
Expert Views
Autonomous Vehicles:
The Human Factor
Driving Consumer Readiness and
the Future of Insurance
SCOR
The Art & Science of Risk
February 2025

Introduction

Imagine yourself five years from now. How does your life at that time compare to your life now? Some things might be the same, like where you live and the work you do. But many things could be different – perhaps you have advanced in your career or relocated. Another thing that might change drastically in five years is the car you drive – and who is actually driving.

Driverless cars may seem like science fiction, a big idea without much chance of coming to fruition in the real world. However, interest in autonomous vehicles (AVs) is growing around the world as the technology develops alongside the regulatory frameworks to support it.

The global AVs market is still small, but it is expected to grow steadily, reaching $3.1 trillion by 2033[1]. According to McKinsey's 2023 Executive Survey[2], interest and investments in autonomous vehicles are expanding. Manufacturers, as well as investors, are uncovering new and tangible opportunities for high potential returns on investment in this massive market. There is also a tailwind from government authorities, as the introduction of AVs is expected to boost national economic growth, improve road safety, and enhance air quality.

Despite the extended timeline for their development due to various challenges, including technical issues, capital availability, regulatory issues, and consumer safety and acceptance, we are making steady progress toward the mainstream adoption of AVs. Although there are still obstacles to overcome, the future of AVs looks promising.

In this article, we will delve into the current state of developments in autonomous vehicles, their benefits, challenges, and potential impacts on the (re)insurance industry. The first four chapters provide background information, examine potential benefits and risks, and assess the impact on insurance.

AVs' potential benefits will only be realized if trust in the technology can be fostered so that consumers want to use them when they become available. Therefore, in the final three chapters, we will discuss how to overcome one of the biggest obstacles impacting the growth of the autonomous vehicles sector: consumer mistrust. We will apply principles of behavioral science to examine current consumer attitudes and suggest effective ways to promote public trust in these vehicles of the future.

[1] https://market.us/report/autonomous-vehicles-market/

[2] https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/our-insights/autonomous-vehicles-moving-forward-perspectives-from-industry-leaders

Background and current market landscape around the globe

"Autonomous vehicles" encompass a wide range of other terms – automated vehicles, driverless vehicles, self-driving vehicles, autonomous guided vehicles, connected and autonomous vehicles, and shared autonomous vehicles.

SAE (Society of Automotive Engineers) International defines six levels of driving automation from Level 0 (no driving assistance) to Level 5 (fully autonomous driving), as shown in Table 1[3]. Currently Level 2 vehicles are widely available, providing partial driving automation.

Level 3 is defined as conditionally automated, where the vehicle is able to operate independently but a driver must be ready to intervene. Level 3 technology is ready and can be found in some luxury vehicles, but the regulation to support this level is not yet widely in place.

In this article, we will use the term AVs to refer to vehicles capable of operating themselves with little to no input from a human driver – Level 3 (Conditional Automation) to Level 5 (Full Automation).

The technology needed to reach full automation is still in development as it must overcome several obstacles related to technical issues[4], costs, regulatory concerns, and consumer readiness.

Table 1: The levels of autonomy in AVs

Level	Description
Level 0: No automation	The human driver is responsible for all aspects of driving. The vehicle may provide warnings or momentary assistance, but there is no sustained vehicle control.
Level 1: Driver assistance	The vehicle can assist with either steering or acceleration/deceleration using information about the driving environment. However, the human driver remains responsible for all other tasks and must be ready to take control at any time.
Level 2: Partial automation	The vehicle can control both steering and acceleration/deceleration simultaneously under certain conditions. The human driver must monitor the driving environment and be prepared to intervene immediately if needed.
Level 3: Conditional automation	The vehicle can handle all aspects of driving under specific conditions. The human driver is not required to monitor the environment constantly but must be available to take over when the vehicle requests.
Level 4: High automation	The vehicle can perform all driving tasks and monitor the driving environment under predefined conditions (e.g., within a specific geographic area / city or during certain weather conditions). No human intervention is required at any time, and there is no need for a human driver.
Level 5: Full automation	The vehicle is capable of performing all driving tasks under any condition. No human intervention is required at any time, and there is no need for a human driver.

[3] https://www.sae.org/standards/content/j3016_202104/
[4] https://www.linkedin.com/pulse/technical-challenges-autonomous-vehicle-development-banafa-ypfhc/

However, governments, private companies, academics, and other interest groups are already working to understand how AVs will be implemented and used when they are ready.

Organizations interested in promoting autonomous vehicles have been coming together in collaborative groups to prepare for and promote the adoption of this new technology. For instance, Partners for Autonomous Vehicle Education (PAVE) is an international coalition with over 80 members including car manufacturers, specific autonomous vehicle manufacturers, consumer groups, disability groups, academics, insurers, and reinsurers including SCOR. Its goal is to educate the public on AVs with a focus on the increased safety, mobility, and sustainability benefits of the technology[5].

In academic literature, publication of studies on attitudes to AVs has been increasing since 2015. The U.S., Germany, and China are leading the way with the most studies published. Many important players in AV development are situated in these countries, leading to significant testing in these areas by car manufacturers and start-ups, as well as government emphasis on preparedness for adoption and roll-out to the public[6].

Governments have also funded research in this area. For instance, the PAsCAL project is an EU research initiative aimed at understanding the perceptions and expectations of the public with regard to connected autonomous vehicles to inform the design and presentation of driverless technology[7].

At the same time, governments are also developing the legislation that needs to be in place in preparation for AVs to be used on public roads. In the US, 29 states have enacted legislation related to AVs, with laws differing widely in terms of where AVs are allowed and whether a human safety operator is required behind the wheel[8].

The UK government has recently enacted legislation at a national level with the Autonomous Vehicles Act, which UK transport secretary Mark Harper explained means that AVs "*could be rolled out on British roads as soon as 2026*[9]". China has also released multiple rounds of regulatory guidelines related to AVs, with the aim of formulating a more comprehensive regulatory system by 2030[10]. Germany, an early leader in AV regulation, established a legal framework for the implementation of highly automated driving (SAE Level 4) in 2022[11].

Limited real-world implementation has also begun. In several US cities, autonomous "robotaxis" offer driverless rides[12]. Some robotaxi companies focus primarily on providing rides to those with mobility issues, connecting them to essential and entertainment facilities through shared AVs[13]. Some university campuses have also begun testing AVs. In North Carolina, for example, a state university launched an autonomous shuttle pilot program within their campus neighborhood[14].

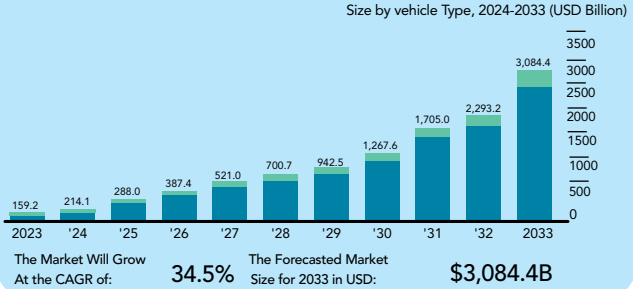
In the UK, several companies are currently trialling AVs in cities across the country[15]. Self-driving public shuttles have also been tested in the UK, as well as in various cities in the EU[16].

[5] https://pavecampaign.org/pave-europe-launches-press-release-march-2022/
[6] https://doi.org/10.3390/su15021566
[7] https://www.pascal-project.eu/project
[8] https://www.autoinsurance.org/which-states-allow-automated-vehicles-to-drive-on-the-road/
[9] https://www.gov.uk/government/news/self-driving-vehicles-set-to-be-on-roads-by-2026-as-automated-vehicles-act-becomes-law#:~:text=Self%2Ddriving%20vehicles%20could%20be%20on%20British%20roads%20by%202026,drive%20vehicles%20on%20British%20roads
[10] https://www.reuters.com/business/autos-transportation/china-issues-safety-guidelines-autonomous-public-transport-vehicles-2023-12-05/
[11] https://medium.com/@MMalterer/the-regulatory-evolution-of-autonomous-driving-in-germany-and-overseas-9ecf0f5d85e7#:~:text=With%20the%20so%2Dcalled%20Autonomous,control%20of%20the%20vehicle%20permanently
[12] https://www.axios.com/2023/08/29/cities-testing-self-driving-driverless-taxis-robotaxi-waymo
[13] https://maymobility.com/
[14] https://www.masstransitmag.com/alt-mobility/autonomous-vehicles/press-release/55126586/north-carolina-department-of-transportation-ncdot-ncdot-releases-report-on-cassi-autonomous-shuttle-pilot-program-at-unc-charlotte)
[15] https://www.gov.uk/government/news/self-driving-vehicles-set-to-be-on-roads-by-2026-as-automated-vehicles-act-becomes-law#:~:text=Self%2Ddriving%20vehicles%20could%20be%20on%20British%20roads%20by%202026,drive%20vehicles%20on%20British%20roads
[16] https://www.bbc.com/news/uk-england-beds-bucks-herts-67418123

Many Asian countries are piloting the use of AVs in specific areas. Singapore's Changi airport is testing the use of a self-driving bus[17], while Wuhan, China leads the way in robotaxi testing, with over 500 AVs operating in the city[18].

The global AVs market is still small, but it is expected to grow steadily, reaching $3.1 trillion by 2033, as shown in Table 2, according to an U.S. research report[19].

Table 2: Global autonomous vehicles market



Potential benefits of autonomous vehicles

For improved safety

One of the main benefits expected from using AVs is improved road safety and reduced incidence of traffic accidents and traffic fatalities. Studies show that over 90% of road accidents are due to human error[20], which can be drastically reduced by the introduction of AVs. According to a 2023 study, AVs are involved in 2.3 times fewer crashes per mile driven compared to conventional vehicles[21]. It is anticipated that once fully developed, AVs will be safer than human drivers. There are several reasons for this. AVs eliminate risks associated with driving while tired, intoxicated, or distracted. AVs are also more likely to strictly follow traffic laws.

For improved lifestyles

AVs are also expected to make positive impacts on people's lifestyles. For example, riding in AVs will allow people to use their time more efficiently, as the hours spent driving can instead be used for work or leisure. A 2017 study conducted by US researchers found that AVs could significantly transform the lifestyles of those who spend large amounts of time driving[22].

For the elderly

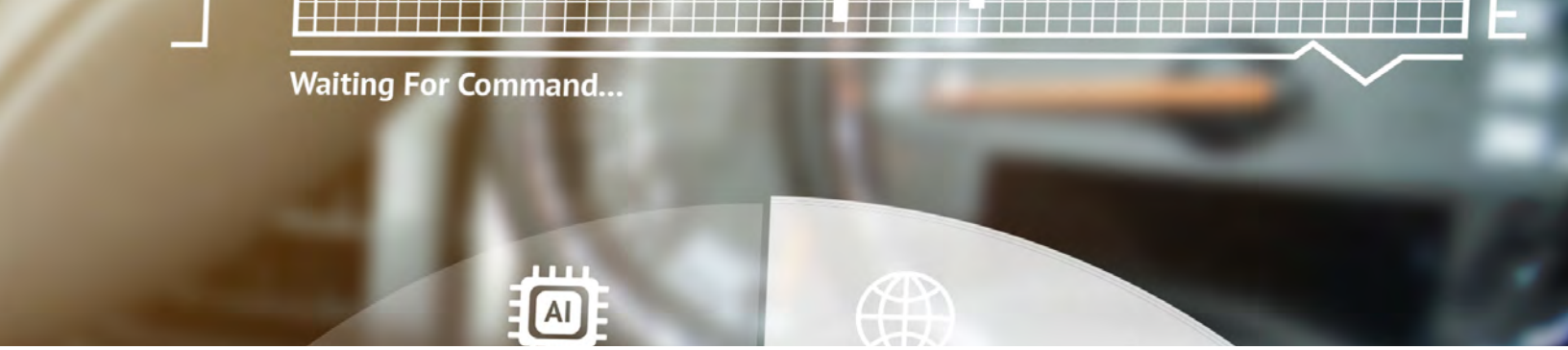
According to the World Health Organization, by 2050, the number of people in the world aged 60 or older will double to over 2 billion[23]. As individuals age, reduced physical and mental agility may inhibit their driving ability, as elderly people have delayed response/reaction towards sudden changes in the driving environment. This can interfere with their independence and their chances of continuing to live at home, both key factors in old age mortality discussed at the 2023 SOA Living to 100 symposium[24].

AVs are one of the technologies expected to assist elderly individuals in living independently and longer. AVs could allow elderly individuals who are no longer capable of driving themselves to reach their destinations independently. In fact, if AVs become widely accepted, more older people may opt to give up their keys earlier, reducing their risk of accidents.

For people with disabilities

AVs can also enhance mobility for individuals with disabilities who are unable to drive. While AV technology is met with enthusiasm by representative groups for those with disabilities, especially the National Federation of the Blind[25]and the European Blind Union[26], these groups also highlight the need for AVs to be designed with their specific needs in mind. The ability of the visually impaired or partially deaf people to

[17] https://www.straitstimes.com/singapore/transport/self-driving-bus-for-airport-workers-to-be-trialled-at-changi-airport
[18] https://edition.cnn.com/2024/07/18/cars/china-baidu-apollo-go-robotaxi-anxiety-intl-hnk/index.html
[19] https://market.us/report/autonomous-vehicles-market/
[20] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115
[21] https://www.aei.org/technology-and-innovation/autonomous-vehicles-a-safer-road-ahead/#:~:text=The%20researchers%20also%20found%20that,7%20percent%20of%20AV%27s%20crashes
[22] https://www.mdpi.com/2078-1547/8/2/32
[23] https://www.who.int/news-room/fact-sheets/detail/ageing-and-health
[24] https://www.soa.org/sections/retirement/retirement-newsletter/2023/july/ret-2023-07-rappaport/
[25] https://nfb.org/programs-services/center-excellence-nonvisual-access/blind-driver-challenge#:~:text=As%20part%20of%20the%20Blind,books%2C%20but%20in%20ordinary%20life
[26] https://www.euroblind.org/campaigns-and-activities/finished-campaigns-and-activities/connected-and-autonomous-vehicles



communicate with the system is among the key adaptions needed for this specific group of potential users.

For the environment

AVs are expected to have positive environmental impacts. They are anticipated to substantially reduce CO_2 and NOx emissions due to their electric power source, as well as improve fuel efficiency through smart car technology that would encourage more efficient driving behavior. Furthermore, the use of AVs is projected to lower traffic accidents and road blockages, ultimately alleviating traffic congestion and reducing emissions from cars.

Potential risks associated with autonomous vehicles

AVs bring many new changes to the automotive industry ecosystem, including the insurance sector, which naturally entails new risks. Although the complete landscape and magnitude of the risks associated with AVs are as yet unknown, PAVE Europe has identified several anticipated risks:

Technical risks

Software or hardware errors, vehicle failures, and cybersecurity threats could all lead to malfunctions of AVs.

Operational risks

Environment, weather conditions, and unexpected obstacles could affect the vehicle's performance, and inadequate maintenance or other operational issues could lead to fatal consequences.

Human interaction risks

Pedestrians and other road users' behavior could disrupt AVs' operation.

Legal risks

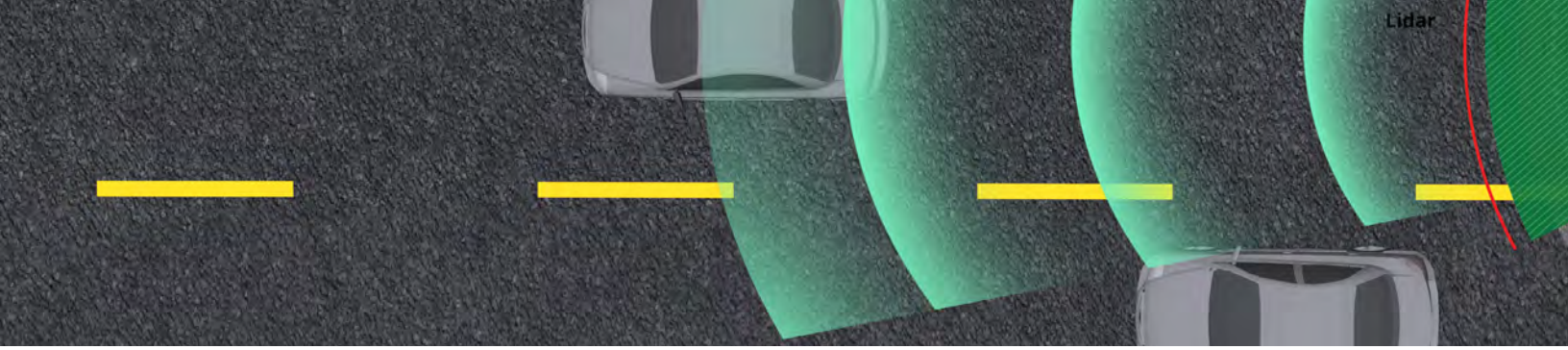
Defining liability for collisions and navigating the complex regulatory environment can also elevate legal risks around AVs.

Supply chain risks

The introduction of AVs could cause delays in supply chains, at least at the beginning, leading to disruptions and delayed potential benefits.

These risks emerging from AVs generate various unique and novel needs for insurance coverage, creating opportunities for insurers. Insurance policies that are suitable for covering these unique AV characteristics should include the following types of coverage:

- Liability coverage for collisions involving the vehicle.
- Physical damage coverage protecting the vehicle from theft and damage.
- Cybersecurity coverage safeguarding against losses due to cyber-related risks.
- Product liability coverage for risks related to product failures or malfunctions.
- Data and privacy coverage for liabilities related to data breaches and privacy violations.
- Regulatory and compliance coverage protecting against losses due to regulatory changes.



Current and future impact of autonomous vehicles on insurance

How will these new and/or unique risks arising from AVs affect the future insurance industry? It is too early to precisely predict as the AV industry is still at a very early stage. However, this new movement in the automobile industry will inevitably require insurers and reinsurers to adjust their services and product development to meet emerging risks and demands.

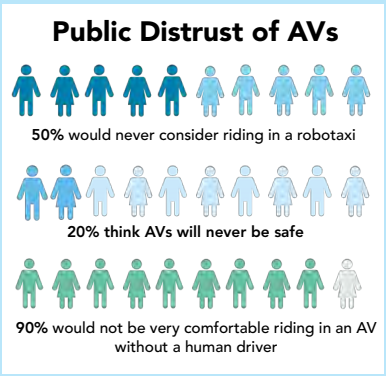
The motor insurance sector will be most affected by the emergence of AVs, as the technology will introduce new types of risks and new players in the market. AVs will not eliminate or reduce the consumer need for automobile insurance markets, as some have speculated. Instead, it will require insurers and reinsurers to adapt their current business model to accommodate a new era of the motor insurance ecosystem, driven by evolving losses and a transformed risk landscape. Under a strict liability regime (such as that implemented in Germany), motor insurers are obliged to pay for any damages from AVs whether they are caused by human or software error. They therefore have a high interest in understanding the overall loss potentials from AVs.

In Life and Health insurance, positive effects on mortality and morbidity are expected due to people switching to AVs. A recent report by Sonecon, an economic consulting firm, estimates that a 25% adoption rate of even basic AV systems (which always follow safe driving behavior) should lower accidents by 11% per year, while a 25% adoption rate of advanced AVs that can anticipate the behavior of other vehicles could reduce accidents by as much as 28% per year, saving 12,000 lives per year in the U.S[27].

Mixed public acceptance and the need to increase trust in AVs

Despite all the benefits and the potential of AV technology and the growing momentum behind its development, public views about AVs remain mixed at best. In a 2020 survey, nearly half of all Americans reported they would never consider riding in a robotaxi, and 1 in 5 thought AV technology would never be safe (Figure 1)[28]. A similar survey by the UK government found that only 10% of those in the UK would be very comfortable using an AV with no human control[29].

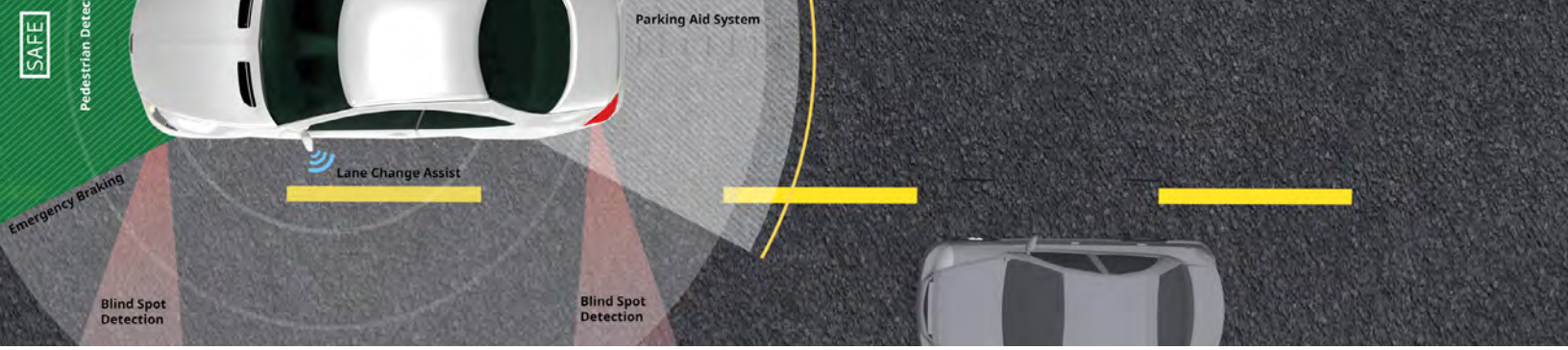
Figure 1: Public distrust of AVs



Source: PAVE and UK Department for Transport

One of the reasons consumers hesitate to use AVs is their lack of trust in the technology behind them. They fear that computer glitches or other technological failures could lead to fatal accidents. According to a 2017 Pew Research survey, 42% of respondents expressed that they would not want to ride in an AV because of a general lack of trust in the technology[30].

[27] https://www.sonecon.com/wp-content/uploads/2023/07/Report-on-the-Economic-and-Social-Benefits-of-Autonomous-Vehicles-Shapiro-Yoder-July-20-2023.pdf
[28] https://pavecampaign.org/pave-poll-americans-wary-of-avs-but-say-education-and-experience-with-technology-can-build-trust/?cn-reloaded=1
[29] https://assets.publishing.service.gov.uk/media/649d83a8bb13dc0012b2e35d/great-self-driving-exploration-citizen-view-of-self-driving-technology.pdf
[30] https://www.pewresearch.org/internet/2017/10/04/americans-attitudes-toward-driverless-vehicles/



Given this consumer hesitancy, if communities are to take full advantage of AV technology when it becomes available, much higher levels of public trust will need to be fostered. In the following sections, we will discuss how leveraging insights from behavioral science can help foster consumer trust in AVs.

How to improve trust in technology

What can be done to improve consumers' trust in AV technology so that more people will support and purchase AVs when available? Studies have shown that familiarity is key to producing trust in new technologies. An HSBC survey conducted across 11 countries found that trust in technology improved with information and experience. Technologies that were more familiar scored higher on reported levels of trust[31].

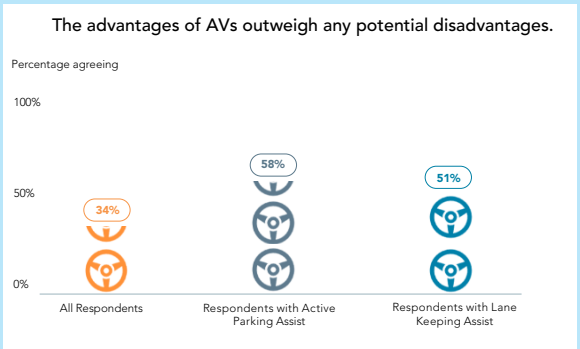
A 2023 study by the UK Department for Transport tested this concept in relation to AVs[32]. Participants were first educated about the safety, technology, cost, and environmental impacts of AVs and concerns related to how AVs would fit their current lifestyles. Subsequently, they experienced a test ride in an AV.

The researchers measured the comfort levels of participants at the beginning of the study, after the information session, and after the test ride. On a scale of 1-10, average comfort levels increased from under 6 to over 7 (after education) and then to over 7.5 (after the test ride). Groups that skipped the initial information session scored lower than those who completed both the education and the test ride, highlighting the importance of using both knowledge and experience in order to increase consumers' familiarity with new technology.

A 2020 survey of 1,200 U.S. adults sponsored by PAVE found that 58% of respondents said they would have greater trust in AVs if they could experience a ride in one[33]. The survey also identified respondents who already owned vehicles with advanced driver assistance systems (ADAS) features, which allow for some autonomous accelerating, braking, and steering, while the driver remains in control. Those who had experience using these features in their current vehicles were more likely to agree with the statement "the advantages of AVs outweigh any potential disadvantages".

On average, across all survey respondents, only 34% agreed with this statement, but this increased to 58% for those who had vehicles with Active Parking Assist and 51% for those who had Lane Keeping Assist, as shown in Figure 2.

Figure 2: Survey result on advantage vs. disadvantage of AVs



Source: PAVE

[31] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjt3-Lp-oOIAxWXRTABHW6OADMQFnoECBUQAQ&url=https%3A%2F%2Fwww.hsbc.com%2F-%2Ffiles%2Fhsbc%2Fmedia%2Fmedia-release%2F2017%2F170609-updated-trust-in-technology-final-report.pdf&usg=AOvVaw3OTT-CyenxNEugF5VLvGYW&opi=89978449
[32] https://assets.publishing.service.gov.uk/media/649d83a8bb13dc0012b2e35d/great-self-driving-exploration-citizen-view-of-self-driving-technology.pdf
[33] https://pavecampaign.org/pave-poll-americans-wary-of-avs-but-say-education-and-experience-with-technology-can-build-trust/?cn-reloaded=1

These studies tell us that knowledge and experience increase trust and acceptance in AV technology. Given that, increasing public knowledge of AVs and providing the chance for consumers to safely experience the technology are key steps towards higher public acceptance and readiness of AVs.

Using information and experience to improve trust in AVs

Next, let us discuss how we can improve consumers' knowledge of AVs through information and experience from a behavioral science standpoint.

1. Information

Education about AVs should incorporate insights from research in other contexts on how humans receive and process informational messaging. These insights have consistently found that who presents the message and how it is presented can impact how well it will reach its intended audience. Studies have also shown the importance of ensuring that the content of the message is meaningful to the specific target audiences.

Who presents the message – The messenger effect

Suppose you receive the same weather prediction, "It's going to rain today" from two different people. Imagine that this information was delivered to you by the attractive, smiling weatherperson on your favorite morning news show who has never let you down before. How likely are you to reach for your umbrella as you head out the door for your morning commute?

Now suppose instead that you hear the same prediction from your least-favorite next-door neighbor, who's out in their front yard in a stained sweatshirt, putting out a sign in support of a politician you can't stand. Are you as likely to grab your raincoat before you leave?

Most people tend to react differently to the same information depending on the person delivering it. The ways the entity delivering the message affects how it is received are known as messenger effects. Numerous experimental studies in various domains have shown that the same message can be seen as more or less accurate, trustworthy, and deserving of response, depending on the messenger[34].

Some factors that influence a messenger's credibility, and therefore, how likely we are to accept information from them, seem perfectly reasonable. For instance, we are more likely to trust a messenger we see as an expert[35]. That is rational and understandable – the expert weatherperson likely has training and data to back up their forecast, whereas your nonexpert neighbour might be basing their judgement on instinct.

However, other factors that influence our trust in a messenger are less rational. For example, we tend to trust authority figures, even when they provide clearly incorrect information or when their authority is unrelated to the information they are conveying. We also have a tendency to find information more credible when it comes from an attractive messenger. This might be physical attractiveness or ideological attractiveness, which is sometimes called congruence. If the messenger shares our views, whether about religion, politics, or other values, we are more likely to trust their message[36]. Interestingly, this is the case even when the message itself has nothing to do with those shared beliefs.

[34] https://doi.org/10.1016/j.joep.2011.10.009
[35] https://doi.org/10.1016/j.joep.2011.10.009
[36] https://discovery.ucl.ac.uk/id/eprint/10146276/

This phenomenon is attributed to the psychological concept known as the halo effect. When we perceive a person as competent or likable in one context, we tend to also see them as competent or likeable in other contexts that have nothing to do with the original circumstances on which we based our judgement of them. It's as if our admiration for them in the original context bleeds over into any other context they are associated with[37].

Messenger effects can also work in reverse – we are less likely to trust and act on the same information if it comes from a messenger we see as weak, unattractive, or opposed to our values. In extreme cases, messenger effects can even convince us of the opposite of the message being delivered if we really distrust the messenger.

The research on messenger effects provides at least two lessons for advocates planning to educate consumers about AVs:

1. Messengers matter and should be chosen carefully. Not all messengers will be effective at informing consumers about AVs, and some could even result in consumers becoming less interested and comfortable with the technology.

2. Not all groups will react to the same messenger in the same way. Because individuals differ in who they view as sharing their values or qualifying as an expert, multiple targeted messaging strategies may be needed to reach different groups of consumers where they are.

Checklist for a Good Messenger

- √ Authority figure
- √ Ideologically attractive
- √ Respected by target audience

How the message is presented - Framing

In addition to choosing the right messenger, those who want to educate consumers about autonomous vehicles also need to be aware of the framing of their message or how it is presented.

Framing is a central concept in behavioral science. One classic example of framing effects relates to the difference between framing a situation as a gain or as a loss. For instance, imagine that you expected to receive a 10% raise in your salary, but received only a 5% raise instead. Is this situation a gain or a loss? It could be either, depending on how you view the situation and how it is presented to you. In other words, it depends on how you and others frame it.

The framing matters because studies have shown that individuals react differently to the same situation depending on whether it is framed as a loss or a gain[38]. When a situation is framed as a loss, individuals are more likely to make risky decisions, whereas they are more likely to act conservatively when the situation is framed as a gain. Studies have also shown that individuals feel the pain of a loss of a certain amount more intensely than they feel the joy of a gain of the same amount[39]. Finding a $10 bill on the street makes you happy for a short period of time, but having $10 stolen out of your pocket can ruin the entire day.

Little research has so far been done directly testing framing effects on information about AVs. One study found that messages focusing on the safety of autonomous vehicles were more impactful than economic messages[40]. However, further research is clearly needed in this area.

In the meantime, lessons from other contexts can be used to inform AV messaging strategy. For instance, loss framing can be used to emphasize the consequences of not embracing autonomous vehicles, such as the lives lost due to human error, or the time wasted on driving[41].

[37] https://discovery.ucl.ac.uk/id/eprint/10146276/
[38] https://doi.org/10.1006/obhd.1996.0014
[39] https://doi.org/10.2307/1914185
[40] https://doi.org/10.1093/ijpor/edab001
[41] https://www2.deloitte.com/content/dam/insights/us/articles/3561_Framing-mobility/DR20_Framing%20the%20future%20of%20mobility_reprint.pdf

The content of the message – Tailoring to specific audiences

As mentioned above, the UK government has conducted research into AV acceptance, focusing on the potential for using AVs in public transportation[42]. In this study, participants from different backgrounds expressed different concerns about AV technology.

Participants from an urban setting with an existing strong public transport network were quite accepting of AVs but saw them as possibly unnecessary. Given that they were already mostly satisfied with their public transport, participants felt that AVs would not have much room to improve services and could result in higher funding costs. They also worried about how AVs would navigate crowded urban areas and if they would worsen congestion.

On the other hand, rural participants, who relied on personal vehicles and had less access to effective public transport, were initially less accepting of AVs than other groups. They were concerned that AVs would struggle to operate properly on poorly-paved rural roads and to deal with obstacles such as animals in the way. They felt that significant infrastructure improvements would be needed before AVs could operate in their area, improvements that they saw as unlikely to be undertaken. Overall, rural participants often felt that AVs were meant for urban areas and not designed for their context.

While both rural and urban participants became more accepting of AVs after being exposed to information and experience, their concerns, if not addressed specifically, lingered after the education campaign. This study reveals the importance of tailoring the content of any information about AVs to the specific context of the target audience. The concern of the rural participants – that this technology was "not for people like them" – will occur in any audience that feels that the design and marketing of AVs do not take them into account.

This need to tailor the messaging around AVs means that before any attempt to roll them out in a certain area, ethnographic research should be conducted, with focus groups and surveys used to understand the concerns of the local community. These concerns should be specifically addressed in the design of any AV program and in the messaging around it. It should be clear that AVs are not being pushed as a one-size-fits-all solution but as a flexible technology that can be used in ways specifically applicable to the given context.

2. Experience

Studies show that the best way to foster trust in a new technology is to combine knowledge and experience of it. Therefore, in addition to education about AVs, consumers need to be given a chance to experience the technology for themselves. Fortunately, the gradual rollout of AV technology necessitated by its ongoing development provides an opportunity to slowly introduce the experience to consumers.

As more and more consumers drive cars with Level 2 (partial automation) and soon Level 3 (conditional automation) features, positive experiences with these levels may boost trust in automation and lead consumers to seek more and more new AV features. There are two reasons to expect this to be the case: habit loops and status quo effects.

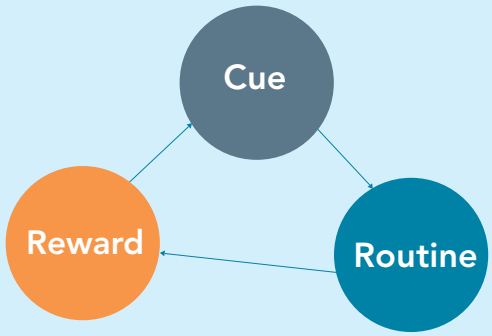
Habit loops

Science journalist Charles Duhigg defined the habit loop in his book *The Power of Habit*. According to this theory, habitual behavior consists of loops with three elements, as shown in Figure 3 below. First, there is a cue, a trigger that reminds us to engage in a certain behavior, known as a routine. Engaging in this routine leads to the third and final element of the loop: a reward – some desirable outcome. The reward reinforces the loop and makes it more likely that the next time we encounter the cue, we will once again engage

[42] https://assets.publishing.service.gov.uk/media/649d83a8bb13dc0012b2e35d/great-self-driving-exploration-citizen-view-of-self-driving-technology.pdf

in the behavior. Over time, the cue begins to automatically produce the behavior, establishing a habit.

Figure 3: Habitual behavior loops



Source: Charles Duhigg

Under this framework, using ADAS features in their vehicles on a daily basis means that consumers have an opportunity to experience the rewards of that behavior in the form of a positive experience. For instance, using adaptive cruise control on long trips could lead to a more relaxing drive. That positive experience could create a habit loop in which the cue (getting in the car) leads automatically to an expectation of using automated systems. As higher levels of automation are introduced, they may be accepted more regularly as they fit easily into this habit loop.

As mentioned above, the results from PAVE's 2020 survey showed that drivers who had experience with ADAS technology were more likely to have a favorable view of AVs, likely because they had already experienced the rewards of using automated features and had incorporated this use into their habits. A 2022 McKinsey survey of drivers around the world further confirms that many drivers see ADAS features as rewarding[43]. Around 80% of those with ADAS features in their current vehicles would repurchase them if given the chance, and up to 42% of drivers would be highly likely to switch vehicle brands to gain better advanced ADAS features.

Of course, this understanding of habit loops also points to an important lesson for those designing the AV experience – in order to establish a positive habit loop, there needs to be a reward for consumers, a positive experience that motivates them to return to the behavior of using their ADAS features. If automated features are difficult to use or function improperly, drivers may instead get into the habit of not relying on them, making it even harder to convince them to rely on higher levels of automation when these become available.

This is also indicated in the McKinsey survey mentioned above. Although most drivers are generally positive about their ADAS features, up to 30% who have access to such features rarely or never use them. Some of the reasons cited for this include "not knowing when to use them" and "a fear of technology failure".

Status quo bias

Another way to use experience with automated technology to produce gradual acceptance of fully automated vehicles is through an understanding of status quo bias. This bias means that humans tend to prefer for things to stay as they are, favoring the option currently in place over anything new.

A recent study from the Economic and Social Research Institute in Ireland offers a good example of the effects of status quo bias. It showed that when an active travel policy (in which walking and biking are prioritized over cars) was presented as a planned change from the current system, respondents evaluated it more negatively. They also sought out information about potential problems with the system, showing their concern with its possible consequences. It was as if they immediately asked, "What could go wrong?"

[43] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/hands-off-consumer-perceptions-of-advanced-driver-assistance-systems#/

In contrast, when the same active travel policy was presented as something already in place, participants responded more positively. When given the chance to seek out further information, they looked into both the advantages and disadvantages of the policy, seemingly starting their evaluation from a more neutral perspective[44].

What this means for public trust in AVs is that if AV technology is presented as new and completely unprecedented, status quo bias is likely to lead many consumers to immediately be suspicious of it and look for possible downsides. Presenting AVs as something already established and a continuation of current systems could help to avoid this effect and lead to more neutral evaluations of the technology.

Given this, it is interesting that much of the marketing around AV technology focuses on its innovative and ground-breaking nature. For instance, the homepage of Waymo, a leading AV company, invites potential users to "be one of the first" to experience a ride in an AV. The site explicitly states that "the status quo is not acceptable" and that Waymo's mission is to "innovate beyond the impossible[45]".

While this marketing may create excitement around AV technology, understanding status quo bias and the importance of experience for building trust in new technologies shows that such statements may not be the best way to promote AVs. Instead, marketing and public information campaigns could focus on how the history of cars is one of evolution, with gradual changes leading smoothly to the technology in place today. AVs can then be presented as the next step on this familiar road, instead of a radical departure from it. It could also help to point out that automated technology is already in place in many settings, linking newer systems to a proven track record.

For instance, many airports around the world already have train systems that run on automated technology without human drivers. AVs are also used in industrial settings such as shipping or mining, where they operate on tracks or within defined areas. Even commercial airplanes have significant autopilot functionality. And, as already discussed, many cars in use today offer ADAS systems that are gradually approaching full automation.

Given the prevalence of AV technology in our daily lives, it is safe to say that this means that almost everyone has already experienced some form of AV technology. Reminding consumers of this and linking new forms of AVs to this status quo of established systems could help to bolster public trust in full automation.

[44] https://www.esri.ie/system/files/publications/WP755_0.pdf
[45] https://waymo.com/

Conclusion

It may not be a fantasy anymore to think that five or ten years from now, you may be making your morning commute in an automated vehicle. Whether this will become reality and how safe and comfortable you will feel during the experience depends on many factors. The technology itself will require further development to move beyond the current automation stage (Level 3) to full automation (Level 5). More research is needed to ensure that AVs live up to their early promise of improvements in public safety. Government regulation will also have to evolve – more countries will have to address this technology at a systematic, standardized level.

In addition, the future use and acceptance of AVs depends on what is done during this gradual rollout phase to manage public expectations and promote public trust. Campaigns to promote AVs should focus on the twin levers of information and experience. It's important to consider carefully not just what information is presented but also who presents it, how it is framed, and whose perspectives are considered. In addition to thoughtful education, positive experiences with AVs can be harnessed to form habits and avoid the worst effects of status quo bias.

Ultimately, even if AVs eventually become capable of driving without human input, they will always depend on human factors for their success, just like any technology. The benefits of AV technology will only be realized if humans trust and rely on it. Understanding how humans think about new technologies can provide a road map for a positive, safer future for drivers, riders, and the world.

Information			Experience	
Messenger Effects	**Framing**	**Specific Audiences**	**Habit Loops**	**Status Quo Bias**
Choose authoritative and attractive messengers	Focus on what will be lost if AVs are not adopted	Conduct research into local concerns	Use gradual rollout to create rewarding habits	Focus on proven track records
Choose messengers based on audience	Present AVs as "can't miss" opportunity	Address local concerns directly in messaging	Ensure ADAS features produce positive experiences	Link new features to systems already in place

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