

Citation information:

MLA: Applin, Sally. "Autonomous Vehicle Ethics: Stock or custom?." *IEEE Consumer Electronics Magazine* 6.3 (2017): 108-110.

APA; Applin, S. (2017). Autonomous Vehicle Ethics: Stock or custom?. *IEEE Consumer Electronics Magazine*, 6(3), 108-110.

Chicago: Applin, Sally. "Autonomous Vehicle Ethics: Stock or custom?." *IEEE Consumer Electronics Magazine* 6, no. 3 (2017): 108-110.

Harvard: Applin, S., 2017. Autonomous Vehicle Ethics: Stock or custom?. *IEEE Consumer Electronics Magazine*, 6(3), pp.108-110.

Vancouver: Applin S. Autonomous Vehicle Ethics: Stock or custom?. *IEEE Consumer Electronics Magazine*. 2017 Jul;6(3):108-10.

Pre-Pub Draft

Autonomous Vehicles Ethics: Stock or Custom?

Sally Applin, Ph.D.

A current challenge in the development of autonomous vehicles is in the programming of the ethics of their behavior.

One way to explore ethical issues of safety and deference when an autonomous vehicle is put in a situation where it must choose between two outcomes before it, has been to use the "Trolley Problem," a moral dilemma documented by Professor J.J. Thompson of M.I.T. [1]. In the Trolley Problem, a moral dilemma is issued: is it preferable to kill one person to save the lives of five others, or to do nothing, even if one knows that five people would die? The Trolley Problem suggests two choices: 1) that if a person is driving a trolley without functioning brakes, which is about to hit five people working on a track, would they steer the train down another track and just kill one workman or; 2) if someone is a bystander, given similar circumstances, would they pull a switch to kill one person working on the track, instead of the five people? As it turns out, Thompson declares that "most people" believe it is acceptable to divert a train away from killing five people, to kill only one, but in a variation involving pushing

someone onto the track to stop the trolley, it "would not be morally permissible for you to proceed, even if this would save five lives."

One issue with the Trolley Problem is that it omits the option of self-destruction. Would it be preferable to self-destruct rather than harm five people or even one person? Another issue is that of the author's use of "most people." Here is where cultural differences can emerge, for we must define which culture "most people" refers to. Some research has been conducted on cultural issues and the Trolley Problem. Hauser and Cushman et. al (2007) explore the dissociation between moral judgements and justifications [2], while Gold and Coleman et. al (2014) evaluated the idea of different cultural perceptions being used to resolving moral dilemmas, with the Trolley Problem being one part of an axis of various considerations, which include behavior and action as well as moral judgement [3]. While these studies do not suggest any definitive outcomes, it is worthwhile considering that different cultural and personal experiences could possibly impact one's ethical framework.

With traditional automobiles, manufacturers have made adjustments for international markets with regard to things such as where the steering wheel is placed (in countries where the driver's side differs from the country of manufacture) and other details and features respective to particular locales, cultures, as well as languages. Thus, while there is a global market for automobiles, they are adapted in particular ways for each country that purchases them. There can also be adaptations within the same country. While the Tesla seems to be able to drive in snow [4], one owner discovered that winter snow "road salt" lines, "confused" their autopilot [5]. This could be a design oversight of a car being developed in California and used in un-accounted for road conditions in another state.

As manufactures create autonomous vehicles and introduce them to a global road space, cultural considerations of algorithms become more important, as ethics are embedded in cultural behavior. Ethics for drivers in the current road space

are mapped to them as individuals within their cultures alongside the framework of the rules and laws of the road in their particular countries, states, and cities. Some people may superimpose their personal ethics on top of these cultural and legal ones, perhaps even unconsciously, when driving. When faced with a choice from the Trolley Problem, most drivers might avoid following the legal rules-of-the-road in an emergency, if it spared lives. For over a century, we've managed to drive reasonably successfully no matter where we are in the world. There are fatalities, but adherence to rules-of-the road in combination with continuously improving safety features have saved many more lives.

Generally, the cultural research with regard to the Trolley Problem explored the idea that different cultures may have ethical values that could be the same or different when considering outcomes from the Trolley Problem, and that this area required further exploration. Thus, at this juncture, we can only acknowledge that there can be individual differences with regard to how each of us resolves ethical dilemmas (if we consider ethics), and our own thoughts about ethics within the framework of the law (and even outside of it) no matter where we are located, or what culture we come from, or are living within.

The road space is already a highly heterogeneous cultural space in many locales. People move and relocate, keeping some old traditions and adopting new ones as they continue to be mobile, and cars move as well between local locales, and to distant locations. Most drivers on any road are licensed for their particular geographic location, and some or many not completely share culture with others on the road. We follow the rules-of-the-road, but our individual ethics may differ.

Human agency is our ability to choose from available options that unfold as circumstances change in time. Considering our heterogeneity and agency, we drive the roads together fairly well. Many accidents come from people not obeying the law, or taking unexpected agency, which in turn may cause circumstances requiring ethical consideration. This is where individual ethics impact driving conditions. Even if the roads today were comprised of all

autonomous vehicles, laws do differ between regions, and those vehicles would need to have programmed knowledge (or the ability to learn) the rules-of-the-road for various locales.

If someone was driven in their autonomous car from Los Angeles to Vancouver, they would pass through California, Oregon, and Washington in the US, as well as through British Columbia, in Canada. Their autonomous vehicle may pass through many municipalities with different laws from their area of origin. When the programming changes in an autonomous vehicle, how it knows local laws, and whether or not it could, or would, adjust its ethics from those in the US to those in Canada are open issues which will need to be resolved.

Thus, as we automate drivers and driving, ethics will need to be embedded into the software [6] that controls autonomous vehicles.

This will become a more complex task when autonomous vehicles are globally deployed, for just as people's ethics may vary by culture when evaluating potential outcomes from the Trolley Problem, these sensibilities may remain, even when a person isn't driving. Additionally, people may want their autonomous vehicles to reflect the ethics they would have selected, had they been driving themselves.

Autonomous vehicles with a singular ethics software package from the factory won't provide the flexibility to accommodate the human agency we have now, or the complex travel problem described in the road trip above. Today, if I am driving a car, my ethics, morals, and cultural background contribute to the decisions I make when I am confronted with circumstances outside of the usual law-abiding traffic. When someone else drives my car, for example, their ethics, morals, and cultural background will contribute to the decisions that they make. How an autonomous vehicle accounts for differences in ethics between people, and between geographical, or culturally different regions must be considered. If I rent an autonomous vehicle, whether or not I can set the ethics to my own values

if they are still within the law, or if must I use the ethics programmed into the software on the car, should be debated. This would extend for new and used car purchases as well.

To some extent, we forfeit ethical considerations when we ride with other drivers, in other vehicles at the moment of travel. We don't ask the train, bus, taxi, or ride-sharing operators and drivers what their ethics are before we climb aboard. But will this matter when we own or ride in autonomous vehicles, that we can't evaluate or review—and that we share no common culture or history with.

If ethics could be customizable in autonomous vehicles, the road space could become more or less fragmented depending upon who is driving—and where. What potential outcomes, opportunities, risk, and oversight would be needed, would also need to be evaluated.

The technology industry's role in manufacturing autonomous vehicles is different than their usual product production. When electronics and computer companies manufacture their products, they often rely on software in the form of operating systems to provide the user selection for "globalization" and local regional language options. For autonomous vehicles, these may also be set as software options, along with some way to account for local laws and traffic rules. This leaves driver/operator ethics unaccounted for in autonomous vehicles. Up until the present, the ethics for vehicles were embedded in the humans and the rules of the road, not in software, and not in the vehicle. This will change with autonomous vehicles, and as such, the opportunity for people to embed their own ethics in their own autonomous vehicles (or any other form of automated algorithmic assistance) may not be considered, or may be considered and discarded.

As long as cultures consider ethics in the fashioning of their laws, and manufacturers of autonomous vehicles consider these as they develop vehicles for a global market, there will be some protection for people, as long as they agree on

the ethics of how their particular locale resolves the Trolley Problem for them. Presently, we are able to disagree with the locale's ethics to suit our own needs, because we are driving, and can make our own ethical choices by taking agency when we need to. We will forfeit that option when we are being driven, and when we purchase or rent autonomous vehicles in their current designed state. However, if we make an effort to understand cultural requirements and ethical considerations in this context, we can include these in the ethics debate for the future programming of autonomous vehicles.

References

- [1] J. J. Thomson. (1985). "The Trolley Problem", *The Yale Law Journal*, vol. 94, no. 6, pp. 1395–1396, 1985.
- [2] M. Hauser, F. Cushman, L. Young, R. Kang-Xing Jin and J. Mikhail, "A Dissociation Between Moral Judgments and Justifications", *Mind & Language*, vol. 22, no. 1, pp. 1-21, 2007.
- [3] N. Gold, A. Colman and B. Pulford, "Cultural differences in responses to real-life and hypothetical trolley problems", *Judgment and Decision Making*, vol. 9, no. 1, pp. 65–76, 2014.
- [4] F. Lambert, "How Tesla's Autopilot is able to steer in the snow even without lane markings or lead vehicle", *Electrek*, 2016. [Online]. Available: <https://electrek.co/2016/12/28/tesla-autopilot-snow/>. [Accessed: 15-Mar-2017].
- [5] A. Webb, "The salt lines for tonight's storm is confusing the Tesla's autopilot", Twitter, 2017.[online]. Available: <https://twitter.com/amywebb/status/841292068488118273> . [Accessed: 15-Mar-2017].
- [6] S. Applin and M. Fischer, "New technologies and mixed-use convergence: How humans and algorithms are adapting to each other", in *2015 IEEE International Symposium on Technology and Society (ISTAS)*, Dublin, Ireland, 2015, pp. 4-7.

Bio:

Sally Applin earned her Ph.D. from the University of Kent at Canterbury, UK, working with the Centre for Social Anthropology and Computing (CSAC) where she researches the changing relationship between humans and algorithms, the impact of technology on culture, Maker culture, leading-edge technologies, and the outcomes of network

complexities as modeled by PolySocial Reality (PoSR). Sally holds a Masters degree from the graduate Interactive Telecommunications Program at NYU (ITP), and a BA in Conceptual Design from SFSU. Sally has had a career in the science museum design, computer software, telecommunications, innovation, insight, and product design/definition industries working as a Senior UX Designer, Senior Researcher, and Senior Consultant. Sally is an Associate Editor of the IEEE Consumer Electronics Magazine (Societal Impacts Section), a member of IoT Council (a think tank for the Internet of Things (IoT)), and a board member of the Edward H. and Rosamond B. Spicer Foundation.

Pre-pub Draft - Cite this work if you use it