

Autonomous Vehicles: An Ethical and Moral Dilemma

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1. Introduction

Self-driving autonomous vehicles are not far from being a reality. They will help decrease car accidents and congestion by removing human error from the equation. However, not all accidents are avoidable so autonomous vehicles will need to be programmed with a set of instructions to deal with accidents. This leads to a lot of ethical and moral dilemmas. Should the vehicle protect the owner at all costs, or follow a utilitarian doctrine by minimizing the death toll regardless of the owner's life? Moreover, who should be making those decisions and be held responsible for the actions made by an autonomous vehicle?

2. Summary: 'Autonomous vehicles need experimental ethics: are we ready for utilitarian cars?'

Bonnefon, Shariff & Rahwan (2015) argue that accidents involving autonomous vehicles are inevitable and some of these accidents will require the vehicle to choose the less harmful of the possible choices. In such an unavoidable situation, the vehicle could either sacrifice a passer-by to save several people, or sacrifice its owner in order to minimise harm. They propose that the best way to solve this dilemma is using a data-driven approach to identify the moral codes that people are prepared to accept and be subjected to, and as a result, they ran three studies with over 900 men and women participating. The results from the studies suggest that participants generally approve of an autonomous vehicle making utilitarian decisions in order to minimise harm in an accident. Also, participants praised the moral value of self-sacrifice, and were prepared to see it legally enforced for AVs albeit being unwilling (Bonnefon, Shariff & Rahwan 2015, pp. 5-8). These results, however, provide a very broad view of the moral issues as there could be other factors to be considered in the vehicle's moral algorithms. For instance, should the vehicle protect the passengers over others if there's a child on board? And, should manufacturers be allowed to offer different algorithms for buyers, and in that case, would the buyer be

held responsible for any possible accidents? Bonnefon, Shariff & Rahwan (2015) state that the results only provide key insights into what people expect from autonomous vehicles, however, as more and more companies advance into this field, it is vital to take these moral algorithms seriously.

3. Summary: 'Responsibility for crashes of autonomous vehicles: an ethical analysis'

Hevelke & Nida-Rümelin (2015) discuss the moral responsibility behind accidents caused by autonomous vehicles and the alternative approaches to deal with the issue: responsibility on the manufacturer, responsibility on the user or moral responsibility on the user. They argue that although holding the manufacturer responsible for any accidents caused by an autonomous vehicle may be the most obvious option, it may halt further development of autonomous vehicles. However, it is a moral obligation to continue the development of autonomous vehicles, if their introduction would not only cause the reduction of accidents and reduce the yearly death toll, but also enable the physically impaired, disabled or elderly to drive their own vehicles. An alternative approach would be to simply hold the driver responsible for any accidents involving his vehicle, and the liability would be the driver's failure to pay attention and intervene to prevent the accident as it is a moral obligation to enforce drivers to pay attention if it were to provide an additional level of safety. However, it begs the question: are humans capable of effectively intervening during accidents, or would they be doing more harm than good? Another approach would be to hold the driver morally responsible for any possible accidents, and it could be applied in two different ways. In one scenario, you could argue that a person driving an autonomous vehicle did nothing wrong but can be held responsible for the knowingly taking the risk of using such vehicle, meaning that the cost of the accident can be shared by all users of autonomous vehicles who took these risks in the form of a tax or insurance. On the other hand, it can be argued that only the person who took the risk should be blamed and held responsible for any accidents, however, this is an example of what is wrong with our current practice of ascribing blame when accidents happen. Hevelke & Nida-Rümelin (2015)

suggest that forcing drivers to intervene or holding them morally responsible are viable solutions to the issue. For the duty to intervene, the responsibility entirely depends on there being a chance for the driver to prevent an accident, otherwise, they should not be held accountable. As for holding them morally responsible, it can be only viable if it does not exceed the responsibility of taking the risk of using an autonomous vehicle and can be justified by holding all autonomous vehicle users collectively responsible.

4. Comparative Analysis

The paper by Bonnefon, Shariff & Rahwan (2015) draws attention to the moral and ethical issues behind any decisions made by autonomous vehicles in the case of accidents. It discusses situations similar to the Trolley Problem, where the vehicle will have to make the choice between saving the passenger or minimising harm. The paper was written by reliable authors as seen in the table below, and it was published online to the Cornell University library archive, arXiv, which is known for scientific papers in the field of mathematics, physics, computer science and more. Although it is not peer reviewed, submissions to arXiv are reviewed by moderators that can reject any non-scientific papers, and the moderator list is publicly available. Moreover, an author must be endorsed by an existing arXiv author before being allowed to submit any papers. The paper provides key insights into the ethical and moral issues, and discusses how the issues can be approached as we advance into the field of fully autonomous vehicles. It also briefly mentions the responsibility for the actions taken by the vehicles, but does not cover this aspect in great detail. One of the issues was the low sample size for the studies conducted, however, the authors acknowledged this in the paper. It is also one of the most recent scientific papers on this topic and has been cited by different credible sources such as the MIT Technology Review.

	Autonomous vehicles need experimental ethics: are we ready for utilitarian cars?	Responsibility for crashes of autonomous vehicles: an ethical analysis
Relevance	Discusses the ethical and moral issues behind decisions made by autonomous vehicles in accidents	Discusses the moral responsibility for the actions made by autonomous vehicles during an accident
Reliability	<p>Bonnefon is a research psychologist focusing on rational mind, Shariff is an assistant professor of psychology and Rahwan is an associate professor at the MIT Media Lab focusing on the intersection of computer and social sciences. Reliable and qualified authors.</p> <p>Unpublished scientific paper, non peer reviewed and cited by different credible sources, average reliability.</p>	<p>Hevelke and Nida-Rümelin are philosophers with works on responsibility and ethics. Reliable authors.</p> <p>Peer reviewed article and was published in a well-known scientific journal, very reliable.</p>
Accuracy	Agrees with widely available information, and is supported by reliable sources, however, results from the studies are not sufficient due to the low sample size	Agrees with widely available information, is supported by reliable sources, and research data is supported by quotes and stats
Lack of Bias	Authors are academics who do	Authors are academics who do

	not have a vested interest in the topic Provided a balanced view of the issues and solutions discussed	not have a known vested interest, and they acknowledge that the research received funding Provided a balanced view of the viable responsibility options
Completeness	Sufficiently covers most aspects of the topic and discusses solutions, but does not provide a lot of details regarding responsibility	Sufficiently covers the responsibility aspect of the topic, but does not discuss in detail the ethical issues in the decisions made by a vehicle
Up-to-date	Published online in October 2015, cited sources are up to date (2008-2015) and studies in the paper were conducted in June 2015	Published online in June 2014, and in print in 2015. The cited sources are up-to-date (2012-2015)

The article by Hevelke & Nida-Rümelin (2015) analyses the ethical and moral issues behind who holds the responsibility for actions taken by an autonomous vehicle during an accident, and discusses different approaches to this problem. The article does not discuss in detail the ethical and moral issues behind the actual decisions, but mainly who would be held accountable in the situation. As seen in the table above, the article was written by two credible philosophers with works relating to ethics. It is a peer reviewed article published in the Science & Engineering Ethics journal. Although the article covers the issues behind responsibility and liability, it lacks sufficient coverage of the ethical issues involved in the decisions made by the vehicle. It was originally published in 2014, making it another of the most recent articles on the topic.

5. Conclusion

In conclusion, each article sufficiently covers the ethical and moral issues regarding the aspect of autonomous vehicles it focuses on. People may be comfortable with utilitarian autonomous vehicles as they would save lives and minimise harm, however, they are not very willing to own a vehicle that may self-sacrifice the owner. As Bonnefon, Shariff & Rahwan (2015, p. 8) state 'people mostly agree on what should be done for the greater good of everyone, but it is in everybody's self-interest not to do it themselves'. It is also difficult to ascribe blame and hold people responsible when accidents happen with autonomous vehicles. Should drivers be punished for simply deciding to use an autonomous vehicle, or should they only be held morally responsible? As stated previously, these ethical and moral issues will need to be taken seriously by companies such as Google, Tesla and others who are working to advance in this field, and there should be a consensus on what moral principles will be programmed in autonomous vehicles.

6. Bibliography

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