

Debate Essay

In Support of: Governments Should Delay the Development of Self-Driving Vehicles Because
They Will be too Disruptive to the Livelihoods of Taxi and Truck Drivers

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Author Note:

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Opening Statement

Autonomous vehicles (AV) are projected to dramatically alter United States' transportation system as AVs are nearing mass production and the government is actively approving AV legislation to support this projected \$7 trillion infrastructure by 2050 (Bigelow, 2019). The government should delay the adoption of AVs as the livelihoods of approximately 2 million taxi and truck drivers are at stake from automation replacement and it would be difficult for the economy to absorb these workers given their skill-mix profile (Gittleman & Monaco, 2020; Hayes, 2019; Wang & Akar, 2019). Additionally, research on self-driving vehicles in dense neighborhoods is limited and requires the assistance of legislators to provide guidance plans on the AV inner-city requirements (Wang & Akar, 2019). Finally, AV machine learning algorithms require maturity time as *smart* technology is not born smart but rather learned across many miles and environmental conditions the algorithms have yet to accumulate (Stilgoe, 2019).

Argument 1: Displaced Workers

According to Hayes (2019), there are a number of unintended consequences with driverless technology including unemployment, hacking, privacy, decreased private auto ownership and accountability in the auto industry. As of 2012 the U.S. Bureau of Labor Statistics recorded 2.56 million truck drivers, 250,000 taxi and delivery drivers and 650,000 bus drivers. This entire population is subject to the stress of AV job displacement through 2050 and the situation is compounded as positions require relatively low skills and other similar skill requirement positions are lacking in the economy (Hayes, 2019). State budgets are projected to be strained with higher retraining costs and legislators are not preparing for this impact.

According to the International Transportation Forum in Paris a worst-case scenario for United States truckers would be 50-70 percent displacement by 2030 (Sperling, 2019). Further research by Gittleman & Monaco (2020) indicates 79% of long-haul trucker jobs would be impacted by AVs. Overall, it is not well understood how many workers understand potential for job loss and are actively retraining or seeking labor alternatives. Such misguided short-term thinking will lead to increased state costs from displaced workers. Even though trucker job replacement will occur incrementally over time some states, such as California, will have a far greater immediate impact as legislators and insurance companies support AV's rapid adoption (Sperling, 2019).

Long-haul trucking is easier to automate than short-haul because short-haul has complex regulations governing merchandise movement in the “last mile.” However, long-haul truckers make up a lion share of the 2-3 million workers. The Government Occupational Requirements Survey confirms a relatively limited education levels with short vocational training is required creating an easy transition into employment for physically healthy individuals (Gittleman & Monaco, 2020). Collectively this speaks to significant education and retraining dollars needed to help transition individuals into other occupations. Current legislation is also not accounting for dramatic employment changes and the government should delay the approval of AVs to help states plan, allocate funds and begin retraining soon-to-be displaced workers.

Argument 2: Insufficient Research on AVs in Neighborhoods with Mixed Traffic Types

Perceptions vary on self-driving vehicles and have been found to be more of a concern when AVs are corporeal in a person’s immediate neighborhood (Wang & Akar, 2019). Public opinion research on AVs is widely growing but the “rubber hits the road” when citizens see, feel, and interact with them in their neighborhood. Effective policy planning would benefit by researching and understanding neighborhood safety perceptions when AVs are integrated into city and urban environments. Such research is inadequate and requires a better understanding of key neighborhood acceptance factors so legislators can provide a successful framework to help account for mixed traffic patterns like pedestrian, bikes, rollerbladers in thickly settled neighborhoods.

According to Wang and Akar (2019), neighborhood characteristics such as traffic lights, striped bike lanes, and signal crosswalks are crucial in assessing AV’s perceived risks. Their study assessed multivariant relationships amongst differing demographics, travel patterns, street infrastructure and preferences amongst 7514 respondents. Analysis found increased traffic volumes and speeds were positively associated with perceptions for separate lanes. Research also found neighborhoods with higher amounts of mixed traffic result in respondents being “more likely to be concerned about the interactions between AVs and other road users” (Wang & Akar, 2019, pg. 2133). Perceptions were also influenced by lifestyle preferences, education level, subway travelers and individuals who walk. The diversity of the research’s findings and limited empirical evidence highlight the importance of delaying AVs integration to allow policy planners more time to collate and decipher critical neighborhood attributes currently navigated by

experienced taxi and truck drivers (Wang & Akar, 2019). Legislators, insurance companies, and manufacturers are simply ambitious to “experiment” with civilians but are less willing to fund research to help inform environmental factors and ensure pedestrian and AV safety.

A final point of interest revolves around the significant findings of proximity and length of bicycle lanes, presence of marked feature lanes, and research discovering citizen’s neighborhoods with more marked lanes “are more likely to express higher levels of concern on the interactions between AVs and other road users” (Wang & Akar, 2019, pg. 2133). This finding is significant and suggests citizens may prefer separation from AVs rather than interacting with them. For urban city planners this can have a drastic impact on AV planning as it suggests some city areas may need improved marked lanes to manage mixed traffic. This research is far from complete and the government should consider funding new research rather than rapid AV integration whereby enabling drivers more time to transition to other industries.

Argument 3 – Immaturity of AV Machine Learning Algorithms

Self-driving cars are not autonomous, devoid of error, or able to shape and solve self-governing problems such as changing a tire. Self-driving cars are artificial intelligence machine learning systems ingesting event feedback across a fleet of cars with software designed to learn, solve tasks, and make rules based on environmental stimulation. From a governance perspective the “unruliness” of how AV machines learn is a cause for concern as some faults may result in an opaque “mode confusion” (Stilgoe, 2018, pg. 39). Such computer processing concerns speak to the nascent state of this technology and the government should consider delaying AV implementation until “standards of success” are agreed upon and achieved across manufacturers and non-data sharing companies such as Tesla.

Truckers and taxi drivers are moderately impervious to hacking and cybersecurity threats whereas AVs require sophisticated programming to ward off malicious attackers with either traditional hacking methods or new, so-called, adversarial machine learning (Garfinkel, 2017). Adversarial machine learning targets machine learning systems by purposely trying to alter a machine’s response to stimuli. For example, the addition of polka dot eyeglasses was able to successfully defeat state-of-the-art facial recognition algorithms (Garfinkel, 2017). Rapidly displaced workers could lead to various forms of aggression on AVs to help sabotage their

implementation. By government more carefully layering AV's integration it would help reduce the potential of such adverse feedback.

It has been four years since the death of a citizen by an AV in Arizona but since twenty-nine states have legislation in favor of AV integration. Insurance companies are advertising AV benefits in response to 41,000 deaths a year caused by automobiles with a 90% human error rate (autoinsurance.org, 2020). Insurance companies are quick in the "justification and blaming of human deficiencies" as cause for rapid approval (Stilgoe, 2018, pg. 40). Corporate and regulatory statements also overlook the infancy of machine learning and the net complexity of AV machines (Stilgoe, 2018, pg. 45). Such hubris raises alarm as it will become acceptable for AVs to learn from rare events, i.e. severe crashes and human deaths, rather than the National Transportation and Safety Board establishing clear cut standards on AV black box policy ensuring the machines "can explain" concretely what happened in an accident (Stilgoe, 2018, pg. 45).

Allowing more time to further the advancement of machine learning algorithms will facilitate companies' perfection of the technology while enabling marketing of retraining programs to truck and taxi drivers. Machine learning would clearly benefit from the additional miles accumulated, safety would be given a higher priority, and truckers and taxi drivers would be provided the needed resources to remain active workforce participants.

Closing Statement

The government should consider prolonging AV's societal integration and begin expeditiously marketing combined with funding of trucker and taxi driver retraining programs. Legislation supporting AV integration has grown from twenty-one to twenty-nine states since 2018 with nine additional states preparing legislation (Stilgoe, 2019). The rapid adoption and impact of AVs on taxi drivers is potentially better understood by taxi drivers given the rapid proliferation of Uber and Lyft competition. However, for the 1.7 million individuals employed as long-haul truckers they are less prepared, and the government is woefully under-estimating costs associated with their displacement. When accounting for flat out "new" machine learning technology, displaced workers, and limited research the government would be best suited to coordinate the technologies adoption and safety of the American people rather than rapidly approving legislation for an unproven technology.

Word Count: 1500

Questions to the Opposing Side

- i. Given insufficient research on autonomous vehicles (AVs) ability to effectively navigate dense populations and mixed traffic neighborhoods, such as an inner-city neighborhood, should urban planners be provided more time and financial resources to research AVs integration in these settings (Wang & Akar, 2019)?
 - A likely interaction from an opposing side will be support of this research but having it occur concurrently with AV roll-out. The other side may also acquiesce to limiting rollout to less dense neighborhoods while the technology is being proven but still not perceiving research as critical to prolong AVs city integration.
- ii. Has the opposition considered the increased health risks associated with projected sedentary lifestyles resulting from AV convenience (Wang, R. et al., 2019)?
 - A likely interaction from the other side may lean toward being unprepared for this question. Rising obesity in the millennial generation is a well-documented societal issue (Larery, 2019). Millennial's overall acceptance rather than weariness of technology will fuel societal AV integration and perhaps contribute to more sedentary behaviors associated with video gaming and other less demanding physical from the information technology revolution.
- iii. Why are legislative policies not accounting for the retraining costs displaced taxi and truck driver workers will require as their jobs are phased out?
 - The legislation landscape on self-driving vehicles is vast and the other team may not have become familiar this cost perspective. This question was chosen last as a means to help weaken and detract from for the opposing side's prior arguments during the last part of the debate.

Arguments the Opposition is Likely to Ask

- a. If both the government and legislators negotiate with the manufacturers of self-driving vehicles to create retraining programs for displaced workers at the manufacturer site of new autonomous vehicles (AV) would this help gain approval for rapid adoption and integration of AVs into society?
- b. If AV manufacturers are able guarantee a high percentage of vehicles are electronic fuel-cells to help dramatically reduce carbon footprint would this positively contribute to government's rapid adoption and integration of self-driving vehicles?
- c. Government and legislators should move rapidly forward with AV integration as most inner-city landscapes are continuously stressed by limited parking spaces, double parking, and commuter congestion. A reduction in inner-city congestion from AVs would positively impact a city's carbon footprint and improve the health of the city with safer streets.

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