn't say negative, it's just something that you always have to bear in mind...' (EV_#7).</p> <p>'It was great not having to stop at garages on the way home, and just come home and plug it straight in, that was brilliant' (EV_#6).</p>	<p>3rd translation of affect – embodied feelings</p>
Environment	
<p>'I felt it was very much a green experience and I was pleased about that' (EV_#6)</p> <p>'...you're perhaps on the cutting edge of some technical development and something which is very green, which is very good' (EV_#4).</p>	<p>3rd translation of affect – embodied feelings</p>
Negatives	
<p>'...dissatisfaction probably with steering, performance, some of the suspension and handling attributes ... [and] ... disappointment with some of the trim' (EV_#1)</p> <p>'I've previously had a Prius ... it was just a much more all-round complete package, whereas the EV – the Tata – was more of an experimental, more of a prototype' (EV_#7).</p> <p>'The heating was a problem ... I'd turn the heating on, get it warm, and then turn the heating off. But what I found was your left leg got extremely hot because that was where the air came out ... it hadn't retained any of the heat, so that was quite weird ... It wasn't like an ordinary car that gets the heat from the engine' (EV_#6).</p>	<p>3rd translation of affect – embodied feelings</p>

Drivers expressed a variety of ways that their EV made them feel. These included a sense of environmental-friendliness, and of 'doing one's bit for the environment', alongside pride,

¹¹ It is interesting to note that this latter comment contradicts one reported by Graham-Rowe *et al* whereby the performance of a PHEV – a 'conventional' hybrid vehicle converted to 'plug-in' – was reported as "substandard" (2012: 145) and feeling "underpowered" (*ibid*). Whether this was as a result of perception, or a corollary of the aftermarket installation of the plug-in element of the PHEV, is subject to conjecture.

peaceableness, and *avant garde*. Some anxieties were also mentioned, statements of which allude to an affectual ‘flow’ between the cars and drivers (Table 4).

Table 4: EV drivers’ affectual experiences

Eco-friendliness	
<p><i>‘...one of the biggest wins with driving an electric vehicle ... it makes you feel that you are doing just the right thing’ (EV_#5)</i></p> <p><i>‘...it made me feel quite, er, I wouldn’t say smug, but it made me feel quite righteous’ (EV_#7)</i></p> <p><i>‘...a psychological sense of privilege and goodness in that you’re not throwing out fumes’ (EV_#4)</i></p> <p><i>‘I suppose that another thing that it does is that you get a strange pleasure out of being an energy miser, so you find yourself thinking ahead much more in your driving style ... every time you see the energy flow into the battery rather than into the red out of the battery, it gives you a kind of warm feeling’ (EV_#2).</i></p>	<p>1st & 3rd</p> <p>translations of affect – condition, mores of automobility & embodied feelings</p>
Novelty	
<p><i>‘...it’s a point of conversation with people that you’ve got an electric car and they want to know about it because people are interested, I think, in new technology, and they want to suss out for themselves whether or not it’s going to be relevant or not to their needs ... it does make you feel special because people notice it, you see people pointing ... it’s a talking point’ (EV_#3).</i></p> <p><i>‘I felt quite proud really for being part of the project, almost like a trailblazer, and that was nice’ (EV_#6)</i></p> <p><i>‘...it appeals to your sense of individualism at this stage ... a lot of people want to know what it is and they’re very interested in it’ (EV_#2).</i></p>	<p>1st & 3rd</p> <p>translations of affect – condition, mores of automobility & embodied feelings</p>
Peaceableness	
<p><i>‘...more patient, more peaceful, less aggressive ... a little bit of ‘holier-than-thou’ (EV_#2)</i></p> <p><i>‘...appealing to a different set of senses, really ... the electric car appeals to your better nature, in the sense that it does stimulate a certain kind of peace of mind, whereas conventional vehicles are more likely to feature aggression’ (EV_#2).</i></p>	<p>1st & 3rd</p> <p>translations of affect – condition, mores of automobility & embodied feelings</p>
Anxiety	
<p><i>‘...it made me feel good because I was saving money and helping the environment but it also gave me some anxiety in regards to ... how to make appointments, how to get to places and do things’ (EV_#1).</i></p>	<p>1st & 3rd</p> <p>translations of affect – condition, mores of automobility & embodied feelings</p>

Feelings of environmental-friendliness echo those reported by Graham-Rowe *et al* (2012) in their analysis of short-term (7-day) exposure to EVs. They would correspond to Thrift's seventh tenet of non-representational theory (Figure 1) concerning novelty and aliveness, a notion which can also be said to allude to the sensation of speed. That most drivers interviewed derived a positive sense of environmental wellbeing from the trial EVs, and were still able to do so despite being detached from them for a period of time, is encouraging. Such a reaction is perhaps testament to the EVs *authenticity*. After all, environmental-friendliness is what the EV is all about, this is what it is for, this is its essence. This observation may be useful, given that Liao *et al* (2017) found only one study (Kim *et al*, 2014) which measured perceptions of EVs as being environmentally friendly and suggested that for many environmental factors will take second place to economic ones.

More broadly, these feelings of environmental-friendliness imply that we might look beyond notions of speed or power to feel good about our cars. They also suggest a way that those indifferent to the car might feel something about it after all and may even transfer such feelings into other aspects of their lives. Such potential was noted by Ryghaug and Toftaker (2014) who found that driving electric vehicles heightened an awareness of wider energy consumption. This in turn dispels the notion of a rebound effect whereby one eco-action permits deleterious consumption elsewhere. It rather supports that of an eco-affect, predicting intentions of environmental engagement, whereby norms can become habits (Whitmarsh, 2011; Gifford, 2014).

As to how long these feelings of automotive environmental-friendliness might last should EVs become more mainstream and conditioned to, only time will tell. However, at the moment, such a 'feelgood factor' resultant of a 'green affect' invoked by electric cars provides a unique selling point which transcends conventional rationalities as an incentive for uptake. It may need to, as the indifference noted by some ICE-drivers, and experienced by some EV-drivers, suggest that barriers to uptake of EVs may be more practical in nature. Long-standing issues of price, range and practicality, are more important than any subconscious disposition.

More positive feelings were fomented by a sense of novelty. This sentiment resonates with Thrift's seventh tenet of non-representational theory (Figure 1) which here pertains to the contemporary novelty value of EVs. Indeed, broader interest from members of the public was noted by several drivers, with the EV providing a conversation point.

On the negative side, anxiety was observed in relation to the potential loss of freedom and flexibility (Table 4, EV_#1). This is a critical issue, as freedom and convenience are central to the essence of the motor car which has provided the means to go where we want to go, and when, without really thinking about it. That said, home-charging of EVs should afford them a real convenience given how recharging behaviours more generally have been domestically routinised. The increasing prevalence of rapid chargers are also enabling longer EV journeys to be undertaken. Not only that, but it is also possible that EVs may actually help to maintain automobility in a world where future legislation may dictate how or when cars may be used. While it is perhaps instinctive to regard range issues as a disincentive to EV adoption, their outcome as observed in a calmer driving style whilst maximising range, akin to 'hypermiling' an ICE vehicle so as to maximise fuel economy, is potentially positive.

Whilst observations citing an EV calm and an ICE 'aggression' allude to an automotive gendering applied to early EVs (Scharff, 1991; Mom, 2004; McCarthy, 2007; Ivory and Genus, 2010), they may also suggest a change of 'meaning' or rationale to the electric car. This potentially provides a unique selling point with EVs "seen as a new mobility option ... and not simply as vehicles featuring a new propulsion system" (Peters and Dutschke, 2014: 373).

Drivers were asked as to how feelings engendered by their EV compared to those of their conventional ICE cars. Some drivers referred to a lack of reassurance of an EVs all-around abilities compared to those of an ICE car (Table 5). Such anxiety, coupled with the negative observations of the trial vehicle noted earlier, suggest that while the EV experience wasn't wholly positive, this was more a result of innate shortcomings with the trial vehicle rather than electric propulsion *per se*.

Driving an EV didn't have an impact upon everyone however. Some drivers felt that there was no difference in the way that an EV made them feel compared to a conventional car (Table 5). Such comments echo those made by ICE-drivers who were similarly indifferent to their own cars. This suggests that in terms of a 'technicity', a shift to electric propulsion and the technologies therein may not be an issue for many drivers, especially as exposure to these new technologies increases.

Table 5: EV drivers' affectual perceptions

Feel different – yes	
<i>'...you can drive [my diesel car] at 85 in the wet knowing you're fairly safe, and the Tata was always ... it'd never have done that, it wouldn't have gone that fast, and you'd never feel as safe as you may well have been' (EV_#4)</i>	2 nd & 3 rd
<i>'...with [conventional cars], you've got more security, you're more relaxed because you know you can just pull into a garage and get fuelled up again ... it's quite an ordinary experience now, driving a car ... it was a disappointment to have to come back to an ordinary car' (EV_#6).</i>	translations of affect – an automotive 'essence' & engendered feelings
Feel different – no	
<i>'...just a means of getting from A to B' (EV_#7)</i>	2 nd & 3 rd
<i>'...probably I'm not that passionate about cars to the extent that it takes me from A to B and that's it. In doing so, the electric does it in an environmentally friendly way and a more economical way so I don't notice much from one to the other' (EV_#5).</i>	translations of affect – an automotive 'essence' & engendered feelings

Performance concerns aside, findings suggest that the EV reality is little different from the perception. Responses from EV-drivers indicate that the driving experience of an EV was actually much more positive than that of an ICE. This is witnessed for example in the reported smoothness, instant response and nippiness, a corollary of the electric car being able to deliver maximum torque, or pull, from standstill.

The EV drivetrain attributes of smoothness and responsiveness noted here allude to electromobility being fun (see also Cenex, 2013). That such a notion wasn't explicitly expressed is perhaps a result of the specific vehicle driven in the trial. The impression gleaned from the EV-drivers was that, though possessed of EV technology, the Indica was a relatively unsophisticated vehicle. It is possible therefore that the drivers' EV experience may have been even more positive than it was had they driven purpose-built, 'authentic' electric vehicles such as the Nissan Leaf¹². However, the timing of the CABLED trial and the roll-out of EVs from car manufacturers precluded this.

Nonetheless, it appears that drivers found the experience of EVs acceptable, and occasionally superior, to that of their conventional ICE cars. They also broadly bear out ICE-drivers' perceptions of them from which, incidentally, the early gendering of the electric car is notably absent. This points

¹² See also footnotes 7 and 10 regarding implications concomitant with the retrofitting of EV technology to existing mass-produced vehicles.

to how low carbon vehicles might be 'consumed' differently, and how their 'meaning' and/or *raison d'être* may have changed in the light of the environmental imperative. It also suggests that ICE-drivers knew more about EVs than they realise and that the technicities (Thrift, 2008) pertaining to EVs may hold no more terrors than those encountered when learning the finer points of a new or different ICE car.

It is important to consider one aspect that precludes a truly direct comparison between the affects and non-representationalities of conventional cars and EVs here. This is the affect concomitant with ownership. The cars used by the EV-drivers in the demonstrator trial reported here were not their own. They were leased for twelve months and then returned. As such, any affectual or non-representationality inferred inevitably lacks the authentic depth of that manifest and expressed by ICE-drivers pertaining to their own cars. This is evident not only in the leasing of the cars but also in the intrinsic trial-status of the vehicles during tenure, compared to the owner-status possessed by most motorists regarding their own cars. This suggests that how affectations of low-carbon automobility compare with those associated with conventional car ownership can only be fully ascertained by liaising with EV *owners* rather than lessees. At the same time the leasing of EVs, through initiatives such as demonstrator trials, is expedient in providing access and exposure to new technology. The same could also be said for car sharing schemes.

Traditionally predicated on reducing both traffic congestion and emissions associated with use, car share schemes have been in existence for some time (Shaheen *et al*, 1999; Firnkorn & Müller, 2011). While raising similar further considerations regarding an automotive affectus, like vehicle trials they can also act to facilitate the roll-out of emergent low carbon technology through increased exposure. This is exemplified by schemes such as Autolib EV Paris, and the more recently launched Bluecity scheme in London (Coffey and Thornley, 2012; Glotz-Richter, 2012; Riversimple, 2017; Autolib, 2017; BlueCity, 2018). However, while car share as a concept provides a challenge to both the notion and the need for car ownership, contemporary regard of the car still renders this problematic (Glotz-Richter, 2012). Indeed, Wells and Xenias (2015) suggest caution over notions of peak car as a result of car-sharing schemes, since the use-intensity of the vehicles involved suggests that a reduction in car ownership does not necessarily result in a reduction in car-distances travelled. Nonetheless, car-sharing schemes may yet predicate new business/transport models, whereby motorists pay to access mobility, whether intra-marque or otherwise. In addition, it has been suggested that car sharing through providing exposure to, and experience of EVs, can act to reduce range anxiety (Amsterdam Round Table & McKinsey and Company, 2014). Such restructuring and

toppling of institutions in the name of automobility is nothing new, and is perhaps innate to the autopoietic nature of automobility (Urry, 2004).

Reports of 'sensations' such as environmental-friendliness and *avant garde* suggest that most drivers were 'affected' by their EV in some way. Such feelings are not physically felt or experienced; instead, they hint at something more non-representational, the 'affect' of an electric car on its driver. This sits in contrast with the feelings that ICE-drivers expressed with the cars they drove at the time. Appropriating affect and non-representational theory to explore this allows us to look beyond textual descriptions (see Burgess *et al* (2013), however rich, and begin to address the concerns of Rezvani *et al* (2015) regarding the lack of theorising such observations.

4.3 An innate automotive 'affectus' – impacts upon EV uptake?

As established the environmental imperative is impelling the automotive industry towards producing low carbon technologies as witnessed in the rise of the electric car, but is there more to EVs beyond their environmental rationale and credentials? To what extent are EVs desirable in themselves despite (or even because of) their differing rationale to ICEs and, if not, how can they become so or their uptake fostered? Exploring the collective lived and unlived experiences of drivers in this research, assists in reconciling how automobility has evolved in terms of technical diffusion and socio-cultural consumption, with how it subsequently evolves into a low carbon future.

It appears from the responses of the EV-drivers that while practicality and convenience remain issues, ordinary motorists could enjoy the driving experience of the electric car, both physically and psychologically. If this is coupled with an amenability towards environmentally friendly vehicles, then it is possible to suggest that while low carbon vehicles are perceived and experienced differently to conventional ICE vehicles, this should not be a barrier to their uptake. Findings revealed that EVs don't necessarily carry more fears for drivers than those experienced on any first 'encounter' with a vehicle. Broadly speaking, based on the lived experiences of EV drivers and the unlived knowledges of ICE drivers, electric propulsion is not seen as a frightening step into the unknown.

It is in how the car is experienced and felt that the lens of affect and non-representational theory contributes in assessing if, and so understanding how, such experiences, with respect to the way that the car is represented, gendered, anticipated and felt, translate to a low carbon automobility. This is witnessed not only in wider feelings of empowerment and reassurance that the motor car

brings, but also feelings wrought of the tactility and/or sounds of a car, feelings which will necessarily differ with a move to electric cars. An example of this would be how drivers of electric cars revealed feelings of environmental-friendliness, serenity, even *avant garde*, fostering a greater positivity that in turn points to a 'greater automotive perfection' in the future. An indicator of this positive disposition is evidenced in the way some of ICE-drivers thought that they would feel differently about their car if it was electric, and that they would feel better about themselves, happier and more positive about their diminished environmental impact. Such sentiments were also experienced by EV-drivers. Other ICE-drivers were less overtly positive, though by no means negative, believing that there would be no difference in how they felt as long as the electric car does what they want and need it to. As noted earlier, electric cars are not necessarily seen as inferior, or as a 'lesser perfection', providing they maintain the freedom and flexibility to which motorists are accustomed. Concerns over the limitations of current technology in terms of range, price and recharging time should be addressed as technology advances and take-up increases over time.

As demonstrated previously, the limitations of EVs a century ago persist still. Correspondingly, the observations noted here, though collated in 2012/13, maintain a contemporary resonance, not least as EVs are still "seen as a novel technology" (Wikström *et al*, 2016: 66). A recent demonstrator trial assessing the feasibility of EV take-up among rural businesses in the UK found that range and infrastructure issues continue to be a key concern: "Although I start with 93 miles [range] on the clock and I am all happy, I daren't put the heater on" and "our engineers can go...where the infrastructure for charging is non-existent" (Jones and Begley, 2016, 16-17). This is despite the superior technology of the vehicles used (e.g. Nissan Leaf and BMW i3) compared to those used in the CABLED trial five years earlier. Such concerns were also observed by Wikström *et al* (2016). Similarly, Berkeley *et al* (2018) note in a wide-ranging survey of UK drivers that socio-technical concerns such as range anxiety and practicality remain key barriers to EV uptake and more so for women than men. However, aside from a pecuniary and instrumental emphasis, Jones and Begley (2016) also report a positivity as to the driving experience of EVs, one regarding an environmental efficacy: "We used that [EV] in our business ethically ourselves, we were interested as part of our image..." (*ibid*: 27). Such notions are posited by Schuitema *et al* (2013) and are evocative of the feelings of 'greenness' expressed by drivers interviewed here.

Analysis of the unique, empirical data presented in this paper represents a practical application of affect- and non-representational theory with regard to the automobile, exploring how barriers to EV uptake beyond the instrumental are manifest. As EV technology progresses, and the industry moves

Commented [NB1]: In what context? i.e. ...in their study of..

to explore the potential of autonomous vehicles (which more than likely will be electric), it is suggested that a sharper focus on such barriers to future automobility is ever more pertinent.

5. Conclusion

This paper drew on notions of affect and non-representational theory from social and cultural geography to assess the contemporary 'consumption' of the car in the context of an uptake of low carbon vehicles. In doing so, it contributes to a seemingly neglected discourse, understanding how feelings, experiences, knowledges and behaviours of drivers locked into an established way of doing things will translate to a new greener automobility.

Such theorising is important with respect to policymaking, as sustained impetus for any social change posited from the top down needs to come from the bottom up, to be carried by people, if it is to be effective. Automobility is no different in this regard. Indeed, the socio-cultural significance of the car means that such impetus is even more important in pursuing the amelioration of the environmental impacts of a continued private automobility. This is because the car is a tool that transcends the instrumental pursuit of movement and transport, and which can move us in ways beyond the physical. It is an artefact such that motorists will need to *want* to change from established, even conditioned, automotive mores, practices and experiences if a transition to a low-carbon automobility is to be tenable. How automobilities, and a low-carbon transition of such, are perceived, performed and experienced is consequently crucial.

This research finds that electric propulsion isn't regarded as a leap into the unknown, with any initial prospect no more intimidating upon encounter than with any new, conventional ICE vehicle. Nor are EVs necessarily regarded as inferior as long as they maintain the freedom and flexibility conventional automobility provides. Experience of EVs can permit a 'greater automobility perfection', not only in terms of driving characteristics, but also in feelings of 'peaceableness' and environmental-friendliness. Exposure to EVs can additionally assuage fears of range anxiety, a factor regarded a major hurdle to EV adoption. Recognising and addressing this 'affectual' divide through the ways in which manufacturers of vehicles design and disseminate knowledge about EVs is crucial to mainstreaming their appeal and in disrupting the established ICE ecosystem.

The framework posited here facilitates the exploration of an automotive affectus and non-representationality that is not just confined to motorists. Other road users, for example pedestrians and cyclists, are also possessed of such affectus and will act accordingly with automotive encounter.

The Dieseltgate scandal of 2015 heightened awareness of local air-quality issues. With regard to EVs, the potential for improvement to air quality can elicit an amenability to electromobility, which may also facilitate a 'bottom-up' change in quotidian automobilities that will sustain beyond policy mandates.

In terms of the contemporary EV market, instrumental aspects of new technologies pertaining to battery performance and recharging times present barriers to transition that endure. However, from the perspective of consumers, the feelings and experiences concomitant with extant automobility suggest significant cause for optimism regarding the potential for low carbon vehicle uptake.

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Appendix 1: Four translations of affect (Thrift, 2004: 60-64)

Thrift's first definition is that affect is "a set of embodied practices that produce visible conduct as an outer lining" (2004: 60). If we take the car as this 'outer lining', then this definition appears most relevant in considering the car as, following Spinoza, our actions are a result of what happens within us or outside us. Such actions are manifest as an "expressive/aesthetic feeling-cum-behaviour of continual becoming" (*ibid*), in which the context will inevitably influence how we act. For our purposes, this context could be the car that motorists drive, the traffic in which it is driven, or the actions of other drivers. In his second definition, Thrift cites Silvan Tomkins' assertion that the Id and the Unconscious are key components of affect (Thrift 2004: 60), and Tomkins' regard for the face as "a primary organ of affect" (*ibid*: 123), with Thrift describing the face as "affect in process" (Thrift, 2004: 61). Similarly, we can describe the manner in which the car is used as 'affect in process', while Tomkins' reducing of affect to a psychological 'drive' ties in with Spinoza's observation that our 'essence', or our true meaning or self, lies in the way in which we endeavour to be or find ourselves. This notion can be applied to the car; that is a car can have a true meaning or self in its design/engineering, or in freedom and flexibility, and the resultant autonomy it brings.

Thrift thirdly defines affect as being "the property of the active outcome of an encounter" (*ibid*), manifest as mind and body acting together according to the particular encounter; whether this is a positive or negative action predicates emotion (*ibid*). Citing Charles Darwin, Thrift notes in his fourth definition how emotion evolves from affect "as a means of preparing an organism for action" (*ibid*: 64), and that while some basic emotions are common to all cultures, how they are communicated is necessarily influenced socially in different ways. Similarly, automobility is communicated culturally in vastly differing ways across various social groups, consumer communities and national cultures (e.g. Edensor, 2004; Miller, 2001).

Appendix 2: Seven tenets of non-representational theory (Thrift, 2008: 7-14)

Thrift's Spinozist first tenet suggests a monist cognition acts as a guidance function, monitoring and interpreting situations, manifest as the way motorists drive and adapt to road conditions, and how they react to and judge other motorists' actions, using the car they drive and appropriating the way they are driving as a means of such navigation. Correspondingly, his second tenet suggests that the nature of non-representational theory means that it is perceptive, manifest as a result of a "continuous and largely involuntary process of encounter" (*ibid*: 8) whereby the creation and production of practices is manifest. This relates to Thrift's third tenet, which pertains to schooled practices and routines, such as those associated with the use of the car. While society has been conditioned, or 'schooled', to automobility, the EVs rebirth after almost a hundred years suggests we may well have to reassess automotive practices again.

The fourth tenet is key for a cultural and consumer artefact such as the car, since a car can 'affect' our sense of sight, smell, hearing and touch; as Thrift notes, "things answer back" (*ibid*), things such as the aesthetics of a car; we can all distinguish the smell a car; the sound of a car too, whether sonorous or a drone, one that indicates the correct gear or a breakdown; the 'feel' of a car, evidenced in its tactility. Fifthly, Thrift states the importance of the virtual as multiple sensory registers, since our sensory experiences inform our performances which take place in the car, with motorists acting/driving as they do constantly discarded/renewed. His sixth tenet considers affect, whereby Thrift notes that affect and sensation are simply how each object or 'thing' is merely its own essence, in that the way we act and think varies depending how and where we are. This suggests that the way we act in differing cars and differing traffic constitutes the way we subsequently present our representations. How we do this pertains to the seventh and final tenet of Thrift's non-representational theory, which broaches the subject of ethics, as in agency or ways of being. He purports an ethic of unfamiliarity, or novelty, which would permit 'aliveness' and allow us to become what we can know.