

Attitudes towards automated vehicles: a Dutch-Australian comparison

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Abstract

This paper explores attitudes towards automated vehicles (AVs)¹ in two contrasting urban contexts: car-centric Australia and bicycle-centric the Netherlands. Semi-structured interviews were conducted with 15 participants in each country, covering issues such as ownership, sharing, safety and use for various trip purposes. Participants in both locales expressed concern that AVs are not currently safe, would strip control from drivers and result in a less-human world. Australian interviewees expressed concern about liability, the deskilling of the population and the practicality of electric AVs. By contrast, Dutch interviewees expressed concern that owning an AV would be ‘showing off’. Key benefits of AVs expressed by participants of both nations included ease of use, ability to multitask, relief from parking hassles, improvements in traffic and convenience. The findings suggest that an understanding of environmental and cultural contextual influences provide an important dimension to the acceptance and potential adoption of AVs.

1 Introduction

The last decade has witnessed much discussion and conjecture around Automated Vehicles (AVs). Recent research has predicted that AVs will provide benefits such as improved safety (Anderson et al. 2016; Fagnant & Kockelman 2015), a reduced carbon footprint, improved air quality (Anderson et al. 2016; Fagnant & Kockelman 2015; Wadud, MacKenzie, & Leiby 2016) and improved mobility for children, the elderly and the disabled (Fagnant & Kockelman 2015; Meyer, Becker, Bösch, & Axhausen 2017). However, research also warns that the advent of AVs may increase our reliance on the automobile, potentially increasing traffic congestion, urban sprawl and the negative health impacts of physical inactivity (Crayton & Meier 2017; de Hartog, Boogaard, Nijland, & Hoek 2010; Kellett, Barreto, Hengel, & Vogiatzis 2019; Thomopoulos & Givoni 2015).

¹ Level 4/5 Automated Vehicles that are capable of driving with or without a human present.

Within the current literature, there has been little examination of the role of existing transport culture on attitudes towards AVs. In particular, there has been little examination of whether AV adoption will be strongest in countries where the “car is king”, or whether the advent of AVs may see a resurgence of the car in countries where active travel (i.e. walking and cycling) is currently popular. In the case of ‘car-centric’ contexts, it is unclear whether AVs will offer sufficient marginal utility to overcome ongoing concerns regarding trust in the safe operation of AVs (Kaur & Rampersad 2018; Shariff, Bonnefon, & Rahwan 2017). Additionally, there is little research on how different AV ownership and business models may affect adoption and usage for various trip types (i.e. commuting, shopping and social) in contrasting environments.

Given these uncertainties, the current paper explores attitudes towards AVs in two highly developed, yet starkly different urban/transport environments: what we loosely coin, ‘car-centric’ Australia and ‘bike-centric’ the Netherlands. Semi-structured interviews are conducted with 15 participants in each locale to elicit their perceptions around various aspects of AVs, including their comparative advantages/disadvantages, suitability for performing commuting, shopping and social trips, as well as preferences for different ownership/sharing models.

2 Literature review

The rapid growth of interest in AVs has coincided with a similarly rapid growth in research around this topic and it is now fair to say much is known about both the capabilities of and general attitudes towards this technology (Sun et al. 2017). The focus of this review is on identifying the main opportunities and concerns around AVs, before contemplating how these might be influenced by differing contexts, particularly around location, transport opportunities and cultural influences.

The literature has found that general acceptance of AVs is increased by a perception that AVs are highly useful (Nordhoff et al. 2018), with even those uncertain about AV usefulness found to develop an increased perceived usefulness through experience with AVs (Xu et al. 2018). A high proportion of Australian’s have reported a belief that AVs are somewhat or very likely to reduce crashes and reduce severity of crashes (85%), lower traffic congestion (71%), shorten travel times (68%), lower vehicle emissions (70%), improve fuel economy (74%), and lower insurance rates (66%) (Schoettle & Sivak 2014a). A clear advantage of AVs is that they do not require car parking to be available at destinations. This benefit is recognised by users, with those who report difficulty with finding a parking space more accepting towards AVs (Nordhoff et al. 2018).

Vehicle passengers tend to feel that vehicles driven by humans would be safer than AVs (Hulse, Xie, & Galea 2018), with most people preferring their children to travel in conventional buses over automated ones (Anania et al. 2018). Even among those who are happy to ride in an AV, more than two in five say that they would spend their time “watching the road”, indicating a somewhat provisional level of trust in the system (Schoettle & Sivak 2014a). A large proportion of the population believes that AVs will

result in fewer crashes (Schoettle & Sivak 2014a, 2014b), particularly due to the mitigation of human factors (Sharma et al. 2018) such as poor reaction time, aggression, distraction and speeding. However, many people are still concerned about potential system malfunction and hacker attacks (König & Neumayr 2017). This concern may affect the adoption of AVs, with trust in AVs found to have an impact on intention to use AVs (Panagiotopoulos & Dimitrakopoulos 2018; Xu et al. 2018). Concerns about privacy and system security also play a role in acceptance (Kaur & Rampersad 2018). The concerns described above suggest that barriers to the mass-adoption of AVs may be psychological rather than technological (Shariff et al. 2017). While attitudes are likely to be improved by familiarity with AVs, any trust gained may also be difficult to maintain in the face of (perhaps unavoidable) safety failures (König & Neumayr 2017).

People are also concerned about the reliability of fully-automated driving and have a strong desire for AVs to have the provision for a human driver to take control if necessary (König & Neumayr 2017; Liljamo, Liimatainen, & Pöllänen 2018; Schoettle & Sivak 2014a). In fact, an emergency stop button was rated as the most desirable feature of an AV (Nordhoff et al. 2018). Although the literature has found that maintaining control is highly-desired, the use of AVs will likely lead to a loss of driving knowledge and skills (McBride 2016), potentially resulting in a population unable to take control of a vehicle, even in an emergency situation (Douma & Palodichuk 2012).

While it has long been accepted that the social and cultural meanings of conventional vehicles far exceed the practical need for mobility (Redshaw 2017), studies of AVs are yet to find a strong link between AVs and status or social recognition (Hulse et al. 2018; König & Neumayr 2017). While it may seem reasonable that the advanced nature of AVs will bestow elevated status to users, it must also be recognised that AVs strip control from the user, consigning them to “being moved” rather than “moving” (König & Neumayr 2017). This poses a threat to existing identities and power structures, particularly in societies where cars signal wealth, role in society and reputation (McBride 2016). For those who are currently unable to drive or cannot afford to own their own car, the sense of independence and ability provided by AVs (even those rented for short periods) may address status imbalances and level the playing field (McBride 2016).

One of the key factors that will determine the way AVs will affect transport and societies in general, is whether users will choose to purchase their own AV and, if they instead use AV services, will they be willing to share journeys with strangers. Much of the literature on AV preferences fails to compare attitudes towards all three models of AV operation (Owned, Reserved and Pooled AVs). Instead, AV ownership is examined in isolation, with Willingness to Pay to purchase an Owned AV considered by several studies (Bansal & Kockelman 2017; Daziano, Sarrias, & Leard 2017; Jiang, Zhang, Wang, & Wang 2018; Shabanpour et al. 2017). The choice between using Reserved AVs and Pooled AVs is also examined in other studies, but not in combination with choices regarding Owned AVs (Krueger, Rashidi, & Rose 2016). Even in papers that examine both Owned AVs and AV services, these choices are considered separately rather than as alternatives in the same choice task (Bansal, Kockelman, & Singh 2016; Stoiber, Schubert, Hoerler, & Burger 2019).

For passengers considering using Pooled AV services, attitudes towards sharing rides or “car-pooling” are critical. Car-pooling has been encouraged as a means to conserve resources in response to wars, energy crises and environmental concerns (Finger & Audouin 2019), however, factors such as inconvenience, lack of trust and high transaction costs had prevented car-pooling from developing market share. However, immediately prior to the appearance of COVID-19, car-pooling was seeing a renaissance in the form of ride-sharing services such as Uber, Lyft and Ola. These services ameliorated many of the shortcomings of traditional car-pooling, with smartphone platforms improving convenience, reducing transaction costs, and improving trust through the rating of market participants (Finger & Audouin 2019). Customers have been found to value the convenience and economic benefits of ride-sharing over its risks (Wang, Gu, Wang, & Wang 2019), with the added cost-effectiveness of travelling with strangers also overcoming the inconvenience and privacy issues at moderate-to-low fare levels (Gurumurthy, Kockelman, & Simoni 2019). However, the economic viability of these platforms is yet to be proven, with annual losses in the billions of dollars², even before the impacts of COVID-19 have become clear.

Attitudes towards AVs have been found to differ across international borders (Schoettle & Sivak 2014b, 2014a). In a comparison of Australia, the UK, and the US, Americans were reportedly less positive (57%) than their Australian (64%) and UK (67%) counterparts. In a similar vein, the same authors suggest more positive attitudes to AVs and interest in adding AV capabilities to their vehicles than those from Japan (Schoettle & Sivak 2014b, 2014a).

3 Data Collection

3.1 The Two Contexts

This paper examines two environmental contexts that offer a diverse case study (Gerring 2008), with one representing an archetypal car-centric context (Sydney, Australia) and the other an archetypal bicycle-centric context (the Randstad, the Netherlands). Notably, the quantity of car use in Australia and the Netherlands is actually not substantially different, with Australians covering 77% of land transport kms by car (BITRE 2017) compared to 72% by the Dutch (KiM 2016). However, shorter trips have very different characteristics with the bicycle used regularly in the Netherlands and only sparingly in Australia. For example, in Sydney only 0.8% of commuting trips are made by bicycle³ compared to 25% in the Netherlands, with between 29% and 41% in the four cities that dominate the Randstad (KiM 2016). In Australia, access to PT by bicycle is minimal, with only around 2% of Australians reporting that they accessed PT by bicycle in the last month (Munro &

² <https://www.theverge.com/2020/2/6/21126965/uber-q4-earnings-report-net-loss-revenue-profit-2019>

³ AUSTRALIAN BUREAU OF STATISTICS 2016 Census of Population and Housing

Gardner 2019). In the Netherlands, the bicycle provides 43% of all PT access trips (KiM 2016), leveraging the high speed of the train and high accessibility of the bicycle to form a hybrid mode of transport that competes well against the car (Kager, Bertolini, & Te Brömmelstroet 2016).

The two contexts also differ in terms of AV readiness, with a KPMG assessment ranking the Netherlands first of twenty countries, while Australia ranked fifteenth (KPMG 2019). The Netherlands excelled in terms of infrastructure, consumer acceptance and policy/legislation. Conversely, while Australia ranked highly in terms of regulatory support, it trailed the Netherlands substantially in terms of consumer acceptance, Electrical Vehicle (EV) adoption and the number of EV charging points. The lag in EV acceptance and infrastructure may prove critical if AVs are owned rather than used as fleet services.

3.2 Interviews

This research uses semi-structured interviews of 30 adults aged 18 to 65 (15 in each locale), conducted in Australia and the Netherlands in August 2019 and July 2019 respectively. Participant characteristics and the interview script are further documented in a separate paper based on the same interviews (Arnold et al. 2021).

This sample size was in line with recommendations of 25-30 interviews for a heterogeneous population (Creswell 2013). Participants were sourced with the help of a market research firm with the aim of capturing reasonable diversity in terms of gender, age, employment, and income. Participants were only accepted into the study if they indicated they walked or cycled, given particular interest in understanding the potential impacts of AVs on these modes. An incentive of AU\$25 (or the Euro equivalent) was provided.

Interviews lasted approximately one hour and were conducted in-person in English, with audio recordings taken of the interviews. Interview questions covered several dimensions thought to underly AV preferences including: Instrumental Attitudes, Experiential Attitudes, Perceived Control, Self-Efficacy, Environmental Constraints, Social Norms and Social Practices. These dimensions were derived from various behavioural models, including the Theory of Planned Behaviour (Ajzen 1991), the Integrated Behavioural Model (Glanz, Rimer, & Viswanath 2014), Social Practice Theory (Shove, Pantzar, & Watson 2012), Technology acceptance: Technology Acceptance Model (Davis 1985) and Unified Theory of Use and Acceptance of Technology (Venkatesh, Morris, Davis, & Davis 2003).

AVs were presented as fully automated (i.e. Level 4/5), affordable, allowing multi-tasking, removing the need to find car parking, safe, quiet and zero-emissions. Transcriptions were imported into NVivo, to automate the Attribute Coding of categorical questions (Saldana 2013). In addition, a thematic analysis was conducted, where codes were generated based on either existing literature or derived from participant comments.

4 Results

4.1 General attitudes towards automated vehicles

A wide range of advantages and disadvantages were identified relating to the use of AVs (see Table 1 in Appendix A). Concerns about the safety of AVs were noted over five times more often than any other concern. Other disadvantages raised often involved the sense that AVs subsume a portion of our humanity, with *control*, *driving enjoyment*, *skills loss* and *isolation* all figuring in the top 10 disadvantages. Participants from both locales had positive instrumental attitudes towards AVs, perceiving them to be easy/convenient to use, leading to a reduction in traffic, and relieving the burden of the navigation task and the need to find a parking spot.

Attitudes towards environmental impact in the two locales were opposite, with only the Dutch noting the environmental benefits of AVs and some Australians instead expressing concerns over the potential environmental impact of the batteries used to power electric AVsⁱ. Australians also perceived electric AVs to limit the range that can be travelled, be difficult to charge, and offer low performanceⁱⁱ.

A small number of Dutch participants acknowledged that AVs could overcome some of the barriers to active transport such as exposure to weatherⁱⁱⁱ or the need to carry cargo^{iv}. Several Australians also expressed an interest in using AVs more for short trips (that may suit active transport) than for long trips^v.

Several people from both locales were reluctant to trust AVs^{vi}, with some instead showing extraordinary faith in the abilities and magnanimity of human drivers^{vii}. The transition to AVs was noted as a time of heightened danger^{viii}, with Australians also expressing concern about their liability in the case that an AV that they owned caused a crash^{ix}. Many people showed an expectation that, while they would be nervous about using AVs now, they would adapt as necessary^x. Some also expressed unconditional enthusiasm for AVs^{xi}.

Safety was noted by many as an advantage, but often conditionally on the basis that “*if what you say is true, then (AVs would be safer)*”. In one case, a participant’s willingness to use an AV was expressed in relation to their discomfort driving, saying, “*I would feel comfortable with it because I don't feel so comfortable driving myself*”. For another, AVs were only acceptable “*if I'm not going far*” where risk was perceived to be lower. This contrasted to another participant who felt that “*for a long distance I'll prefer an automated vehicle ... the train takes a long time*”.

AVs were likened to aeroplanes by more than one person, noting that “*like a plane, overall it is safer, but when something goes wrong, it really goes wrong*” and “*people were probably very afraid of flying originally, but eventually it will become the norm*”. People also felt that, like aeroplanes, AVs will be well regulated and tested^{xii}.

Dutch participants noted that removing human drivers would remove human error^{xiii}, reduce road rage^{xiv} and reduce congestion^{xv}. Several participants expressed concern about

AVs existing alongside human drivers, with one participant noting that people would take advantage of AVs, as they offer no threat of retaliation^{xvi}. Despite an acknowledgement by many that AVs would be safer than vehicles driven by humans, several participants noted that they want to remain in control^{xvii}. One Australian participant felt that it would be undesirable for AVs to obey the law as it would limit his driving enjoyment^{xviii} and another felt that getting a driver's licence is a rite of passage that would be missed^{xix}. The effect of no longer driving also caused deeper concerns about what deskilling would do to society^{xx}. The removal of drivers from the transport system was seen as dehumanising, even for those outside the vehicle^{xxi}. This dehumanisation was also felt through an uncertainty about how to communicate with vehicles^{xxii}.

People from both locales felt that AV users would be seen favourably by others^{xxiii}. However, some Dutch perceived Owned AVs as being elitist^{xxiv} and preferred Reserved AVs and Pooled AVs which were seen to be more egalitarian^{xxv}. While AV ownership did appeal to one Dutch driver, who expressed joy in car ownership^{xxvi}, in general, AV ownership was more appealing to Australian participants^{xxvii}, with the ability to ensure cleanliness of their own vehicle being a key factor^{xxviii}.

4.2 Trip Purposes and Preferred Types of AVs

In general, using AVs for commuting was seen favourably^{xxix}. Pooled AVs were more accepted as a commuting mode than for other trips^{xxx}, however some concern was expressed about delay if Pooled AVs picked up on-demand passengers^{xxxi}. Several Dutch participants described how current PT subsidies affect their travel choices for work/study trips^{xxxii}, with these subsidies provided by employers or as part of student benefits. One participant reflected on how the availability of subsidies for AVs would play an important role in mode choice, stating adamantly that he would only use the mode of transport paid for by his employer^{xxxiii}.

Shopping trips may offer an entry point to AV use for those concerned about safety^{xxxiv} and for those who currently use the car for shopping^{xxxv}. The fact that AVs can provide door-to-door convenience and bypass parking difficulties was valued^{xxxvi}. Owned AVs were valued by one participant for shopping trips due to the convenience of accessing the house directly from the car^{xxxvii}. Reserved AVs were preferred over Pooled AVs for shopping trips due to the perceived difficulty of managing shopping bags on a public transport service^{xxxviii}, however, price may still make Pooled AVs appealing for some^{xxxix}. Some proposed that AVs would fundamentally change the shopping experience, proposing that groceries would be delivered by the store or picked up by an Owned AV rather than requiring them to visit the store in person^{xl}.

Travelling with friends and family in AVs was considered an extension of social time^{xli}, with freedom from driving and navigation seen favourably^{xlii}. The use of Pooled AVs was seen less-favourably for trips made at night^{xliii} or after drinking^{xliv} due to concerns about personal safety. Trains were valued by a grandparent due to the experience they offered his grandchildren^{xlv}, however, he saw AVs as being unable to offer the same experience.

4.3 AVs and Active Transport

While the current paper focuses on attitudes towards AV use, a separate paper (Arnold et al. 2021) based on the same interviews comprehensively explored attitudes towards walking and cycling in a world with AVs. That paper found that participants in both locales were concerned that AVs would create a dehumanised world run by machines and that they would feel isolated and unable to communicate with the vehicles to negotiate priority. Australian participants were concerned that *other people* would hold up AV traffic, whereas Dutch participants expressed a willingness to hold up AV traffic themselves, by asserting their right to use the street on foot. Australian participants were cautiously-optimistic that AVs could create a safer environment for cycling. Dutch participants were unconcerned with the impact of road-bound AVs on cycling (due to a widely available separated bicycle path network), however, they were concerned about sharing bicycle paths with automated micro-freight vehicles.

5 Discussion

A key difference between Dutch and Australian contexts found both in the literature and in the participant responses was the household building type. Australian's were most likely to live in free-standing houses (9 of 15 participants), but the Dutch were far more likely to inhabit attached housing up to around 6 levels (14 of 15 participants). This underlines the contrast in population densities of urbanised areas in Sydney and the Randstad: a contrast that also influences transport choices. Another key difference was found in existing travel attitudes and behaviour, with Dutch participants expressing a far higher capability for walking and cycling than Australian participants. This distinction was most-evident in attitudes towards cycling in traffic which were overwhelmingly more positive for Dutch participants.

Many instrumental benefits of AVs were noted, confirming earlier work that found people perceived AVs to be highly useful (Nordhoff et al. 2018). Perceptions of safety also confirmed earlier work (König & Neumayr 2017; Schoettle & Sivak 2014a, 2014b), with many people believing that AVs will lead to fewer crashes, but that they would be concerned about using them today. Safety was by-far the greatest concern regarding AVs, however, few participants said that they would never use AVs. In fact, responses primarily fell into three categories: 1. Don't like the idea. 2. Nervous but accepting and 3. Ready and waiting.

The similarity between the airline industry and the AV industry was noted and, just as the public expects airplane travel to be highly regulated, participants also expected that AVs will be 'required' to be safe through regulation and rigorous testing. It appears that authorities are honouring that expectation, with the investigation of the first pedestrian

fatality involving an AV (18th March 2018) conducted by the US National Transportation Safety Board (NTSB)⁴: a group that usually investigates airplane crashes.

Australian participants were more concerned about liability than the Dutch, which may be partly-explained by the heightened individuality of the Australian culture⁵. Although Australian policy-makers cannot address these concerns by guaranteeing that AVs will be infallible, they can put in place legal measures to ensure that AV operators are held liable for crashes caused by their vehicles.

Australian participants showed greater concern that AVs would result in a deskilling of the population and that reliance on technology would degrade our ability to function without it. These findings provide empirical evidence to support concerns raised in the literature that AVs would precipitate a loss of driving knowledge and skills (McBride 2016). However, Dutch participants did not display the same fears about deskilling, with the Dutch perhaps feeling that the symbiotic relationship between bicycles and public transport (Kager et al. 2016) would allow them to maintain access to vital services and remain in control of their lives despite losing the right to drive. The fear of losing control expressed by Australian participants may also be explained by the higher measures of masculinity and individuality found in the culture⁶.

The indifference displayed by Australian participants towards the environmental impact of driving, and the scepticism shown towards electric vehicles highlight the challenges that Australian policy-makers face to encourage sustainable forms of transport. The concern expressed for environmental issues by Dutch participants supports work on national cultural dimensions that show the Dutch to have a greater long-term focus than Australians⁷.

While many Australians expressed interest in owning their own AV, several Dutch participants felt that AV ownership violated the ‘National Habitus’ of the Netherlands where conspicuous non-consumption is valued (Kuipers 2013). Instead, the path to AV adoption in the Netherlands may come through the use of AV services (Reserved AVs and Pooled AVs) rather than through AV ownership. It was found that the adoption of AVs in The Netherlands may also be impacted by current employer subsidies for PT use. Several people expressed a reluctance to pay for travel when PT travel was provided free of charge by their employer. Therefore, employer-funded AV subsidies (or lack thereof) may prove pivotal in AV adoption.

⁴ <https://www.nts.gov/investigations/AccidentReports/Reports/HWY18MH010-prelim.pdf>

⁵ <https://www.hofstede-insights.com/country-comparison/australia,the-netherlands/>

⁶ <https://www.hofstede-insights.com/country-comparison/australia,the-netherlands/>

⁷ <https://www.hofstede-insights.com/country-comparison/australia,the-netherlands/>

The use of PT by families travelling together in both locales was found to be discouraged by the cost of multiple fares which may also impact demand for Pooled AV services. Reserved AVs or Owned AVs are therefore more likely to suit this segment of the population. Attitudes towards trip distance were non-linear, with some concerned about increased risk exposure of using AVs for long trips, but others seeing benefits for longer trips that were difficult to reach by PT. Several people noted that Pooled AVs would be undesirable if they deviated from the most direct route to pick up additional passengers. It appeared that a preference existed for walking to a nearby pick-up point if this ensured a more direct route. Of course, sensitivity to walking distance and route deviation should be tested more rigorously with a larger sample using quantitative techniques.

6 Conclusions

This paper provides a comparative assessment of attitudes to AVs in two highly-developed, yet starkly different land-use/transport contexts, Australia and the Netherlands. Evidently, attitudes were quite similar on dimensions such as safety, potential loss of control, and de-humanisation. However, Australians seemed more concerned around issues of liability and less concerned about environmental issues than their Dutch counterparts. The suggestion here is that Australian policy-makers and AV operators should assuage concerns about liability by making appropriate legal changes and contractual arrangements to ensure that AV operators are held liable for crashes caused by their vehicles. Additionally, AV operators wishing to encourage the use of AVs in Australia should focus on the instrumental benefits of AVs that are captured by individuals rather than the environmental or social benefits realised by the wider community.

Dutch participants exhibited a more ‘reserved’ attitude towards AVs overall. AV operators wishing to encourage the use of AVs in The Netherlands should highlight the environmental and social benefits such as improved safety and reduced emissions to encourage the transition to AVs. Instrumental benefits are also appealing to the Dutch, but not where they communicate an elevated status or conspicuous consumption. Given the importance that current PT subsidies have on travel behaviour in the Netherlands, policy-makers and employers should implement programs to subsidise Pooled AV travel rather than subsidising other forms of AV use that would impose greater negative externalities.

The interviews were all conducted in English, which may bias the sample in different ways in each locale given significant levels of non-English in both nations. It must be acknowledged that the hypothetical nature of the questions and the imprecision with which AVs can presently be described introduces several unknown biases. The results are also qualitative in nature and are derived from a small sample size, so cannot be used to draw inferences about the choices or behaviour of the wider population. Despite the acknowledged limitations, the findings suggest that understanding of environmental and cultural contextual influences provide an important dimension to the acceptance and potential adoption of AVs. Additionally, qualitative assessments provide a richness of understanding and insight not discernible from more quantitative surveys and are recommended either as a supplement or stand-alone investigation method.

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Appendix A: Coded Responses

Table 1: Perceived advantages and disadvantages of Automated Vehicles

Disadvantages	AU	NL	ALL	Advantages	AU	NL	ALL
Reduced safety	25	19	44	Ease of use	8	11	19
Loss of control	2	6	8	Freedom to multitask	8	7	15
Loss of driving enjoyment	3	4	7	Improved safety	3	11	14
Loss of skills	5	2	7	High status	7	6	13
Concerns about charging	6	0	6	No need to find parking	6	2	8
Isolation (less social)	4	2	6	Environmental benefits	0	6	6
Owner's liability exposure	5	1	6	Reduced traffic	2	3	5
Mixing of AVs and non-AVs	4	2	6	Improved convenience	3	2	5
High cost	2	3	5	Good for long trips	2	2	4
Environmental impact	3	1	4	Automatic navigation	2	2	4
Loss of status	1	3	4	Low cost	3	1	4
Worsening of traffic	2	2	4	Low weather exposure	0	3	3
Bad for longer trips	4	0	4	Free to drink alcohol	1	2	3
Performance uncertainty	0	4	4	Flexibility	1	2	3
Loss of employment	0	3	3	Ability to carry cargo	0	2	2
Susceptibility to hacking	1	2	3	Reduced travel time	0	2	2
Difficulty of use	2	0	2	Reduced pollution	1	1	2
Poor reliability	1	1	2	Reduced road rage	2	0	2
Silence of vehicle (safety)	0	2	2	Like a chauffeur	0	1	1
Boring experience	0	1	1	Useful for the disabled	1	0	1
Less direct (if shared)	0	1	1	Sign of progress	1	0	1
AV use is lazy	0	1	1	Meeting people	1	0	1
AVs are oversensitive	0	1	1				
Requires parking	1	0	1				
Data privacy	0	1	1				
Increasing road rage	1	0	1				
AVs require space	0	1	1				
AVs are unnecessary	0	1	1				
Total	72	64	136	Total	52	66	118

Appendix B: Verbatim Responses

i

“is it really beneficial to the environment?”
“chemicals involved in the battery systems are probably harmful to the environment and people”

ii

“the distance you can travel”
“enough spots where they can be charged”
“takes too long to charge”
“doesn't have much power”

iii

“it could replace some short trips to the library or the supermarket. Or maybe to see my mum who doesn't live too far away, to go by bike is 25 minutes. It is very weather dependent”
“it depends on the weather. If it is bad weather, I would probably take one if it is free”

iv

“if it's raining or I have some luggage”

v

“my commute is long, so I would be more worried”
“I would feel better knowing that I'm only going a short distance and I'm not in control for a short period of time”
“I'd be hesitant to use one. If it was just going to the local shop, I'd use one. When it came to going somewhere busier, I wouldn't use one”

vi

“I don't know if it will drive properly or not”
“what if the computer malfunctions”
“I am worried about safety”
“a slight mistake could take your life away”
“I worry about the safety”
“I am not always sure it is going to be as safe”
“I just can't imagine yet that it is really safe in a busy city when people walk and cycle and it's busy”

vii

“I would be more careful if I see a car without a driver. At least a human being will react quickly”
“there is nothing like having someone there who can stop a vehicle because they see you or know that you want to cross. It mightn't be at a crossing, but they will stop the car and let you cross”.

viii

“it would probably be the worst time to be in for safety”
“I don't think that the transition will be easy”
“it might create more damage than good right now”

ix

“who is responsible”
“who would be held accountable if you are not in the driver's seat”
“do I get an insurance increase as a result (of a crash) even though I wasn't at the wheel”

x

“it will have a period where people have to get adjusted to the idea”
“it will just be an adjustment phase”
“I think you will get used to it very fast”
“it will come down to education and confidence through experience”
“it just takes a period to get used to it”
“I guess it is a matter of getting used to it”

"I think it would soon be fine"

xi

"if one came on the market, I'd buy one. I'd love it"

"if there is a company that wants to try it and test it, I would say yes. I wouldn't feel uncomfortable"

"I would try just to experience to get the trust"

xii

"are not going to put it on the market if it is not safe"

"would be regulated and they would be tested a lot and serviced every year"

"would not be able to be used until they are bulletproof".

xiii

"you take the human factor out of driving which makes it a lot safer"

"you don't have any human errors anymore, so it's definitely good"

"theoretically it is safer than people driving"

"they are paying attention all the time, but people don't"

"if I drive a car and I can be distracted I do not see you"

xiv

"you don't see people with road rage on trains"

xv

"people like to watch. Everyone will slow down and they are curious. An AV cannot be curious"

xvi

"in real life I better not cut them off because they might tailgate me or hit me. So people might take more risks knowing that the AV would do the correct thing"

xvii

"want to be in control... If you leave it to the computer, of course they can do it better than I can ... Still, trusting a computer with that is not a thing I'd straightaway do I think"

xviii

"what about those days when I'm in my car and I want to drive, if I owned a Ferrari and I want to go 110 km/h, and I'm happy to break the law and get a ticket, but I'm impeded by these very slow vehicles that are annoying me"

xix

"a kind-of a responsibility on us. We drive, we pass tests, we get our licenses ... we are just taking that all away... If they did that, I would wonder what is next. What is stopping them from stripping away other things that we have done for years and they are trying to do more for us"

xx

"if we lack any sense of accountability or responsibility because we are no longer in charge of a vehicle, what is that doing to us as a society?"

"that the world is relying on technology too much. If we are not careful, it will get out of control and our whole lives will be just based on this and then something will go wrong and we are not going to be able to use any of it and no-one is going to know how to do anything anymore"

"we are losing the basics in life because we are relying on technology too much".

xxi

"when I am walking and I see people driving their own cars it feels very natural but if there are automated vehicles you feel as though everything has been changed and there are robots and computers everywhere. Something imaginary where you don't get human touch"

"there will be no interaction, no one will look at you, from the car definitely. You don't get to see them driving themselves, which is again isolation. You feel like you are working all the time with technology so you will again lose human touch and you will feel that you are working with machines".

xxii

"I can't look the driver in the eye and make that connection, so I have to assume that this car is going to detect me"

"I don't know how I would react against the machine"

xxiii

“cool exciting zone”
“fancy, shiny, exciting”
“fascination”

xxiv

“electric cars. They are for rich office boys who want to look fancy ... if you get one from your company, the company is showing off. If you buy one, then you are really showing off”
“a luxury”
“for a rich guy/woman”

xxv

“everyone the same, there will be no, ‘oh this person's rich and this person's not’”

xxvi

“it is just a little room on wheels that is your own and has your own things in it”

xxvii

“definitely use my own AV”
“I would use my owned AV”.

xxviii

“if other people are sharing with you it might not stay that way (clean)”
“especially if you've got the kids in there, you don't want it to be filthy. Not saying that the (AV) bus would be filthy, but I catch PT and I see some feral people on there”

xxix

“replace the whole journey to work, because the whole point of taking the train is being able to work and not having to do anything”

xxx

“going to work, I'd be happy to use the bus-style one (Pooled AV)”

xxxi

“other people have to get picked up somewhere else, so it is sort-of like a bus at your own home, but it will use routing that I probably don't like or is not convenient for me”

xxxii

“for my job, they do reimburse me on my public transport costs which is why I go by public transport and not by car”
“for work, obviously you don't want to be paying to drive there, why would you? They pay for PT, so I go by PT, easy”
“my PT card would be an NS business card”
“I am still a student. So when you are student you get free travel with PT, so for me it is an easy decision”

xxxiii

“I won't want to be paying for my travel to work...if they offer it (AVs), and they could because they want to look good and it's probably a tax benefit for them, of course I'd use it. Just like they pay for public transport. I'll use the one they offer me (pay for)”

xxxiv

“better if I'm not going far”

xxxv

“the stuff that I use our car for now”

xxxvi

“I don't take a car because I really hate the parking part ... if I could use these and if they wait for you at the mall or at the supermarket or you could get another one within a few minutes of paying for your groceries I might use it more. I might replace the bicycle thing”
“if it stops in front of my door and stops in front of the shop, then I would ... use it for more trips”.

xxxvii

“it would be good to park it in the garage and carry the parcels up rather than get out of somebody else's vehicle and carry all the parcels up”

xxxviii

*“it has to be not like a bus, because when I have three or four bags, I think I prefer the private one”
“once you get older, loaded down with shopping bags, I wouldn't even consider jumping on a bus”*

xxxix

“if it costs me €5 to do grocery shopping then I would not do it because it is way too expensive. Right now parking is free anyway at the supermarket”

xl

*“if those cars were around ... you would have more shopping centres delivering your food rather than you going to get it”
“can I let (the AV) do the shopping as well?”*

xli

*“travelling will become part of the social time”
“pick someone up and then go somewhere else”
“if it is summer, I might need the car if friends want to go with me to a festival”
“the family all go together to my parent's (house)”
“it is not just me who visits my family, so we all have to go”
“you can just take the car, go to your friend's (house) and then go shopping together”*

xlii

*“chit chat and gossip in the car rather than focus on navigation & GPS”
“focus on the social interaction”*

xliii *“I wouldn't use a group-one coming home from a night out with friends, I'd want to be on my own”*

xliv

“uncomfortable jumping into an AV, my own AV, after having a few drinks and relying on that. I would still want to be compus mentus”, although he conceded that “You'd probably take a few more risks and before you know it, you're in a car that's driving itself and you can hardly see (i.e. drunk)”

xlv

“I'd take a different form of transport to make it more enjoyable for the grandkids like I do now. I've got the ability to take my own car, but there is no fun in that when I can show them a different way to get to somewhere”