Who's in the Driver's Seat? An Analysis of Public Policy Formation Around Autonomous Vehicles in Tempe, Arizona

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Abstract

In 2016, The National Highway Traffic Safety Administration reported that human error is involved in 94 to 96 percent of all motor vehicle crashes. Also in 2016, researchers Bonnefon et al. predicted that autonomous vehicles could eliminate 90% of traffic accidents due to their elimination of human error. However, there is still a 10% gap of unavoidable accidents that requires this technology be regulated at the local, state, and federal level. This project analyzes how governmental actions, policy values, public opinion, private sector motivations, and social equity issues shape the discussion, creation, and implementation of governmental policies and regulations surrounding driverless automobiles in Tempe, AZ, where many companies are currently testing autonomous vehicles and where the first pedestrian death due to collision by an autonomous vehicle occurred. Informed by theories of public policy formation and the concept of the right to the city, this research suggests that public policy is currently being informed by the policy values of safety and increased mobility for people with disabilities. To a lesser extent, public policy is being informed by the policy values of increased mobility for the indigent and convenience. Additionally, there is a misalignment between public perception of the government's most important policy values around autonomous vehicles and the top policy values the government reports as its most important policy values, leading to distrust of the technology and governmental actions around it by the people. This has been caused by increased awareness of inequality within Arizona's autonomous vehicle regulation scheme and its entire transportation system after the first pedestrian death by autonomous vehicle.

Introduction

Autonomous vehicles have been a prominent feature of science fiction for decades, representing a futuristic society that could occur only in one's wildest imagination. However, that future is quickly becoming a reality. In 2009, the Google-run project Waymo began developing a self-driving car project. By 2018, more than two million miles had been driven by Waymo's autonomous vehicle (Dormehl & Edelstein, 2019). By 2013, other major car manufacturers announced development their own self-driving car technologies. Nissan committed to a launch date by announcing that it will release several driverless cars by the year 2020 (Dormehl & Edelstein, 2019). While it is clear now that Nissan was not able to honor that commitment and has since extended that date to 2023, it is interesting to see major companies not only developing this technology but promising to bring it to consumers soon.

It is easy to understand why these companies, and the federal and state governments, have an interest in developing a marketable autonomous vehicle. In 2016, The National Highway Traffic Safety Administration reported that human error is involved in 94 to 96 percent of all motor vehicle crashes. Autonomous vehicles would virtually eliminate human error in traffic situations; autonomous vehicles have been predicted to eliminate 90% of traffic accidents due to their elimination of human error (Bonnefon et al., 2016). If this prediction is accurate, then autonomous vehicles could save tens of thousands of lives every year. Because of this, autonomous vehicles could change the entire transportation system in America once they are fully implemented.

However, the development of autonomous vehicles has had its setbacks. On March 18, 2018, the first pedestrian death by autonomous vehicle occurred when an Uber prototype struck a woman in Tempe, Arizona (Wakabayashi, 2018). The event has raised questions many questions about the development of autonomous vehicles, including questions around public policy

formation, public opinion around testing and the vehicles in general, and social justice issues such as right to movement within a city and inequality around who has access to this new technology. This is an interesting time to address these questions as autonomous vehicle development is in a sort of liminal space: the technology is developed enough to be present in a testing capacity on public streets but not developed enough to be fully functioning or marketable. This has created a time of experimentation, both in terms of development of the technology and in creation of public policy at the state and local level. Because of this, it is important to understand what policy values are involved in the design and implementation of these new policies, as well as what effects those values-driven policies bring about.

Literature Review
Stages of Autonomy

TABLE 1   NHTSA Road Vehicle Automation Levels (1)

NHTSA Automation Level	Description
0. No automation	Driver is in complete control of steering, braking, and throttle, although vehicle may provide warnings.
1. Function-specific automation	Vehicle may independently automate one or more control functions.
2. Combined-function automation	At least two control functions are automated and operated in conjunction (e.g., adaptive cruise control and lane centering). Driver may have to take control with no notice.
3. Limited self-driving automation	Driver can cede full control to the vehicle in some situations, and driver has a reasonable amount of transition time before he or she must take control.
4. Full self-driving automation	Vehicle can safely pilot the vehicle for an entire trip, with no expectation for the driver to take control. Such a vehicle does not yet exist.

Goodall, 2014, pp. 59

There are four stages of automation in vehicle programming, with Stage 1 being the least autonomous and Stage 4 being the most autonomous (Goodall, 2014, pp. 59). There are examples of programming from Stages 1 through 3 that already exist in current vehicles on the market; for example, some vehicles are equipped with hands-off parallel parking, which would fall under Stage 3 level of automation where "driver can cede full control to the vehicle in some situations, and driver has a reasonable amount of transition time before he or she must take

control" (Goodall, 2014, pp. 59). Along with this, Stages 1 through 3 require a passenger to be present who can take control of the vehicle once the vehicle has finished its autonomous function; the vehicle cannot do everything by itself. Because of this factor in the ranking system, even programs like Tesla's add-on Autopilot and Full Self-Driving Capability can only be considered Stage 3 as both advise that the driver stay alert and keep her hands on the steering wheel while using them (Tesla, 2020, p. 3). Only Stage 4 autonomous vehicles can be considered fully autonomous because reaching Stage 4 requires that "vehicle can safely pilot the vehicle for an entire trip, with no expectation for the driver to take control" (Goodall, 2014, p. 59). A usable, marketable Stage 4 autonomous vehicle does not yet exist, and is what companies like Waymo and Uber are trying to create. Given these different stages, this project is referring to Stage 4 autonomous vehicles when using the term "autonomous vehicles" and will not consider vehicles with capabilities only within the lower stages when discussing the development of this technology.

Arizona and Uber

Arizona Governor Doug Ducey is a small-government pro-business politician, which he has demonstrated through several actions taken during his tenure. He also has demonstrated an interest in innovation and technology, including those in the realm of transportation. In April 2015, Governor Ducey legalized ridesharing and dismissed several state regulators who had previously attempted to take severe measures against then-illegal ridesharing drivers (Kang, 2017). This relationship between Governor Ducey and modern transportation companies quickly grew to include autonomous vehicle testing, especially with Uber where the relationship had already been established through friendly ridesharing policies.

Additionally, Governor Ducey used executive orders to pass less strict regulations on autonomous vehicle testing in the Arizona compared to neighboring California; these included

not requiring a report of disengagements in which the autonomous vehicles were switched from autonomous mode to human-controlled driving that testing companies argue give a "misleading impression of safety" (Kang, 2017, p.30). These policies are discussed more later in the paper. As a result of Arizona's less strict regulations, many autonomous vehicle testing companies moved some of their testing into the state and out of California. One of these companies was Uber, who left California quite theatrically. The California DMV revoked the registrations of Uber's autonomous vehicles following Uber's failure to obtain a permit to test autonomous vehicles in the state, while Uber contested the necessity to obtain the permit because their vehicles were not "sophisticated enough to continuously drive themselves" (Associated Press, 2016, p. 9). California also cited Uber's failure to mark its vehicles as test vehicles (Associated Press, 2016, p. 11). In response, Uber moved its entire fleet into Arizona after Governor Ducey made it clear through tweets that Uber would be welcome there (Isaac et al., 2018, p. 11). Even more theatrically, Uber moved its entire fleet to Arizona on the back of an autonomous Otto truck, showing that some of its technology is sophisticated enough to warrant an autonomous vehicle license in California while also showing the promise of its testing program (Muoio, 2017, p. 13). With the looser regulations, Uber had more protection from being shut down and more freedom to test as it desired. Also, Uber's already friendly relationship with Governor Ducey after the Governor legalized ridesharing in the state seemed to promise Uber even less oversight.

Along with the widely recognized actions the Arizonan government took regarding autonomous vehicles, there is speculation that it also took some actions in secret. Some news sources allege that Governor Ducey gave Uber permission to begin testing in August 2016 without informing the public (Harris, 2018, p. 2). This is interesting because Uber appeared to begin autonomous vehicle testing in December 2016 after its public exodus from California, a

full three to four months after news source allege it began testing. While manned autonomous vehicle testing was legal at that time, the news report questions why the Governor would not make Arizonan citizens aware of the new potential hazard on public roads at the start of testing (Harris, 2018). The report contends that the actions the Governor allegedly took were questionable despite their legality.

Also, some of the emails between Uber officials and Governor Ducey indicate a very strong relationship between the two, including some offers of office space and branded polo shirts (Harris, 2018). It is important to note that the emails did not reveal any illegal activity on the Governor's part, or on the part of Uber - in fact, Governor Ducey did not accept the offer of a branded polo shirt (Harris, 2018). The emails are only pertinent because they might indicate a willingness to promote Uber's interests over the interests of the public. This relationship and incentive could have contributed to Arizona's loose regulations.

Kingdon's Streams Model
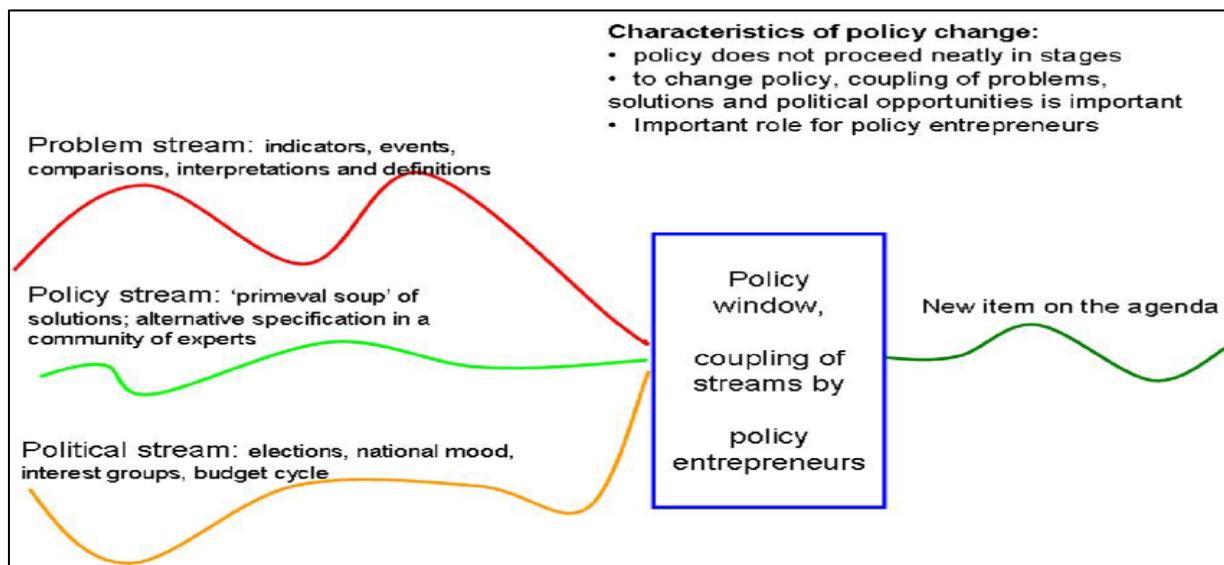
Kingdon's Streams Model involves three streams that flow independently from one another: the problem stream, the policy or solution stream, and the political stream (Kingdon, 2003). Policy entrepreneurs interpret these three streams and wait for an opportune time where

the streams intersect in such a way where all three can address one topic in a complementary and beneficial way for the policy entrepreneur, creating a policy window in which public policy can be adopted (Kingdon, 2003, pp. 165). Kingdon's Streams Model thus accounts for several different factors in the creation of public policy, all of which equally affect the outcome.

Policy values are important to this theory because they contribute heavily to and can represent all three streams in public policy formation, thereby giving them immense importance to policy entrepreneurs in creating a policy window. Policy values are representations of the problem stream since they seem to address what people would hope the future technology will fix the most, thereby drawing attention to the most pressing problems related to that issue. They are also representations of the solution stream since they represent how policies should be crafted to address those problems best.

Kingdon also discusses what he calls focusing events as a category within the problem stream in his Streams Model. Kingdon writes, "Problems are often not self-evident by the indicators. They need a little push to get the attention of people in and around government. That push is sometimes provided by a focusing event like a crisis or disaster that comes along to call attention to the problem…" (2003, pp. 94-95). Focusing events are then essentially a way for problems in the problem stream to become more apparent; this increased attention then allows policy entrepreneurs to leverage public outcry and increased prioritization to form the policy window. I interpret the first death by autonomous vehicle as a focusing event for Tempe.

The Right to the City

The right to the city is a concept considered in political geography as well as transportation geography. Mark Purcell gives a solid definition when he writes, "Key to this radical nature is that the right to the city reframes the arena of decision making in cities: it reorients decision-making away from the state and toward the production of urban space"

(Purcell, 2003, pp. 103). Purcell also notes contemporary movements that focus on the right to the city have a unifying similarity of resistance to commodification and economic exclusion in public spaces (2013, pp. 142). The right to the city as a framework utilizes a socially oriented understanding of the state as merely an institutional body where the state has no inherent power, but instead "the power of the state is the power of the forces acting in and through the state" (Jones et al., 2015, pp. 33). Since place is socially constructed and can be contested, the next logical step is to question who is considered a part of the "public" and will therefore be catered to by the city through infrastructure and what activities will be legally sanctioned in that place. In this way, inequality in access to transportation allows the more privileged members of the city to construct ideas of who is considered "the public" and therefore to whom the city owes a political obligation in the form of access and use of public space (Attoh, 2017).

Autonomous vehicle development and its social implications can also be interpreted through the framework of the right to the city. This is because autonomous vehicles will occupy public streets. First, streets can be seen as public spaces for two reasons: city taxes pay for street construction and maintenance so people can use most of them without being charged any additional fee, and occupation of the street has long been a form of political protest. Following Attoh's understanding of transportation's social implications, streets are used by people to be a part of the city in a similar way to how public parks are used for political, social, or even survival purposes: Mitchell quotes Vidler when he writes, "The street as a site of interaction, encounter and the support of strangers for each other... These spaces, without romanticism or nostalgia, still define an urban culture, one that resists all effort to 'secure' it out of existence" (2003, pp. 3). Therefore, the social implications of autonomous vehicles fall under this category as socio-

economic and other political concerns such as the right to movement come into play around the technology.

Methods

This project can best be understood as a case study analysis addressing the questions:

What are the policy values around autonomous vehicles in Tempe? How do these policy values affect development of autonomous vehicle public policy?

Phase One: Document Analysis

I began by analyzing documents from various actors regarding autonomous vehicle testing in Arizona. During this document analysis, I considered existing public policy on autonomous vehicles, mostly focusing on public policy and law around the development and testing of autonomous vehicles in Arizona. I also considered public statements and memos made by government officials and private companies regarding autonomous vehicles since they could give an indication of the policy ideals and interests of these entities, as well as how these public statements could have shaped public opinion around the technology.

One of the significant portions of the document analysis phase was conducting an analysis of the first pedestrian death by autonomous vehicle that occurred in Tempe in 2018. The first pedestrian death by autonomous vehicle was particularly important to this study because it serves as a focusing event in Kingdon's Streams Model, which is discussed later in the paper. This portion of the document analysis involved reading executive orders and public statements made by AZ Governor Doug Ducey to understand his policy values. I also read official and unofficial reports related to the death of Elaine Herzberg, the first pedestrian to be killed by autonomous vehicle collision. Finally, I read popular news sources to understand how the public was reacting to Herzberg's death which gave me an understanding of the political culture around autonomous vehicles in 2018-2019.

Another way I used document analysis in this project is through the analysis of social media posts and public discussion threads related to autonomous vehicle policy in Tempe and Arizona largely. I did this by analyzing a public post and its comments from a Tempe-area residents Facebook group where residents talked about their interactions with autonomous vehicles, their understanding of the benefits and consequences of autonomous vehicles, and what they perceive to be the city of Tempe and Arizona's policy ideals related to the technology. I also analyzed public responses to discussion posts on the "Tempe Forum," a page on the city government's official website that allows residents to comment on city issues that will be discussed by Tempe City Council and other departments of the Tempe government.

Finally, I was able to access some data concerning public opinion around autonomous vehicles in Tempe from studies done by other entities, including the Consortium for Science, Policy & Outcomes at Arizona State University (CSPO) and Valley Metro. The CSPO, supported by grants from the Charles Koch Institute and the Alfred P. Sloan Foundation, conducted community forums on automated mobility in Boston, Buffalo, Washington D.C., and Phoenix. Those forums addressed questions of public opinion of topics like safety, data privacy, comfort, and trust in stakeholders around autonomous vehicle technology.

Phase Two: Interviews

To gather data directly from participants, I interviewed them. Participants were categorized into one the following groups: government official, private sector member, and member of the general public in Tempe. The diversity of these groups in terms of role allowed me to understand how different motivations affect the public policymaking process, especially considering that policymaking in a democracy becomes a group project to an extent; in the words of John Kingdon, "Public policy is not one single actor's brainchild" (Kingdon, 2003, pp. 71). Talking to a variety of people involved in the policymaking process gave a more

comprehensive understanding of how policy is being formed in each city and illuminated how and why that process might be different when comparing those cities. Everyone I interviewed was over the age of eighteen. I was able to interview 11 people in 2020, which was fewer than I originally intended. Because of this, the interviews should be considered suggestive instead of conclusive.

Phase Three: Coding and Analysis

I used the qualitative research software NVivo to aid in my coding and analysis. I used coding to identify broad topics in each interview that appear often, which gave me a sense of order of importance for those broad topics. From there, I identified smaller, more focused areas of interest that were common in multiple interviews and could provide a deeper level of insight. Coding this way allows me to analyze trends in topics across interviews in multiple participant categories, which then allowed me to begin to form conclusions about the nature of public policy development in Tempe. It also allows me to present what I found in a descriptive nature without causal or correlative implications. This is acceptable for a study like this due to the novelty of the technology and policies around it.

Results

Safety

The most important policy value for autonomous vehicles in Arizona found in this study is increased safety. This was demonstrated in the document analysis and in interviews with both government officials and members of the public. For example, participants in the public forum were asked what their greatest hope for the technology was consistently listed safety as their top concern. 10 of the 11 interviewees ranked safety as the most important value, and the other participant named safety as the most ideal value although he did not believe safety was the most important value for entities such as the state government or private testing companies. When

talking about safety, participants emphasized the elimination of human error and subjectivity around traffic laws (rolling through a stop sign or speeding) as a way that autonomous vehicles could be safer than human-operated automobiles. This emphasis on safety could or could not be a result of the first pedestrian death by autonomous vehicle; I did not have access to any data from before the first pedestrian death that addressed this question. However, based on advertisements put out by private testing companies and reasoning used in executive orders used to introduce testing to Arizona, safety has probably been one of the most important aspects of autonomous vehicles in the mind of the public since the introduction of the technology. What may have changed is the public's perceived trustworthiness of the technology to deliver on the promises of safety made by its developers. While no participants knew the details of Herzberg's death or the mechanisms of Uber's testing system that allowed such an incident to occur, Herzberg's death signaled that the technology is clearly not as safe as what was once believed.

Since safety is most important to policymakers and is the most accessible consideration for members of the public, there will be more opportunities and demand for safety to be the main focus of public policy around autonomous vehicles. One could also speculate that safety as the most important policy value will generate more restrictive use policies and stricter regulation of the technology, especially by local governments. However, one should consider how Governor Ducey was able to use safety as a policy value to promote autonomous vehicle testing in his earlier executive orders since autonomous vehicles could be safer than traditional automobiles in the future, relating long-term safety to innovation. This relationship between safety and innovation was also only present in official documents and interviews with government officials; social media posters and interviews with the public demonstrated that those not in the government do not relate safety to innovation in this way.

Accessibility for People with Disabilities

The largest practical aspect of government focus on autonomous vehicle development

occurred at the local level, with collaborations occurring between Valley Metro, the main

regional public transit service in the Phoenix metropolitan area, and Waymo. This partnership is

focused on creating a first-mile-last-mile program for people with disabilities and, to a lesser

extent, the indigent. Valley Metro and Waymo have so far completed two stages of their

partnership. Stage One focused on establishing convenient pick-up and drop-off areas as well as

ensuring vehicle accuracy; Valley Metro representatives stressed that this was one of the most

important factors of Stage One as one of their primary user groups is people with visual

impairments who rely on precise location alerts to orient themselves. Stage Two focused on

geographic information system mapping, or GIS for short. This stage concerned mostly mapping

of the Phoenix/Tempe area for future autonomous vehicles, including roads and other major

destinations such as shopping areas and universities. Valley Metro has conducted some post-ride

surveys the people that it has served, but that data was not available at the time of this study.

The partnership between Valley Metro and Waymo is an example of the large focus on

accessibility for people with disabilities by the government employees I was able to interview.

All four listed accessibility in the top two values they believe are integral to autonomous

vehicles. In fact, one participant mentioned that a coworker in their department has a visual

impairment and so people in that department had a personal interest in the accessibility aspects

of the technology. Additionally, this focus on accessibility could be a focus on one of the more

explicitly beneficial aspects of the technology. Participants I interviewed from both the state and

local governments focused on the more positive aspects of the technology, such as accessibility

and the potential for increased safety. To maintain this optimism, some participants downplayed

the negative aspects of the technology or attributed these negative aspects to the private company

that was testing, i.e., Uber. Because Uber is no longer testing in the area, government officials I interviewed tended to use Uber as a scapegoat for negative aspects of the technology, often following up with a sentiment like this from one participant: "[Uber's] company culture was not transparent in the least… That's not something we have had to worry about as much with Waymo." This is a convenient way for government officials to discuss the first death by autonomous vehicle and their continued support of testing without having to seriously account for the incident or other consequences of the technology. It also supports the policy value of aid for people with disabilities because it praises the current collaboration with Waymo.

It is important to note that this policy value rarely occurred in documents related to autonomous vehicles. Increased accessibility appeared in only one article by the New York Times over the course of the document analysis (Kang, 2017). This could indicate that this policy value is more relevant for those at the local level rather than at the state or national level. In terms of policy development, this could mean that accessibility could be involved in policy less but in programs more. It could also be left to the discretion of local governments which control transportation programs more directly.

Accessibility for the Indigent

The second most occurring value in the interviews I conducted with the public was accessibility, focusing mainly on improved access to public transportation for the indigent. This value encompassed ideas about first-mile-last-mile connections to other forms of public transportation where autonomous vehicles could provide rides to and from bus stops or train stations; autonomous public transportation that could cost less given that autonomous vehicles would not require a paid driver; and specialty services that could use autonomous vehicles to provide rides to services such as doctor's offices or grocery stores for those who met specific income, health, or age requirements. In general, this policy value differed from accessibility for

people with disabilities in that autonomous vehicles were more viewed as accessories to public transportation rather than entities or programs of their own. There was also a distinct focus on cost of the technology for urban travelers.

However, there was skepticism around the ability of the technology and the will of the government to bring about these benefits for the indigent. One participant said, "Will it be a class thing? Like will only some people have access to autonomous vehicles and others don't? And I think that in a city that is dealing with gentrification issues like every other city in this country, I think that when we think about autonomous vehicles being part of the solution, these questions need to be asked. Like equal for who?" This shows how members of the public might have different perceptions of what problems should be prioritized in the problem stream; when they do not see matching solutions being emphasized in the solutions stream, this can lead to distrust. It is also important to note that this benefit was not referenced in any official documents and participants from the state and local government rarely if ever discussed it. Because it seems that only members of the public are interested in the capacity of the technology to serve the indigent, there might not be as many policy implications while the problems associated with autonomous vehicles are not as salient to the public.

Convenience

Convenience was also widely discussed as a desired benefit of autonomous vehicles, although it was consistently ranked below safety and accessibility. A variety of different factors related to convenience were discussed by participants, most notably a desire to not have to worry about driving in traffic and the ability to accomplish other tasks during a commute while maintaining a higher level of comfort, time efficiency, and safety than public transportation could provide. While participants were interested in the convenience-related benefits of autonomous vehicles, it was clear that many of them viewed these benefits as highly futuristic

and almost unattainable rather than with any concrete desire. One participant even referenced the television show The Jetsons when talking about the convenience-related benefits of autonomous vehicles. This mindset can probably be attributed to the fact that participants had almost no direct experience with autonomous vehicles other than seeing them be tested and operated by somebody else. Perhaps when more people are exposed to autonomous vehicles, convenience-related benefits will seem more attainable and concrete than aspirational and heavily futuristic.

Misalignments

It is important to note that importance of policy values as given by government officials differs from the public's perception of the government's most important policy values. When asked to identify the government's most important policy values, several members of the public stated that they believed it to be progress or economic benefits. Members of the public were also largely skeptical when told the government's reported top policy value is safety. This misalignment of reported and perceived policy values among government officials could contribute to the problem stream in Kingdon's Streams Model because it fosters distrust between the public and government officials, thereby creating distrust in the policies those government officials create.

One common theme of public opinion after Herzberg's death is that the state of Arizona's actions and the actions of private companies after the collision are a prioritization of the economy over its citizens, especially its less privileged citizens. For example, one Facebook user publicly commented on an article about the fatality, writing, "big mistake taking the engineer and co-driver out of the car. begging for a disaster to happen. multimillion dollar endeavor cutting corners to save a buck. gross." Another example of an autonomous vehicle dissenter is Erik O'Polka, a citizen of Arizona, who stated, "They said they need real-world examples, but I don't

want to be their real-world mistake" (Romero, 2018, p. 8). This demonstrates an understanding

of why autonomous vehicle testing companies need to test on public roads but also shows how

some members of the public in Tempe clearly dissent to that testing being done in Tempe

specifically.

There was also tension between the state and local governments, mostly indicated in

responses from participants at the local government level. One participant complained that due to

preemption by the state, the city of Tempe was unable to have much control over how testing is

conducted in that city. This means that they could not impose more regulations for testing other

than what the state has established. While the participant from the state government contested

this, it is important that local-level government officials who I interviewed believed this to be the

case and felt annoyed by the loose state regulations. Some participants in the local government

were critical of Governor Ducey's close relationship with Uber; the most frustrated participant

stated, "And, you know, I heard he had an office at Uber's headquarters in California. That is

troubling." This tension between local and state governments is interesting, especially when one

considers that traffic laws are usually made at the local level. Since there is already a concern

that differing state laws will lead to difficulties in mainstreaming autonomous vehicles since

vehicles must be able to cross state lines relatively easily, it will be interesting to see if these

tensions lead to conflicting laws around autonomous vehicles even within the same state in

different cities.

Finally, the misalignment in perceived importance of accessibility for the indigent

between those in the government and the public clearly relates to the right to the city. Since

accessibility for the indigent is the policy value that most clearly relates to the right to the city,

the misalignment could indicate a struggle over who should control the direction of Tempe's

future. It also indicates there could be a struggle around who will serve as the "policy entrepreneur" for autonomous vehicles in Tempe, redefining the conversation around power and occupation of space both physically and politically.

Conclusion

The most important policy value for autonomous vehicles is increased safety. This was demonstrated in interviews with both government officials and members of the public. Safety being the most important policy value for both groups will have an impact on the development of public policy around autonomous vehicles. Since safety is most important to policymakers and is the most accessible consideration for members of the public, there will be more opportunities and demand for safety to be the main focus of public policy around autonomous vehicles. One could also speculate that safety as the most important policy value will generate more restrictive use policies and stricter regulation of the technology, especially by local governments. However, one should consider how Governor Ducey was able to use safety as a policy value to promote autonomous vehicle testing since autonomous vehicles could be safer than traditional automobiles in the future.

The second most salient policy value is increased mobility and accessibility, both for people with disabilities and the indigent. This policy value has already clearly affected development of public policy around autonomous vehicles because it has been a large factor in governmental justification of partnerships with private testing companies. Other than partnerships between local governments and private testing companies, this policy value easily fits into existing laws around accessibility and transportation. As far as accessibility for people with disabilities, the Americans with Disabilities Act (ADA) already has requirements about both public and private forms of mass transit that will most likely transfer over once automated transportation systems

such as buses are implemented for use by the public (ADA, 2019). As far as accessibility for the indigent, this value was much more important to members of the public who I talked to than government officials who focused much more on people with disabilities. This could be due to a political culture in Tempe that values traditional conservative values such as individual responsibility and consumerism that inherently does not serve the indigent.

Limitations/Areas for Further Study

One important factor to note before addressing my data on the public's reaction to the first death by autonomous vehicle and subsequent general opinion on autonomous vehicles is the overwhelming effect of COVID-19. COVID-19 affected the perceived importance of autonomous vehicles in people's minds both through the prioritization of the global public health crisis and through the simple fact that when people stopped frequently going in public, they also stopped seeing autonomous vehicles regularly and subsequently thought about them less. One participant noted, "I used to see them all the time about a couple years ago but I think since the incident where a person was struck here, I started seeing them less. And now, because of the quarantine I don't really leave the house much at all. But now I think I see them very rarely if I'm out on my bike." One would expect that when people leave the house less often, they would witness autonomous vehicle testing less and therefore prioritize these issues less. This could have affected the responses I got since people might have been more focused on autonomous vehicle testing if not for COVID-19.

As autonomous vehicles are a developing technology, there must be further research in this area as people come to have more direct experience with them. When I conducted interviews, none of my participants who were categorized as members of the public had ridden in an autonomous vehicle. Instead, they had to use conjecture based on indirect experiences with

the vehicles and political talking points to form their opinions on the technology. This meant

that, in general, participants were wary and distrustful of the technology since they did not have a

solid understanding of how the vehicles even worked, let alone their implications on

transportation. It will be interesting to analyze how public opinion changes once more people

have more direct experience with autonomous vehicles once as a mainstream option.

While this project focuses on Tempe, AZ as a case study to understand how public policy

is being developed around autonomous vehicles in one of the testing hotspots, it is important to

note that there are other ways of developing this technology and creating policy around it;

consider Columbus, OH. Columbus won the Smart City Initiative Grant in 2016, which gave the

city $50 million to fund transportation and infrastructure-related projects (SMART Columbus,

2016). One of the projects Columbus has taken on as a part of that grant is an autonomous bus

system with low fees and established routes to services such as women's health clinics. This

direct involvement of social justice-related issues differs from Tempe's approach, so it would be

interesting to research how this difference in motivation has affected public opinion, autonomous

vehicle testing, and public policy formation.

Another area in which there is opportunity for further study is the interaction between

motivations and actions by insurance companies with implementation of autonomous vehicles.

Insurance companies will help determine who has access to autonomous vehicles, as well as how

they can be used once they are a mainstream and marketable option. For example, insurance

companies might determine ethical programming for vehicles in cases of unavoidable accidents

due to premium setting for different programming, making some programming simply too

expensive for individuals or companies to justify. This could in turn affect the political stream,

helping shape the policy window and environment in which policy entrepreneurs get legislation

passed.

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