

An Introduction of Social Practice Theory in Environmental Policy

The Social Practice of Driving in The Netherlands

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Traditional behavioural change methods have not been able to reduce traffic-related air pollution in The Netherlands sufficiently. Social Practice Theory offers new perspectives for effective environmental policy (i.e. policy that generates structural social and environmental change). By applying Social Practice Theory to the problem of traffic-related pollution in urban regions in The Netherlands, the dynamics behind the practice that causes pollution becomes clear. This way, factors that contribute to the persistence of the harmful behaviour are exposed while otherwise they could remain unnoticed and unaddressed. Besides that, practice-based interventions enable more structural social and environmental change. They move from using rational choice as a main driver of human behaviour towards altering the socio-cultural practice of driving as a whole, and consequently change the behaviour of a large group of people (i.e. car drivers in The Netherlands) at the same time.

Preface

I have always been susceptible to respiratory infections. After multiple treatments and a surgery, I found that since last year my symptoms were increasing again. My doctor sent me to an ENT specialist and he told me that my symptoms and infections were induced by poor air quality, and that my options were either to move out of the city or to deal with it, tampering the effects with nose sprays and such. Once home again, I checked the air quality of the street I moved into approximately 8 months ago and it turned out that most of the time, the air quality was below the EU standards. My house is situated at the W.A. Vultostraat, a street just outside the city centre of Utrecht. Cars are constantly driving past my window, filling my room with toxic fumes and clearly now, it started to have an effect on me. And I am not the only one; this street has long rows of houses, fencing off both sides of the roads, harbouring families, young children, elderly and students, who all breathe this same air.

My personal experience and this realisation brought me to the idea of addressing traffic-related air pollution in The Netherlands. Besides that, I often feel discontent with current environmental policy. I wanted to use this research to see if I could contribute to the betterment of current practices.

With this final piece I look back at four years of studying. Environmental Social Sciences has made me more aware and compassionate. I want to thank my family and my friends, far away and nearby, for their support and guidance. I want to thank Jetske Vaas for the honest and helpful feedback during the process of writing.

Finally, I want to dedicate this thesis to my godmother Margreet Zandbergen, who died the 20th of June, 2017. She always believed in me, and loved and supported me unconditionally.

Index

1. INTRODUCTION	4
1.1 FAILURE OF TRADITIONAL BEHAVIOURAL CHANGE METHODS	4
1.2 A NEW APPROACH WITHIN ENVIRONMENTAL POLICY	4
1.3 RELEVANCE	5
1.4 BOOKMARK	5
2. CONCEPTUAL FRAMEWORK	6
3. METHODOLOGY	7
3.1 PRACTICE OF DRIVING IN URBAN REGIONS IN THE NETHERLANDS	7
3.2 PRACTICE BASED INTERVENTIONS TO REDUCE TRAFFIC-RELATED AIR POLLUTION	7
4. RESULTS	8
4.1 THE PRACTICE OF DRIVING IN URBAN REGIONS IN THE NETHERLANDS	8
4.1.1 MEANING	8
4.1.2. MATERIALS	9
4.1.3 COMPETENCES	10
4.2 SOCIAL PRACTICE THEORY AS A BASIS OF EFFECTIVE ENVIRONMENTAL POLICY	11
4.2.1 ELEMENT ‘MATERIALS’: MATERIAL INNOVATION	11
4.2.2. ELEMENT ‘MEANINGS’: MATERIAL SUBSTITUTION	13
5. CONCLUSION	14
6. DISCUSSION	14
7. REFERENCES	16

1. INTRODUCTION

The air quality in The Netherlands is too low to ensure the safety of our health and environment (Knol 2017). High levels of pollutants are mostly found in areas where a lot of cars are driving, such as the main roads and the centres of our largest cities (Luchtmeetnet.nl 2017, figure one). Despite various efforts by the Dutch government to address the negative environmental and social impact caused by road traffic, the persistence of the problematic air quality illustrates that current behavioural change methods have not created the desired environmental and social impact.

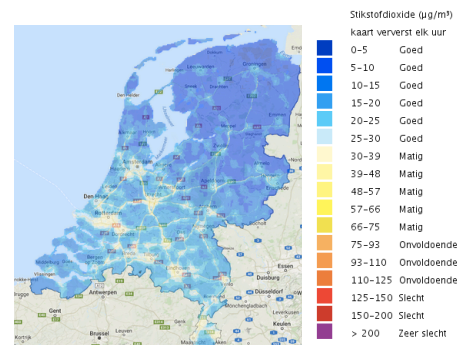


Figure 1: Nitrogen oxides levels in The Netherlands (02-05-2017, luchtmeetnet.nl)

1.1 FAILURE OF TRADITIONAL BEHAVIOURAL CHANGE METHODS

Traditional behavioural change methods within environmental policy are mostly built on the Theory of Planned Behaviour (Ajzen 1985), which suggests that people will refrain from environmentally harmful behaviour if they know they will receive punishment, and that people will engage in environmentally beneficial behaviour if they know they will receive a reward. These concepts are known as ‘command and control’ and ‘the incentive-based approach’, and fit within the dominant paradigm of the ABC framework (attitude – behaviour – choice) of contemporary environmental policy (Shove 2010). Even though these approaches have led to favourable outcomes, the environmental changes generated with these methods are often incremental and temporary (Evans et al. 2011). For example, the city of Utrecht introduced a so-called ‘Green Zone’ in 2015, which prevented diesel cars that were registered before January 1st 2001 from entering the centre resulting in 29% less black carbon emissions from small road traffic (Gemeente Utrecht 2016). However, Utrecht’s city centre still displays toxic levels of air pollutants. Apart from that, people are solely motivated by the monetary punishment, so no fundamental social and environmental change is achieved (i.e. when the restriction is lifted). The report from the International Review of Behaviour Change Initiatives (2011) recognizes a trend and confirms that interventions based on individual change do not have the environmental impact that was hoped for (Southerton et al. 2011).

1.2 A NEW APPROACH WITHIN ENVIRONMENTAL POLICY

According to Hargreaves et al. (2013), fundamental changes that affect the lives and lifestyles of individuals are rarely achieved because of the influence of social and cultural factors on our practices and behaviours. Because of these social and cultural factors, achieving more sustainable consumption patterns by changing everyday practices such as driving is very challenging (Bellotti & Mora 2016). Another option is -instead of looking at individuals or social groups- to change behaviour by using practices as an explanatory process for everyday behaviour (Reckwitz 2002). Social Practice Theory is a sociological theory that approaches behavioural change in such a way, and hereby moves away from using rational choice as the driving force of human behaviour. With this approach, Social Practice Theory provides a more holistic and grounded perspective on behaviour change processes as they occur in situ, and therefore can be of great addition to traditional behaviour change methods (Hargreaves 2011; Strengers et al. 2015), or even replace them (Shove 2010; Shove et al. 2012; Spurling & McMeekin 2015).

The goal of this research is to explore the possibilities for Social Practice Theory as a basis for effective environmental policy (i.e. policy that generates lasting social and environmental

change) that addresses traffic-related air pollution in The Netherlands. Since the poor air quality as a consequence of road traffic is mostly experienced as problematic in the centres of our largest cities, this thesis focuses on the practice of driving in urban regions. This has led to the following research question: *'Which indications can be taken from the Social Practice Theory for effective environmental policy to reduce air pollution caused by road traffic in urban regions of The Netherlands?'* Using the conceptual framework by Shove et al. (2012), the sub-question *'How can we characterise car driving in urban regions of The Netherlands as a Social Practice?'* will provide insight on the status quo. Building on this characterisation, the question *'How can practice-based interventions reduce the negative social and environmental consequences of the practice?'* is answered by evaluating the possibilities of altering the practice in order to make the practice less harmful.

1.3 RELEVANCE

In The Netherlands, one third of all air pollution is caused by traffic (Knol 2017). The chemicals emitted by road traffic have extensive environmental impact, as they contribute to acid deposition, eutrophication of soil and water, the greenhouse effect and the formation of ground level ozone (European Environmental Agency 2013). Besides the environmental dangers, exposure to these substances has proven to have an array of acute and chronic adverse health effects such as asthma, COPD and respiratory infections (Khafaie et al. 2016, Kim et al. 2004), and cardiopulmonary morbidity and mortality (Arden Pope III & Dockery 2006). Currently, air pollution is the third cause of death in The Netherlands, following smoking and obesity (Knol 2017). ABC style interventions have yet to demonstrate social change of the scale and velocity demanded by these social-environmental challenges (Munasinghe et al. 2009), so we should explore approaches that go beyond the theoretic boundaries of this framework (Shove 2011).

Besides offering perspective for more effective environmental policy (i.e. policy that creates structural social and environmental change) and the reduction of traffic-related pollution and diseases, this research also contributes to interdisciplinary strengthening, as this is the first time that Social Practice Theory will transcend its discipline of origin (sociology) and will find application in the field of environmental policy.

1.4 BOOKMARK

Chapter two sets forward the conceptual framework that is used in this thesis. Chapter three explains the methods used to answer the research question(s), and chapter four displays the results of the study; both the characterisation of the practice and potential practice-based interventions are discussed. Chapter five concludes the thesis en provides an answer to the main research question. In chapter six, the research is evaluated and points for further research are discussed. Finally, a list of references is included.

2. CONCEPTUAL FRAMEWORK

Finding its origins in the Structuration Theory (Giddens 1984), Reckwitz (2002) formulated the Social Practice Theory with which he argues that practices are configured or shaped by the many elements, interconnected to one another, that comprise the conditions of existence for a practice. For him, these elements include: ‘forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge’ (Reckwitz 2002 p249). Shove et al. (2012) translated this idea into a conceptual framework containing three elements that together make up the social practice and shape the practice in their process of interaction. The three elements that make up the social practice are:

- Meanings, which include symbolic meanings, ideas and aspirations
- Materials, which include objects, infrastructure, tools, hardware and the human body
- Competences, which include the practical knowledge of the practice, and the skills to execute the practice (figure two)

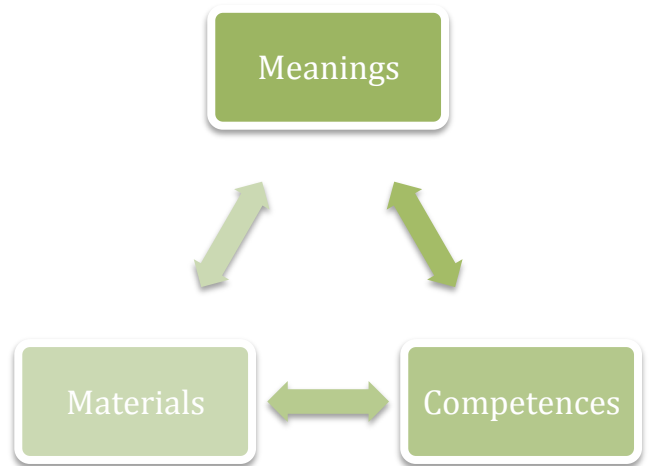


Fig.2: Conceptual framework for social practices by Shove et al. (2012)

Instead of individuals being the subject of analysis, the social practice theory sees individuals as carriers of a practice (Reckwitz 2002). Theories of social practice consider ecologically damaging forms of consumption not as a problem of individual consumer behaviour, but rather understand it as embedded within the prevailing organisation of practices. In turn, these forms of consumption are related to the collective development of what people take to be ‘normal’ ways of life (Shove 2003). The sum of the individuals executing the practice and the way they do this ultimately determines the nature of the practice. Thus, by influencing or manipulating the elements, you can alter the practice and consequently the behaviour of large groups of people.

The contextual boundaries of this research –urban regions in The Netherlands, 2017- are determining factors for the characterisation of the elements. Excluding them could result in completely different practices. For example, in the early 1900’s, driving the complex and mechanically fragile early cars (material) was an adventurous and risky hobby (meaning) that required sophisticated maintenance and repair skills (competences) (Caletrio 2015). After the implementation of various material innovations, cars rapidly became more reliable, which changed the practice from being an expensive hobby for the happy few into a practical and safe mode of everyday transportation suited for the wider public. However, this did not result in a universal practice. For example, due to differences in country size, spatial planning, costs of gasoline and culture, the practice of driving today in the USA differs greatly from the practice of driving in The Netherlands. These dynamics illustrate that a practice is dependent on contextual factors (in the examples the contextual factors were determined by time and place) and that a practice can change once these contextual factors alter.

There can be a role for governments to purposely change contextual factors that enable the practice. These manipulations are called *practice-based interventions*. Instead of addressing individual behaviour, these interventions focus on altering the practice of a large group of people by actively integrating, altering and/or disintegrating the different elements (Shove

2011). The practice-based intervention focuses on the practice that is causing the pollution, hence this thesis addresses the practice of driving in urban regions of urban regions in The Netherlands.

3. METHODOLOGY

This descriptive literature study answers the question ‘Which indications can be taken from the Social Practice Theory for effective environmental policy to reduce air pollution caused by road traffic in urban regions of The Netherlands?’. By using a mix of scientific and grey literature, the possibilities for Social Practice Theory as a basis for effective environmental policy (i.e. structural social and environmental change) will be explored.

3.1 PRACTICE OF DRIVING IN URBAN REGIONS IN THE NETHERLANDS

Paragraph 4.1 will answer the question ‘How can we characterise car driving in urban regions of The Netherlands as a Social Practice?’. This question needs to be answered in order to provide a basis for the exploration of potential practice-based interventions. A combination of scientific (via Google Scholar and Scopus) and grey literature is used to study the relation and interdependency of the three elements as presented in the conceptual model by Shove et al. (2012). To identify the element of ‘meaning’, scientific literature from a wide array of social disciplines (sociology, psychology, urban studies) is evaluated. The elements materials and competences are more straightforward, but will nevertheless be explained.

3.2 PRACTICE BASED INTERVENTIONS TO REDUCE TRAFFIC-RELATED AIR POLLUTION

Following, the question ‘How can practice-based interventions reduce the negative social and environmental consequences of the practice?’ is answered.

Element ‘materials’: material innovations

For the last decade, we are in a period of dramatic change in the capabilities of, and expectations for, the vehicles that we drive. This is mostly expressed in the development of lower to no emission cars and automated cars. If innovations of this nature will find their way into the commercial domain, the element ‘material’, and consequently the practice, can alter significantly. The government has to decide how they respond to these innovations, and even; how they can use them in their advantage. Hence, the first focus for practice-based interventions is on the element ‘materials’ and material innovation. First, by using a combination of scientific and grey literature and the conceptual model, the consequences of the innovations for the practice and the air quality in The Netherlands are discussed. Based on these results, possibilities for practice-based interventions that enable less traffic-related pollution are evaluated.

Element ‘meanings’: material substitution

Instead of starting with a focus on the material element, and then evaluating the consequences for the other elements and the practice, there could be a focus on the element ‘meaning’ as a starting point as well. This could broaden the range of potential interventions, because opportunities will not be restricted by the boundaries of the existing characterisation of the element ‘materials’. Starting from the element ‘meanings’, there are various options:

- Forge new links between ‘meanings’ and ‘materials’ and ‘competences’, i.e. create an intervention that connects new, negative associations with driving a car.

- Break existing links between ‘meanings’ and ‘materials’ and ‘competences’, i.e. create an intervention that disconnects the existing associations with driving a car.
- Forge new links between existing ‘meanings’ and new ‘materials’ and ‘competences’, i.e. create an intervention that provides an alternative material that people have the same or better associations with. The original practice will remain as well.

The first option fits most into the dominant paradigm of the ABC-framework. To reduce car use and improve air quality, negative attributes such as ‘environmentally harmful’ and ‘harmful to our health’ should be included. This is quite challenging because the advantages of the practice are always personal and a result of personal experience; yet the disadvantages are presented with reference to public discourse. For example, respondents of a study by Hagman (2003) seemed to agree that car use in general ought to be reduced due to environmental issues, but they were not thinking of reducing their own car use. This cognitive dissonance illustrates that creating awareness is not sufficient to alter behaviour. From a perspective of the Theory of Practice, this failure occurs due to the lack of active integrations or disintegrations of materials, meanings and competences, and thus the practice cannot change (Shove et al. 2012). The second option deals with various limitations as well, because once all the structures that facilitate the utility and psychological meanings of the practice are in place, only destruction of these structures could result in a different practice. Then, the practice-based intervention should be counter-productive/destructive, which is not only highly unconventional for governmental strategies, but also impossible if other options are not provided. The most practical option is to take the element ‘meanings’ of the practice of driving, and evaluate if it could be connected to an alternative ‘material’ and ‘competences’. Due to the possibilities of the extensive public transport network in The Netherlands, the intervention focusses on the material transition ‘car’ to ‘public transport’. Using the characterisation of the element ‘meanings’ provided in 4.1, this paragraph evaluates which services public transport should offer to match or surpass these characterisations. Following, practice-based interventions that stimulate the development of these services are discussed.

4. RESULTS

This chapter displays the findings from the literature study and will provide an answer to the research question(s). 4.1 starts with a characterisation of the practice of driving in urban regions in The Netherlands. Following, 4.2 explores potential practice-based interventions. Together, these results provide an answer to the question ‘*Which indications can be taken from the Social Practice Theory for effective environmental policy to reduce air pollution caused by road traffic in urban regions of The Netherlands?*’.

4.1 THE PRACTICE OF DRIVING IN URBAN REGIONS IN THE NETHERLANDS

The following paragraph presents the findings for each element and incorporates them into the conceptual model, answering the question ‘*How can we characterise car driving in urban regions of The Netherlands as a Social Practice?*’. The model provides a basis and a visual representation for the practice-based interventions suggested in paragraph 4.2.

4.1.1 Meaning

According to an empirical study aimed at examining various motives for car use in The Netherlands, three categories of car use motives can be distinguished: symbolic and affective

meanings, instrumental meanings and independence (Steg 2005). This categorisation can be used as a starting point to include all the relevant meanings.

Symbolic and affective aspects

Evidence suggests that some people may not always drive out of necessity, but also by choice (Handy et al. 2005). This means that people have other motives for using their car, such as feelings of sensation, power, status and superiority (Steg 2005). Apart from experiencing pleasure while driving, these meanings imply that the car contributes to a person's identity and social position. This can be on a micro level, but also on a more structural macro level: the report 'Making the Connections: Transport and Social Exclusion' (2002) states that in recent years we have seen a growing recognition that transport problems can be a significant barrier to social inclusion. Therefore, Cass et al. (2005) mention spatial access as an important meaning of car use. In the Netherlands this could include the necessity to own/drive a car to reach one's job, or to participate in social/cultural events. This meaning treads a line between being symbolic/affective and instrumental, but since the outcomes are not practical (the goal is social inclusion and not transportation from point A to B), it can be interpreted as a symbolic and affective meaning. Symbolic and affective meanings are more prominent in people that use their car more frequently (Stag 2005), which is an important point of focus for potential policy.

Instrumental aspects

The instrumental aspects include the most straightforward reasons for car use such as transportation and mobility. By only looking at the instrumental meanings in car use, variables like place of residence, and workplace determine the duration and costs of a trip and thus the frequency of use of the car (Lois & Lopez-Saez 2009). In general, this approach assumes that people choose the transportation mode that provides them with the highest utility or relative advantage (Domencich & McFadden 1975 cited in Dong et al. 2006 p165).

Independence

This category includes factors such as individual freedom (Jensen 1999), and advantages such as flexibility, saving time and comfort (Anable 2005; Hagman 2003). It turns out that people are willing to use a different mode of transportation, if they are able to offer the same service (Beirao & Cabral 2007). This implies that the meaning of independence is quite bendable, or at least much more that for example symbolic and affective meanings.

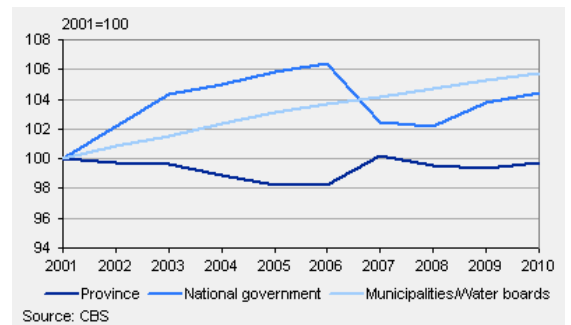


Fig. 3: Growth road network 2000-2010 (CBS 2010)

4.1.2. Materials

The element 'materials' includes objects, infrastructure, hardware and the human body. The first and foremost material that enables the practice of driving is the car. In The Netherlands, the number of passenger cars is ever growing with an increase of nearly 1,9 million cars from 2000 to 2017, resulting in currently more than 8,2 million cars on our roads (CBS 2017 I). This amount is extraordinary, especially considering the small land surface and population density in our country. For example, The Netherlands has about the same amount of cars per 1000 inhabitants as Germany (545-550 cars, Eurostat 2017), but due to lower population density, the traffic is much more dispersed. As a consequence, Germany has significantly lower traffic-related air quality problems (EEA 2014).

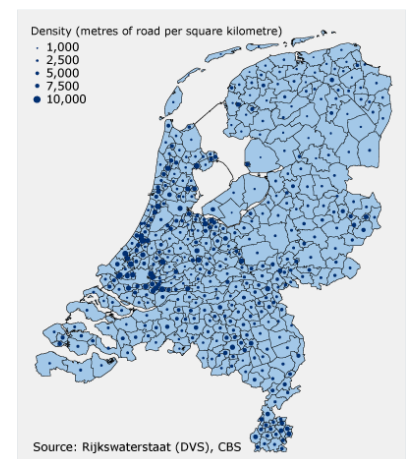


Fig. 4: Road density by municipality (CBS 2010)

The second material element is infrastructure. With more than 137.000 kilometres of roads, The Netherlands has one of the most dense road networks in the world (CBS 2010). In the period 2000-2010, the Dutch road network extended by nearly six percent (figure 3). The network is most dense in the western parts of The Netherlands (figure 4), and as a consequence this area experiences relatively more air pollution as well (figure 1).

4.1.3 Competences

The element ‘competences’ includes the practical knowledge of the practice, and the skills to execute the practice. In The Netherlands this is quite straightforward, as every participant of motorised traffic is obliged to obtain a drivers licence. The national government established an independent public administrative body, the CBR, under the minister of Infrastructure and Environment to oversee the distribution of the licences. The number of people with a drivers licence has steadily increased by 1-1,5% for the last five years, with a total of 10.986.066 people possessing a licence in 2017 (CBS 2017 II). This means that more and more people acquire the competences to execute the practice.

4.1.4 Practice of driving in urban regions in The Netherlands

Figure five illustrates the practice of driving in urban regions in The Netherlands. The elements are not isolated, but are interrelated and interdependent. For example, people generally assume that the driver’s license is obtained for practical reason, but passing a drivers test is a far more important social ritual today than exercising the right to vote for the first time. This means that the drivers licence (competences) functions as a tool for social inclusion (symbolic/affective meaning) and good citizenship (Wickham & Lohan 1999), which inherently leads to more car use. Another example is that some cars (material) are easier to operate such as car with navigation or automated gears, which broadens the range of people that are able to drive them (competences). Lastly, some cars (material) are newer, faster and more expensive than others, which make them more meaningful to their owners (symbolic/affective meaning) and increases their car use (Steg 2005). It important to keep these interdependencies in mind when creating policy.

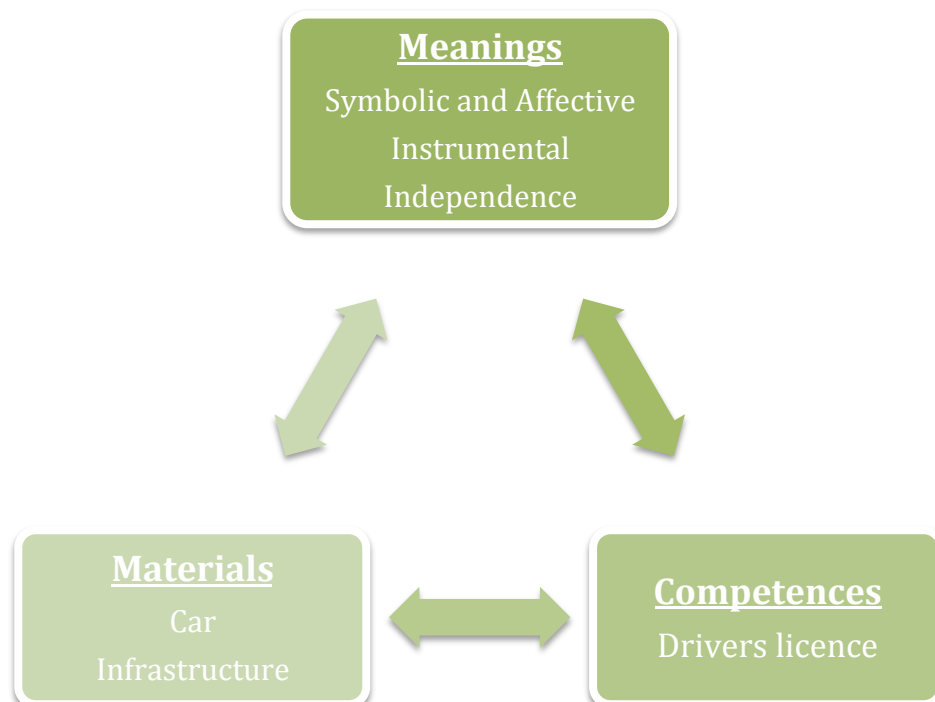


Fig. 5 Practice of driving in urban regions in The Netherlands

4.2 SOCIAL PRACTICE THEORY AS A BASIS OF EFFECTIVE ENVIRONMENTAL POLICY

Following the characterisation of the practice, various options for practice-based interventions that can alter the practice in order to reduce its negative environmental and social impacts are evaluated. Two perspectives are discussed: practice-based interventions that focus on the element ‘materials’, and practice-based interventions that focus on the element ‘meanings’

4.2.1 Element ‘materials’: material innovation

This paragraph evaluates material innovations and the consequences they harbour for the practice of driving and the air quality in The Netherlands. Following, it is discussed how the government can use these material innovations for practice-based interventions in order to reduce traffic-related pollution. First, this will be done for lower/no-emission cars, followed by an evaluation for automated cars.

Lower/no-emission cars

Innovations like the electric car and the use of alternative fuels like biomass fuels, natural gas and hydrogen have emerged in response to growing problems concerning energy dependency, air quality and climate change (Yeh 2007). The integration of these innovations into the practice could be swift, as the car has become somewhat of a ‘black box’ (Wickham & Lohan 1999) and alterations on these ‘invisible’ technical levels would not cause drastic changes in meanings, competences, and the practice as a whole (figure six). While the technologies are available, it remains a matter of bringing them to the wider public. For example, due to the high price of a fully electric car, only approximately 11.000 out of the 8,2 million cars in The Netherlands are electric (RVO 2017). The government can accelerate the adoption of electric vehicles and the exploration of more durable fuels by funding research, investing in new initiatives and stimulating the purchase of lower and no-emission cars. With this strategy, the government can improve the practice in order for it to become less polluting.

Automated cars

The prospected introduction of automated cars in the commercial domain is still years or even decades ahead. However, the possibilities are endless and a good understanding of the implications is therefore vital. In the following hypothetical situation, it is assumed that automation has reached the level ‘hands off’ (level three out of six) of the automated vehicle classification. At this level, the automated system takes full control of the vehicle (accelerating, braking and steering). The driver must monitor the driving and be prepared to immediately intervene at any time if the automated system fails to respond properly (SAE International 2014). The adoption of automated cars has implications for the practice.

- **Materials:** In order for the automated car to function safely, infrastructure has to adjust too, such as the alteration of traffic lights and instalment of sensors that communicate with the cars.
- **Competences:** When a car becomes more autonomous –ranging from using parking assistance to full robotic control- less competences are required to operate it. The simplification of the competences needed to execute the practice means that the practice becomes more accessible for, for example, elderly, or handicapped people.
- **Meanings:** The meaning ‘independence’ could become stronger, as more people will be able to use this mode of transportation to travel independently; the ‘instrumental’ meaning could become stronger, because the simplified execution and efficiency of the practice could make it a more practical mode of transportation than it was before; ‘Symbolic and affective’ meanings’ could become weaker, as the decreased

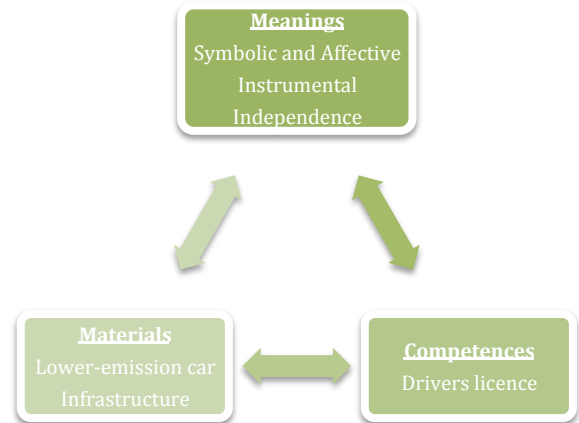


Fig. 6: Material innovation: lower-emission cars

engagement in the driving process potentially diminishes feelings of sensation and power. Besides that, new links could be forged with (negative) characterisations like ‘boredom’, ‘dullness’ or ‘loss of identity’ (figure 7).

The alteration of the practice bears various consequences for the air quality in The Netherlands. For example, the improved access to the practice of driving could potentially result in more cars on the road. To reduce air pollution, this is counterproductive. However, by the time automated cars are commercially introduced, a

large-scale energy transition in the private transportation sector as presented above should have occurred. Then, the innovation harbours a variety of benefits. Due to efficient travel, automated cars are more fuel-efficient (Li et al. 2012) and have the ability to prevent traffic jams, which is especially valuable in the overcrowded city centres of The Netherlands and will reduce emissions from non-moving cars. Besides that, automated cars can go beyond reducing emissions and eliminate them by, for example, facilitating different business models for mobility as a service, especially those involved in the sharing economy (Miller 2014). This could ultimately lead to a reduction of people’s car use, as they not always have their own car at disposal for minor tasks. Another example is the decrease of symbolic and affective meanings due to the depersonalisation of the practice. Symbolic and affective meanings explain 12% of frequency of car use (Lois & López-Sáez 2009), thus a reduction in these meanings could result in less car use and less pollution.

The government could create a practice-based intervention by supporting initiatives that are concerned with the automation of cars. If they do this they should also have a budget to adjust infrastructure for the proper functioning of the cars. However, this should only happen after an energy transition, as this will be easier to implement on a short term and will generate results quickly (figure 8).

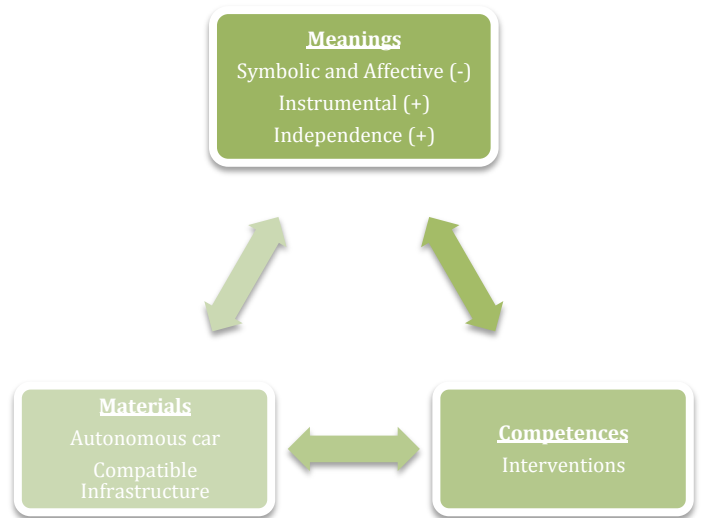


Fig.7: Material Innovation: automated cars

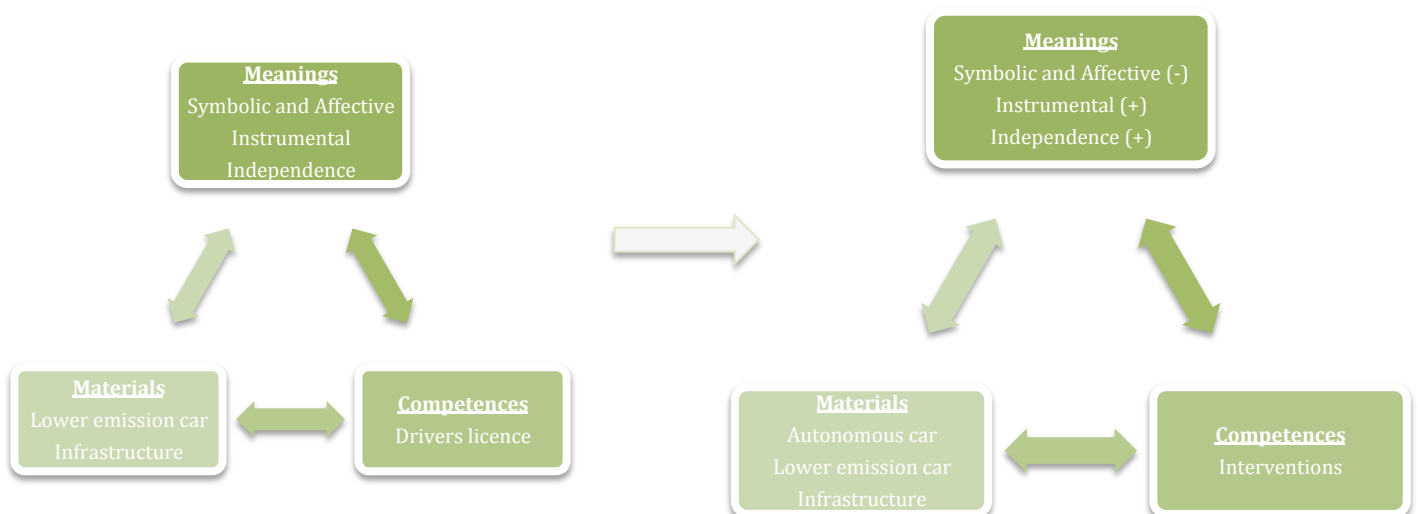


Fig. 8: Lower/no-emission cars + automated cars

4.2.2. Element ‘meanings’: material substitution

Within the conceptual framework, the element ‘meanings’ was characterised by symbolic and affective meanings, instrumental meanings and independence, which together represent people’s motives for car use. This paragraph evaluates the possibilities to connect the element ‘meanings’ to a new material (public transport, figure 9¹) in order for people to make use of this other, less polluting form of transportation. The original practice remains as well.

Symbolic and affective

It will be very challenging, if not impossible to connect existing symbolic and affective meanings such as ‘feelings of sensation’ and ‘power’ to public transportation. Then, the only option is to include new, positive symbolic and affective meanings that make the use of public transport attractive, such as ‘relaxation’ -people that commute by car experience their journey as more stressful than people that use public transport (Gatersleben & Uzzell 2007)- or ‘sociability’. In a practice-based intervention, these new, affective meanings could be promoted by means of campaigns that depict how public transport brings people together, or how public transport offers time to relax.

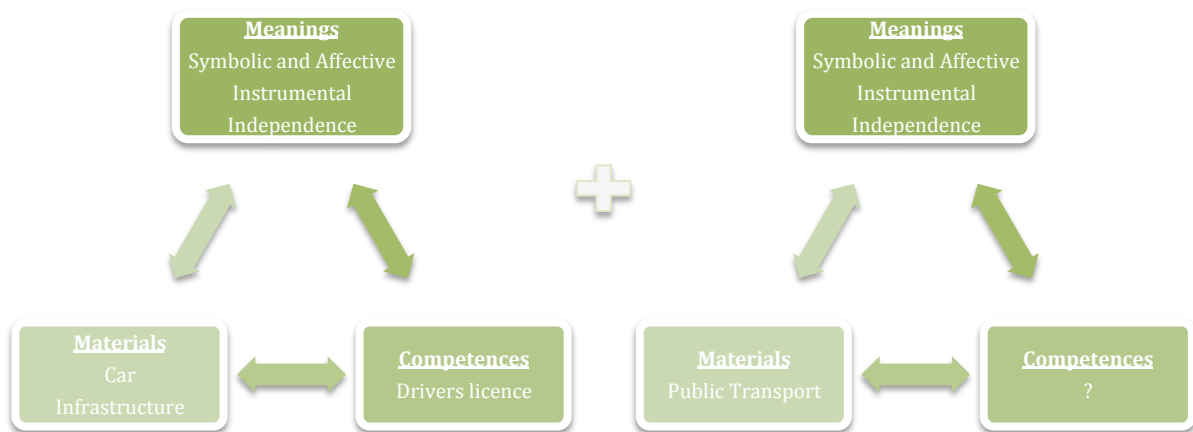


Fig. 9: Practice of driving and material substitution

Instrumental

If public transport can offer the same instrumental value (speed, convenience, price) as a car, people choose public transport more often as a mode of transportation. For example, provinces with relatively poor public transport connections to home and/or workplaces such as Zeeland and Drenthe (RIVM 2016) have a relatively high number of cars per 1000 inhabitants (respectively 492 and 496, compared to 406 in Flevoland or 465 in Friesland, CBS I 2017). If the system is well-connected, it should be able to offer a faster commute than going by car. This mostly has to do with traffic jams, road maintenance and difficulty parking. Besides that, city centres generally have better accessibility by public transportation already. As a practice-based intervention, the government could engage in improving the public transport network in terms of speed and efficiency. Besides physical improvements, other tactics include avoiding ‘waiting time’, as this is perceived as annoying and boring as opposed to ‘walking time’, which is perceived as less of a nuisance (Wardman 2001; Gatersleben & Uzzell 2007), and reducing the pricing.

¹ ‘Competences’ are unknown, as they are dependent on the requirements of the material form, once they match the existing element ‘meanings’

Independence

The meaning of independence includes the desire to travel independently, at any moment of time, to any place. Once again, a well-connected system with frequent rides can offer these services. Other aspects to take into account are both the accessibility and convenience of public transport, as it will offer more people, like elderly or handicapped people, the opportunity to travel independently. Messy or dirty trains and busses could potentially counteract ‘independence’, as people could experience other people’s clutter as invasive. This might be one of the reasons that cleanliness –besides waiting time and comfort- is one of the transport variables most valued by users (dell’Olio et al. 2011). As a practice-based intervention, the government could stimulate the development of these services.

5. CONCLUSION

First, the question ‘*How can we characterise car driving in urban regions of The Netherlands as a Social Practice?*’ was answered. The different elements were characterised as followed: ‘meanings’ includes symbolic and affective meanings, instrumental meanings and independence; ‘materials’ includes the car and infrastructure; ‘competences’ includes the driver’s licence. The result were displayed according to the conceptual framework by Shove et al (2012), which resulted in a visual representation of the practice of driving in urban regions in The Netherlands (figure 5). Following, the question ‘*How can practice-based interventions reduce the negative social and environmental consequences of the practice?*’ was answered. The evaluation of material innovations and material substitution in the practice suggested different practice based interventions that can reduce traffic-related pollution. These practice-based interventions include stimulation of the development and accessibility of lower/no-emission and automated cars, and the improvement of services provided by public transport.

Together, these questions provide an answer to the main research question ‘*Which indications can be taken from the Social Practice Theory for effective environmental policy to reduce air pollution caused by road traffic in urban regions of The Netherlands?*’. The results of this thesis indicate that Social Practice Theory can provide an interesting new perspective for policy makers to tackle the problem of poor air quality in urban regions in The Netherlands. First, by creating understanding on the practice of driving as a social cultural practice, the dynamics behind the activity that causes pollution becomes clear. This way, factors that contribute to the persistence of the harmful behaviour are exposed while otherwise they might have remained unnoticed and unaddressed. For the practice of driving, one of these factors is the ‘symbolic and affective’ meaning that people contribute to their car. Second, the evaluation of material innovations and material substitutions has shown that Social Practice Theory provides a basis for more effective policy, as practice-based innovations can enable more structural social and environmental change. The conceptual model illustrated the dynamics behind the practice and the measures needed to alter the practice. Efforts that fit into the dominant ABC-framework lack active integration/disintegration of elements and consequently have not been able to provide outcomes that are needed to tackle the problem of traffic-related air pollution in The Netherlands. By moving away from using rational choice as a main driver of human behaviour, practice-based interventions alter the socio-cultural practice of driving as a whole and structurally change the behaviour of a large group of people (i.e. car drivers in The Netherlands) at the same time.

6. DISCUSSION

The Social Practice Theory has shown promising prospects as a basis for more effective environmental policy, but there are some limitations inherent to the nature of this theory that can prevent successful application in environmental policy. Awareness of these potential pitfalls can prevent failure of the new approach. First, to accurately construct a policy based on Social Practice Theory, a comprehensive understanding on the practice that is ought to be addressed as a socio-cultural occurrence is necessary. Governmental bodies that want to use practice-based interventions should first create this understanding, before they go on to the next phase. The absence of the resources and knowledge to create this understanding could lead to the failure of practice-based interventions, because the practice-based interventions will be based on an incomplete notion of the practice. Second, contextual boundaries determine the nature of a practice and consequently the suitable practice-based interventions. This means that a practice-based intervention is not universally applicable. For example, a practice-based intervention that deals with agricultural water use cannot be the same for farms respectively in The Netherlands and Italy, because the different climates set different contextual boundaries for the practices (i.e. practice of using water during agricultural activities). This means that the options for practice-based interventions for bodies like, for example, the European Parliament are more limited.

7. REFERENCES

- Anable, J. (2005). 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transport Policy*, 12(1), pp.65-78.
- Azjen, I. (1985). From intentions to actions: A theory of planned behaviour. *Action Control*. 1st ed. Berlin, Heidelberg: Springer Berlin Heidelberg.
- Beirão, G. and Sarsfield Cabral, J. (2007). Understanding attitudes towards public transport and private car: A qualitative study. *Transport Policy*, 14(6), pp.478-489.
- Bellotti, E. and Mora, E. (2016). Networks of practices in critical consumption. *Journal of Consumer Culture*, 16(3), pp.718-760.
- Cass, N., Shove, E. and Urry, J. (2005). Social Exclusion, Mobility and Access. *The Sociological Review*, 53(3), pp.539-555.
- Cbs.nl. (2010). *Total length Dutch roads stretches halfway to the moon*. [online] Available at: <https://www.cbs.nl/en-gb/news/2010/47/total-length-dutch-roads-stretches-halfway-to-the-moon> [Accessed 8 Jun. 2017].
- Cbs.nl I (2017). *CBS StatLine - Motorvoertuigenpark; inwoners, type, regio, 1 januari*. [online] Available at: <http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=7374hvv&D1=2-11&D2=0&D3=a&HDR=T&STB=G2,G1&VW=T> [Accessed 8 Jun. 2017].
- Cbs.nl II (2017). *CBS StatLine - Personen met een rijbewijs; rijbewijscategorie, leeftijd, regio, 1 januari*. [online] Available at: <http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=83488ned> [Accessed 8 Jun. 2017].
- Dale, S., Andrew, M. and David, E. (2011). *International Review of Behavioral Change Initiatives*. Scottish Government Social Research. Edinburgh: Crown.
- dell'Olio, L., Ibeas, A. and Cecin, P. (2011). The quality of service desired by public transport users. *Transport Policy*, 18(1), pp.217-227.
- Domencich, T. and MacFadden, D. (1975). *Urban travel demand*. 1st ed. Amsterdam [etc.]: North-Holland [etc.].
- Dong, X., Ben-Akiva, M., Bowman, J. and Walker, J. (2006). Moving from trip-based to activity-based measures of accessibility. *Transportation Research Part A: Policy and Practice*, 40(2), pp.163-180.
- European Environment Agency (2013). *Air Pollution Fact Sheet The Netherlands*. Copenhagen: EEA.
- European Environmental Agency (2016). *Air Quality in Europe*. No28/2016 ISSN 1977-8449.

Eurostat (2017). *Passanger cars per 1000 inhabitants*. [online] Available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=road_eqs_carhab&lang=en [Accessed 8 Jun. 2017].

Evans, D., McMeekin, A. & Southerton, D. (2012). Sustainable Consumption, Behavior Change Polivies and Theories of Practice. *Collegium*, 12.

Gatersleben, B. and Uzzell, D. (2007). Affective Appraisals of the Daily Commute: Comparing Perceptions of Drivers, Cyclists, Walkers, and Users of Public Transport. *Environment and Behavior*, 39(3), pp.416-431.

Gemeente Utrecht (2017). *Milieuzone | Gemeente Utrecht*. [online] Utrecht.nl. Available at: <https://www.utrecht.nl/wonen-en-leven/milieu/luchtkwaliteit/milieuzone-utrecht/> [Accessed 12 May 2017].

Hagman, O. (2003). Mobilizing meanings of mobility: car users' constructions of the goods and bads of car use. *Transportation Research Part D: Transport and Environment*, 8(1), pp.1-9.

Handy, S., Weston, L. and Mokhtarian, P. (2005). Driving by choice or necessity?. *Transportation Research Part A: Policy and Practice*, 39(2-3), pp.183-203.

Hargreaves, T. (2011). Practice-ing behaviour change: Applying social practice theory to pro environmental behaviour change. *Journal of Consumer Culture*, 11(1), pp.79-99.

Hargreaves, T., Longhurst, N. and Seyfang, G. (2013). Up, Down, round and round: Connecting Regimes and Practices in Innovation for Sustainability. *Environment and Planning A*, 45(2), pp.402-420.

Jensen, M. (1999). Passion and heart in transport — a sociological analysis on transport behaviour. *Transport Policy*, 6(1), pp.19-33.

Khafaie, M., Yajnik, C., Salvi, S., & Ojha, A. (2016). Critical review of air pollution health effects with special concertn on respiratory health. *Journal of Air Pollution and Health* 1(2), 123-136.

Kim, J., Smorodinsky, S., Lipsett, M., Singer, B., Hodgson, A. and Ostro, B. (2004). Traffic-related Air Pollution near Busy Roads. *American Journal of Respiratory and Critical Care Medicine*, 170(5), pp.520-526.

Knol, A and Milieudefensie (2017). *Luchtvervuiling en de gevolgen voor onze gezondheid*. [online] Available at: <https://milieudefensie.nl/publicaties/factsheets/informatieblad-luchtvervuiling-en-de-gevolgen-voor-onze-gezondheid> [Accessed 12 May 2017].

Li, S., Peng, H., Li, K. and Wang, J. (2012). Minimum Fuel Control Strategy in Automated Car-Following Scenarios. *IEEE Transactions on Vehicular Technology*, 61(3), pp.998-1007.

Lois, D. and López-Sáez, M. (2009). The relationship between instrumental, symbolic and affective factors as predictors of car use: A structural equation modeling approach. *Transportation Research Part A: Policy and Practice*, 43(9-10), pp.790-799.

Luchtmeetnet.nl. (2017). *Luchtmeetnet*. [online] Available at: <http://luchtmeetnet.nl> [Accessed 12 May 2017].

Miller, J. (2014). *Self-Driving Car Technology's Benefits, Potential Risks, and Solutions*. [online] The Energy Collective. Available at: http://www.theenergycollective.com/jemiller_ep/464721/self-driving-car-technology-s-benefits-potential-risks-and-solutions [Accessed 27 Jun. 2017].

Munasinghe, M., Dasgupta, P., Southerton, D., Bows, A. & McMeekin, A. (2009). *Consumers, business and climate change*. The University of Manchester Sustainable Consumption Institute, Manchester.

Pope, C. and Dockery, D. (2006). Health Effects of Fine Particulate Air Pollution: Lines that Connect. *Journal of the Air & Waste Management Association*, 56(6), pp.709-742.

Reckwitz, A. (2002). Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European Journal of Social Theory*, 5(2), pp.243-263.

RIVM (2016). *Aanbod openbaar vervoer, 2000-2016 | Compendium voor de Leefomgeving*. [online] Clo.nl. Available at: <http://www.clo.nl/indicatoren/nl2140-aanbod-van-openbaar-vervoer> [Accessed 27 Jun. 2017].

RIVM (2017). *Gezondheidseffecten van fijn stof en ozon, 1992 - 2013 | Compendium voor de Leefomgeving*. [online] clo.nl. Available at: <http://www.clo.nl/indicatoren/nl0340-gezondheidseffecten-van-fijn-stof-en-ozon?i=13-128> [Accessed 12 May 2017].

RVO (2017). *Cijfers elektrisch vervoer | RVO.nl*. [online] Rvo.nl. Available at: <http://www.rvo.nl/onderwerpen/duurzaam-ondernemen/energie-en-milieu-innovaties/elektrisch-rijden/stand-van-zaken/cijfers> [Accessed 27 Jun. 2017].

SAE International (2014). *Automated driving*. [online] sae.org. Available at: http://www.sae.org/misc/pdfs/automated_driving.pdf [Accessed 27 Jun. 2017].

Sheller, M. and Urry, J. (2000). The City and the Car. *International Journal of Urban and Regional Research*, 24(4), pp.737-757.

Shove, E. (2003). Converging Conventions of Comfort, Cleanliness and Convenience. *Journal of Consumer Policy*, 26(4), pp.395-418.

Shove, E. (2010). Beyond the ABC: Climate Change Policy and Theories of Social Change. *Environment and Planning A*, 42(6), pp.1273-1285.

Shove, E., Pantzar, M. and Watson, M. (2012). *The dynamics of social practice*. 1st ed. London: SAGE Publications.

Social Exclusion Unit (2002). *Making the Connections: Transport and Social Exclusion*. [online] London. Available at: <http://mtcwatch.com/pdffiles/3819-CO.pdf> [Accessed 8 Jun. 2017].

Spurling, N., McMeekin, A. (2015). Interventions in practices: sustainable mobility policies in England. *Social Practices, Interventions and Sustainability*. Edited by Strengers, Y., Maller, C. (2015). London: Routledge

Steg, L. (2005). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A: Policy and Practice*, [39(2-3), pp.147-162.

Strengers, Y., Moloney, S., Maller, C., Horne, R. (2015). Beyond behaviour change: practical applications of social practice theory in behaviour change programmes. *Social Practices, Interventions and Sustainability*. Edited by Strengers, Y., Maller, C. (2015). London: Routledge

Wardman, M. (2004). Public transport values of time. *Transport Policy*, 11(4), pp.363-377.

Wickham, J., Lohan, M. (1999). The Transport Rich and the Transport Poor: Car dependency and social class in four European cities. Employment Research Centre, Department of Sociology, Trinity College Dublin. Paper for conference 'Urbanism and Suburbanism at the End of the Century', Friday, November 26th and Saturday, November 27th, 1999.