Debate Essay

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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IST-618 – Information Policy

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2020

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This Paper Prepared for Information Policy Taught by Professor Ian MacInnes, Ph.D.

Opening Statement

Autonomous vehicles (AV) are projected to dramatically alter the United States transportation system as AVs near mass production and both state and federal governments plan a projected $7 trillion infrastructure by 2050 (Bigelow, 2019). A primary reason the government should delay the adoption of AVs is the livelihoods of approximately 2 million taxi and truck drivers are at stake and the economy is not capable of absorbing these workers into similar skill-mix positions (Gittleman & Monaco, 2020; Hayes, 2019; Wang & Akar, 2019). Another reason centers on limited self-driving vehicle research in dense neighborhoods and why legislators should draft inner-city requirements based on peer-reviewed research outcomes (Wang & Akar, 2019). And most importantly, AV machine learning algorithms lack maturity as smart technology is not born smart but rather trained smart across many miles and environmental conditions yet accumulated in AV networked systems (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 auto industry accountability. 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 are subject to AV job displacement distress through 2050. Compounding the situation is the driving positions require low skills, training time, and other similar skilled positions are abjectly lacking in the economy (Hayes, 2019). Furthermore, legislators are woefully underestimating occupation retraining costs to facilitate an otherwise healthy working classes ability to go back to work via skill augmentation.

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). Research by Gittleman & Monaco (2020) indicate 79% of long-haul trucker jobs would be decimated suggesting workers may not appreciate the true potential for job loss and actively planning income alternatives. Such misguided short-term thinking will ultimately fall on states and taxes to assist displaced workers with unemployment and support programs. Of course incremental AV job loss could help smooth unemployment layoffs but some states, such as California, have powerful insurance companies in support AV's rapid adoption and legislators are fast-tracking

technology adoption legislation given supporting actuary damage claim reductions (Sperling, 2019).

Long-haul trucking is easier to automate than short-haul because short-haul has complex regulations governing merchandise's "last mile" delivery. However, long-haul truckers make up a lion share of the 2-3 million workers and findings from the Government Occupational Requirements Survey confirms this industry excels hiring individuals with limited education levels by providing short and inexpensive vocational training periods. For otherwise healthy individuals, the long and short haul trucking business gets workers productive quickly while boosting the economy supply chain of readily available goods (Gittleman & Monaco, 2020). This supports why significant education and retraining dollars will be necessary to build essential experience, such as computer skills, lacking in this working class. As such, the government should delay the approval of AVs to help states plan, allocate funds, advertise, and reach the demographics with retraining options for soon-to-be displaced transportation 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 *seen and heard* in a person's immediate neighborhood (Wang & Akar, 2019). Public opinion research on AVs varies widely but quickly focuses 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. Research is also 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 including pedestrian, bikes, and 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. The study assessed 7,514 people's reactions to multivariant relationships such as travel patterns, street infrastructure, and neighborhood people characteristics. Analysis found increased traffic volumes and speeds were positively associated with perceptions for separate AV lanes. Neighborhoods with higher amounts of mixed traffic found respondents "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 time to collate and decipher critical neighborhood attributes already known and accounted for by experienced taxi and truck drivers (Wang & Akar, 2019). This illustrates legislators, insurance companies, and AV manufacturers would rather experiment with civilians to train their vehicles versus funding research to build scientific evidence to assess environmental factors leading to safer AV, neighborhoods, and pedestrian interactions.

A final point of interest revolves around the significant findings on the presence of marked feature lanes, the proximity and length of bicycle lanes, and research discovering citizen's neighborhoods with increased 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). The 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 transit sensors versus marked lanes to manage mixed traffic. This research is far from complete and the government should support funding research rather than AV's rapid integration which provides drivers 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 a 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 indicate nascent technology and supports government delaying AV implementation until "standards of success" are achieved across manufacturers including 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 adversarial machine learning methods (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 successfully defeated state-of-the-art facial recognition algorithms (Garfinkel, 2017). Other methods even include disgruntle workers who plot to sabotage AV vehicles directly. Whatever the case, by government adopting a policy of carefully layering AV's integration it could help limit adverse events.

It has been four years since the death of a citizen by an AV in Arizona and now 29 states have legislation favoring AV's technology adoption. 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 support for AV rapid approval (Stilgoe, 2018, pg. 40). Corporate and regulatory statements also overlook the infancy of machine learning and the complexity of AV machines (Stilgoe, 2018, pg. 45). Overall, 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 machines "can explain" concretely what happened in an accident (Stilgoe, 2018, pg. 45).

Allowing time to mature machine learning algorithms will facilitate technology adoption and enabling marketing of retraining programs. Machine learning would clearly benefit from the additional mile data, safety would be given a higher priority, and truckers and taxi drivers would be provided the necessary resources to remain productive workforce participants.

Closing Statement

The government should consider prolonging AV's societal integration and begin immediate funding of trucker and taxi driver retraining programs. Since 2018 state legislation supporting AV integration has grown from 21 to 29 states with 9 additional states preparing legislation for 2020 (Stilgoe, 2019). Understanding the rapid adoption and impact of AVs on taxi drivers has precedence with Uber and Lyft's creative destruction but the 1.7 million long-haul truckers are less prepared and the government is woefully under-estimating costs and societal impact associated with displacement in both groups. When government and legislators acknowledge the unproven state of machine learning and prioritize AV's integration, American public safety interests are protected and a significant labor cohort is provided respect and dignity.

Questions to the Opposing Side with Expected Response Outcome

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 Debate Opposition 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 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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