

Dilemma and Solution of Intelligent Vehicle Tort Liability Regulation in The Post-Civil Code Era

Sai Liu*

2School of trade negotiations, Shanghai University of International Business and Economics, Shanghai, China

*Corresponding author: 13772426229@163.com

Abstract: Since the concept of "artificial intelligence" was first proposed in 1956, it has been applied in many fields, and China has also entered the era of artificial intelligence. Smart cars are developing more and more rapidly, bringing great convenience to people's lives, but they cannot completely avoid the risk of traffic accidents. After a smart car is involved in a traffic accident, how to allocate responsibility has become a difficult problem. Due to the autonomy of smart cars, existing laws do not seem to be able to fully solve this problem, and after the introduction of the Civil Code, it cannot solve it. Based on the research of relevant scholars, this paper clarifies the existing legal regulatory dilemma, and attempts to combine it with the classification standard of autonomous driving, so that the tort liability allocation of smart vehicles can be solved under the existing legal framework through the principle of grading proportionality.

Keywords: The regulatory dilemma, Tort Liability, Grading criteria.

1. Introduction

Traditional cars combined with artificial intelligence make self-driving cars a reality. In 2012, the United States issued the first driverless test license for Google cars, followed by relevant legislation on driverless cars, and self-driving cars were gradually integrated into people's daily lives. Apollo is an open platform for self-driving cars launched by Baidu, which has cooperated with Changsha, Chongqing, Cangzhou and other cities, and in September 2019, Baidu Apollo Vehicle-Road Collaborative Fleet Robotaxi started trial operation in Changsha. Although smart car technology is becoming more and more mature, it is not possible to completely avoid traffic accidents.

On January 20, 2016, Gao Yaning was driving a Tesla vehicle in "automatic driving mode" in the Handan section of the Beijing-Hong Kong-Macao Expressway when he was killed in a rear-end collision with a road sweeper in front. Gao Yaning's father, Gao Jubin, said in his lawsuit that the main reason for the crash was Tesla's self-driving function that Tesla has been exaggerating. One year after the trial of the case, Tesla confirmed that the vehicle was in a state of "automatic driving" at the time of the crash, which is the first case of death caused by automatic driving in China, which is representative. This case further makes us realize that smart cars have the risk of causing traffic accidents.

2. The Dilemma of Smart Car Infringement Determination and Existing Theories

The International Society of Automotive Engineers has developed a grading standard for autonomous driving, called J3016, which classifies autonomous driving technology into six levels L0-L5 according to the specific role played by the three main roles of (human) users, driving automation technology, and other vehicle systems and components in performing and taking over DDT. At level L0-L2, the driver has full control over the car (all the times): at level L0, it is completely driven by humans, without the intervention of the

automatic driving system; At level L1 is assisted driving, the autonomous driving system (ADS) can perform lateral or longitudinal vehicle motion control subtasks (not simultaneously), and L2 is partial driving automation, ADS can perform lateral and longitudinal vehicle motion control subtasks. At this time, ADS only plays an auxiliary role and does not dominate; However, from the L3 level, intelligent systems replace humans as the main force of driving, which can be called "automatic driving systems", from L3 to L5, the degree of automation is getting higher and higher.

2.1. The regulatory dilemma

Firstly, the attributes of traditional cars as "things" are very clear, so when pursuing liability for traffic accident infringement, they cannot directly claim from the car itself. Tort liability is often identified and allocated by holding the driver, car manufacturer or seller liable. However, the emergence of intelligent cars has shaken the attributes of the "things" of the car, intelligent cars are the product of "artificial intelligence + traditional cars", artificial intelligence is divided into three levels, that is, weak artificial intelligence as a tool, strong artificial intelligence similar to the human brain with autonomous consciousness and super artificial intelligence intelligent system beyond human beings belong to weak artificial intelligence at the L0-L2 level, and the L3 level begins to belong to strong artificial intelligence. With the improvement of the intelligence of intelligent cars, the view that intelligent cars have independent legal personality has emerged, and it is believed that intelligent cars can be directly regarded as the responsible subject. The legal status of smart cars is not yet clear, and the determination of tort liability must first solve this problem.

Second, China's traditional traffic laws and regulations are presupposed on human driving behavior, so the tort liability of the parties will be judged by the general driving duty of care. However, in traffic accidents caused by smart cars, it is often the intelligent system that partially or fully assumes the driving task. Especially since the L3 level, intelligent systems have increasingly replaced human control of vehicles, which will gradually lead to the social demise of the driver's role,

and the legal significance is that the driver's legal liability is reduced or gradually dissolved with the increase of the automation level of the driving system, and the current traffic accident tort liability system centered on the driving behavior of human drivers will be difficult to continue to apply.

2.1.1. The legal status is disputed

Regarding the legal status of smart cars, it can be roughly divided into three theories: object theory, compromise theory and subject theory.

Object theory believes that the essence of smart cars is still things. Although the simulated and extended "human intelligence" robot is quite intelligent, it does not have the human heart and spirituality, so the robot controlled by the civil subject—natural person or a collection of natural persons is not enough to obtain independent subject status. That is, the object theory believes that intelligent cars cannot be borne as the responsible subject, and the responsible subjects should be people, including natural persons and legal persons.

The compromise theory is that self-driving cars do not have special human emotional and physical characteristics, and do not have practical needs such as rest while working, and can be regarded as tireless machines, with the ability to act but not the right capacity, and the consequences caused by it belong to its owner. The compromise actually denies that the smart car itself can be the subject of responsibility.

The subject theory believes that artificial intelligence is an inevitable product of the development of human society to a certain stage, with a high degree of intelligence and independent behavioral decision-making ability, and its nature is different from traditional tools or agents. Intelligent cars are no longer tools that rely on human instructions, and it is more appropriate to define them as special subjects with the nature of intelligent tools and independent meanings [Zheng Zhifeng. Tort liability of self-driving cars in traffic accidents[J].Law,2018(4)]. The subject theory advocates giving smart cars an independent legal status. In this way, smart cars become responsible subjects will bear their own responsibilities, users and owners do not need to bear any responsibility, manufacturers may only need to solve the problem of smart cars' own source of funds.

The compromise is vague and does not clarify the attributes of smart cars; The basic condition of the subject theory is that the intelligent car can be responsible for the infringement and independently bear the liability for compensation, and the scholars who hold the subject theory advocate that the owner or producer jointly set up a compensation fund, which is used as the responsible property of the intelligent car. However, the substantive effect of this is to divide and concretize human assets, so that the person who should be responsible evades legal responsibility, and the producer even only needs to enjoy the benefits and does not need to bear equal responsibility for its damage. At present, the development of artificial intelligence has not yet reached the point where it is necessary to establish an independent legal personality, and the object theory should be adopted, and the intelligent car should be regarded as a "thing", so as to ultimately attribute it to people.

2.1.2. The regulatory dilemma of the existing legal system

At present, China's relevant laws and regulations on the determination of liability mainly include: the Tort Liability Part of 《The Civil Code of the People's Republic of China》; 《Road Traffic Safety Law of the People's Republic

of China》 (Road Traffic Safety Law); 《Product Quality Law of the People's Republic of China (Product Quality Law).

When the Road Traffic Safety Law was enacted, smart cars had not yet appeared, and legislation was carried out on the premise of human driving. First of all, Article 76 of the Road Traffic Safety Law does not specify the specific responsible entity in legislation, and only summarizes it in general terms with the vague concept of "motor vehicle party". The Interpretation of the Supreme People's Court on Several Issues Concerning the Application of Law in the Trial of Road Traffic Accident Damage Compensation Cases (hereinafter referred to as the "Interpretation") once mentioned: "The driver can only be a natural person, and the driver's license, drinking, illness and other factors are only for natural persons, so the 'user' in it should be renamed 'driver'." However, in a traffic accident of a smart car, there may not be a driver role, so it is difficult to directly identify the responsible subject. Secondly, the basic principles of attribution in the Road Traffic Safety Law are fault liability and no-fault liability, and some people believe that the amended Road Traffic Safety Law replaces no-fault liability with presumption of fault. No matter what kind of fault determination standard, human beings are the responsible bearers. Different from the manual driving of traditional cars, the driving autonomy of intelligent cars cuts off the control of traditional drivers to a certain extent, blocks the path connection between traditional drivers and traffic accident faults, and if no fault liability is directly applied, the owner or user is responsible for it, which is obviously unfair.

The Tort Liability Part of the Civil Code provides for fault liability and no-fault liability in the general provisions, which is similar to the Road Traffic Safety Law.

In Article 2 of the Product Quality Law, products are defined as products that have been processed, made and sold for sale. There is no dispute that traditional cars are "products", but there are different views on whether the intelligent systems in smart cars can be considered products. Whether software and digital information are products is still controversial, but the mainstream view seems to be positive and has not yet been explicitly stipulated in legislation.

China's "Product Quality Law" takes "unqualified product quality" as the basis of responsibility, adopts objective standards for product quality, and requires that national standards, industry standards or relevant health and safety indicators that can ensure the safety of people and property and physical health as the basis. For intelligent systems in smart cars, there is no uniform standard. Autonomous driving behavior through intelligent systems will be considered unpredictable because of the "black box" nature in its algorithm, and producers may use intelligent systems as an intervening factor to claim the blocking of causality based on the autonomy and unpredictability of intelligent systems, resulting in objective difficulties in identifying product defects.

The exemption clause in Article 41, paragraph 3 of the Product Quality Law is an easy to invoke successful clause for smart car designers and manufacturers. The clause stipulates that if there is no defect at the time of product circulation or the defect cannot be found according to the science and technology at that time, the manufacturer is exempt from liability. As a high-tech product, smart cars are more likely to be exempted by invoking exemptions based on the revolutionary and advanced nature of technology.

In summary, neither the Road Traffic Safety Law, the Civil Code nor the Product Quality Law can make a good regulation of the allocation of liability for infringement of smart cars, and further discussion is needed, first of all, it is necessary to clarify the legal status of intelligent vehicles - whether smart cars have independent legal personality and whether they can be used as responsible subjects.

2.2. Existing theories and their shortcomings

Interpretation by analogy is one of the common ways to close legal loopholes, and many scholars have tried to apply existing rules by analogy between smart cars and some existing infringement situations. Coexistence in elevator theory, autopilot theory of cars and airplanes or ships, animal theory, etc.

First of all, the elevator theory compares the intelligent car with the elevator, both of which automatically transport the passenger from here to the other, which can identify the intelligent car manufacturer as a common carrier, and the simple and crude analogy of the tort liability is obviously inappropriate, the elevator and the intelligent car have many differences, such as the two owners have different degrees of control over the object, the intelligent car is in a state of possession and can restore manual control, and the elevator occupants can only enter the terminal floor, it is difficult to say that they occupy the elevator; In addition, smart cars can recognize their surroundings and automatically make adjustments, which elevators do not have. In short, the elevator theory simplifies the tort liability of smart cars and is inconsistent with reality.

Second, some scholars have tried to infer that the user of the smart car needs to be liable for damage based on the similarities between smart cars and airplanes or ships, both with autopilot systems. However, this theory is also inappropriate, intelligent cars are different from the autopilot system of aircraft or ships, and the drivers of aircraft and ships have undergone highly professional training, while intelligent car drivers have not been professionally trained, and it is unreasonable to apply completely consistent responsibilities.

Finally, animal theory holds that damage caused by smart cars should be the same as the damage caused by raising animals should be borne by their owners or managers. Although smart cars and animals have similar characteristics that can act independently or cause damage without human intervention, the ultimate liability subject of animal tort is relatively single, generally the breeder, and the ultimate responsible subject of car damage is not only the owner and user, but also the producer and the seller. Therefore, animal theory also cannot solve the complex problem of infringement of smart cars.

In summary, due to the complexity and diversity of smart car technology, responsible subjects, etc., the above analogy cannot be applied to the responsibility division of smart cars. In order to solve the problem of the allocation of liability for smart cars, I believe that we should start from the root cause of accidents caused by smart cars and the obligations borne by relevant subjects, combine the "grading standards for autonomous driving technology", and clarify the allocation of tort liability for smart cars through graded proportional liability.

3. Suggestions for the Determination of Tort Liability of Intelligent Vehicles: Establish Graded Proportional Liability

As mentioned above, there are two major difficulties in the regulation of tort liability of smart cars: First, the legal status of smart cars is not clear, and whether smart cars themselves can be used as responsible subjects is controversial. On this issue, there is an object theory, a compromise theory and a subject theory, and after comparative analysis, I think we should adopt the object theory and still classify smart cars into the category of "things" without giving them an independent legal status. Therefore, for the first dilemma - the legal status of smart cars is not clear, there is an answer, smart cars as things of course cannot be liable; Second, traditional traffic laws and regulations are based on human drivers, and smart cars that gradually dissolve the driver's role seem to be inapplicable. As for this issue, the existing law is not completely inapplicable, but there are limitations, and on the basis of clarifying the obligations of the responsible subject, combined with the six-level classification standard, different levels of different responsibilities are applied, so that the current law is better applicable to the allocation of tort liability for smart cars.

First, clarify the respective obligations of the relevant responsible entities. First, the producer is the manufacturer's product safety obligation. Smart cars, like other products, require qualified product quality. In addition, Xu Yuanzhong also mentioned that manufacturers have risk warning obligations and risk prevention obligations. Risk warning obligations include: response obligations in complex environments and reminder obligations for manual intervention. The reason why China's first Tesla automatic driving caused the tragedy is that when the sweeper in front of it was identified, the automatic driving system did not make any response or remind manual intervention. Risk prevention obligations include protection against the risk of incorrect operation, simple and convenient intervention measures and minimal risk prevention measures. Second, the reasonable R&D obligations of the developer and designer. The legal obligation of developers is to complete the research and development and integration of the above technologies on the basis of the existing scientific and technological level, so that intelligent cars can achieve autonomous identification, automatic driving, and self-safety protection; At the same time, there should also be a clear reminder of the dangers of smart cars. However, since when driving in a smart car, developers may lose control of AI, and developers will claim intervening factors and thus not be liable for AI infringement. Third, the seller's reasonable warning obligation. Due to the characteristics of intelligent vehicles, sellers should fulfill the obligation of safety warnings and reminders, and all information about the vehicle, standardized operation methods, system updates and subsequent vehicle maintenance should be notified in clear written form. Fourth, the user's duty of care. It mainly includes three aspects: the obligation to drive safely, which requires the driver to maintain vigilance and attention during the operation of the vehicle, and the degree of attention gradually decreases with the increase of the level of autonomous driving technology. For example, at level 3, the vehicle performs most of the driving operations, and the human driver needs to maintain concentration in case of emergency, while at level 5, the vehicle performs all

driving operations without the human driver needing to maintain attention; Timely intervention obligation, when the intelligent car system issues a warning, the driver should intervene in time to avoid the danger caused by machine errors, and when the system issues a warning, and the driver ignores the damage and eventually leads to the occurrence, the responsibility belongs to the driver; Risk prevention obligations, timely update the system, do a good job of follow-up maintenance, and maintain the normal use of the vehicle.

Second, the distribution of graded proportional responsibilities is adopted according to the grading standard. At the L0 level, the vehicle is completely controlled by a person, and the relevant provisions of the Road Traffic Safety Law can be adopted, and the principle of fault applies. At Level 1-L2, the intelligent system is used by the driver as a tool for the driver, so it can be handled according to the traditional traffic accident. At levels 3-4, monitoring road conditions has been taken over by intelligent systems, where the driver only has the ability to control the emergency state, and the issue of proportional responsibility is involved. Based on the driver's degree of control over the vehicle and the rationality of the intelligent system's decision-making, the driver and the manufacturer bear joint and several liability externally, and the internal responsibility is proportionally distributed according to the performance of their respective obligations. At the L5 level, because the intelligent system fully controls the vehicle, the person is out of control of the vehicle, so the primary consideration is the reason for the intelligent car itself, the application of the Product Quality Law, whether the manufacturer has the above violation of the obligation that causes the vehicle to have defects, secondary consideration, whether it is due to the driver's violation of the obligation, such as the failure to maintain the car resulting in aging parts, failure to update the system leading to system decision-making errors. According to the different degrees of control of vehicles by different levels of intelligent systems, different liability allocations are applied to different levels, so as to divide the tort liability of intelligent vehicles into levels and enable them to be solved under the existing legal framework.

4. Summary

The characteristics of smart cars make it difficult to determine their legal status and deal with the accidents caused by traditional traffic laws and regulations, but the current law is not useless. On the basis of clarifying the obligations of the responsible entity, the graded proportional responsibility can be established in combination with the "Autonomous Driving Technology Grading Standard". When a smart car is involved

in a traffic accident, the first step is to determine the level of automatic driving, the second step is to apply the principle of attribution of the level, L0 and L5 are two extreme cases, respectively apply the Road Traffic Safety Law and the Product Liability Law, L1-L4 determines the allocation of responsibility in combination with the performance of the obligation by the responsible entity. However, there are still points that need to be clarified about their respective obligations, such as maintaining care and vigilance in the driver's obligation to drive safely, although the duty of care here requires that it is more relaxed than the obligations of traditional car drivers, but different levels of duty of care are also different, and there is no objective standard for judging to what extent the performance of the duty of care is achieved, which still needs to be clarified.

References

- [1] Ji Ruo Wang. Research on the typology of intelligent vehicle infringement. *Journal of Nanjing University*, 2020, 57(02): 120-131.
- [2] Zang Ji Hong, Xiao Jian Lan. Research on tort liability of autonomous vehicles. *Journal of Shanghai University*, 2019, 36(01): 16-31.
- [3] Yin Zhao Heng, Li Jian Qing. The Change of Roles and Responsibilities under the Threshold of Technical Intermediary. *Journal of Natural Dialectics*, 2018, 34(02): 37-41.
- [4] SHI Biao, LI Yu Xia, YU Xhuan, YAN Wang. Short-term load forecasting based on modified particle swarm optimizer and fuzzy neural network model. *Systems Engineering-Theory and Practice*, 2010, 30(1): 158-160.
- [5] Dylan Levalley. Autonomous Vehicle Liability—Application of Common Carrier Liability, 36 *Seattle University Law Review* 5, 2013.
- [6] Zheng Zhi Feng. Tort liability for traffic accidents in self-driving cars. *Law Science*, 2018, (04): 16-29.
- [7] XU Zhong Yuan. On the Tort Liability Legislation of Smart Cars. *Law Journal of 2019*, (04): 61-81.
- [8] Wang Li Ming, Tort Liability Law Research. Chinese Minmin University Press, 2011.
- [9] Wang Hong Xia, Liang Peng. Research on legal liability for damage caused by intelligent cars. *Times Jurisprudence*, 2021, 19(01): 33-45.
- [10] WU Han Dong. Institutional arrangements and legal regulation in the era of artificial intelligence. *Legal Science*, 2017, 35(05): 128-136.
- [11] Yuan Zeng. Artificial Intelligence Limited Legal Personality Review. *East Methodolog*, 2017.
- [12] Feng Jue. Civil Tort Liability for Damage Caused by Self-driving Cars. *China Law*, 2018, (06): 109-132.