

CIVIL LIABILITY AND ARTIFICIAL INTELLIGENCE: WHO IS RESPONSIBLE FOR DAMAGES CAUSED BY AUTONOMOUS INTELLIGENT SYSTEMS?*

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Abstract: The article has as its object of analysis the inquiries related to civil liability in cases where the damage is caused by systems equipped with artificial intelligence. With this intent, the study analyzes the possibility of considering the autonomous system responsible for the damage, as well as what are the essential requirements for the analysis of civil liability in these cases. In addition, the article proposes to understand how the exclusions of civil liability in the described situation work, in addition to making a consideration regarding the Bills of Law n° 5.051/2019 and n° 5.691/2019, in progress in the National Congress, which deal with the principles for the use of autonomous intelligence, as well as the incentives of the development of new technologies in the Brazilian territory. The study intends to emphasize that the rules of responsibility need to find a balance between protecting citizens from possible damage arising from activities carried out by an artificial intelligence system and allowing technological innovation. The methodology used was qualitative, with bibliographic and documentary research, as well as data collection in international organizations, published on the internet.

Keywords: Civil liability. Artificial Intelligence. Unforeseeable damages. Exclusions of civil liability.

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Resumo: O artigo possui por escopo as indagações relacionadas à responsabilidade civil nos casos em que o dano é ocasionado por sistemas dotados de inteligência artificial. Com esse intento, analisa a possibilidade de responsabilizar o próprio sistema autônomo pelo dano ocorrido, bem como os requisitos imprescindíveis para a análise da responsabilidade civil. Ademais, a seguir, o artigo propõe-se a descrever como funcionam as excludentes de responsabilidade civil em casos de erros cometidos pela inteligência artificial, além de realizar uma consideração acerca dos Projetos de Lei nº 5.051/2019 e nº 5.691/2019, que se encontram em tramitação no Congresso Nacional, e que tratam dos princípios para uso da inteligência autônoma e o estímulo ao desenvolvimento de novas tecnologias no território brasileiro. O estudo pretende ressaltar que as regras de responsabilidade precisam encontrar um equilíbrio entre proteger os cidadãos de possíveis danos oriundos de atividade realizada por um sistema de inteligência artificial e permitir a inovação tecnológica. A metodologia utilizada foi qualitativa, com pesquisa bibliográfica e documental, além de investigação em dados colhidos em organismos internacionais, veiculados na internet.

Palavras-chave: Responsabilidade civil. Inteligência artificial. Danos Imprevisíveis. Excludentes de responsabilidade civil.

1. Introduction.

The debate on artificial intelligence is not only restricted to the present times, since for many years fantasy has been nourished by reflections arising from the transformations that new technologies could bring to social relations. Samuel Butler, in 1872, with his novel *Erewhon*, had already introduced this theme, based on a text previously written by him, *Darwin among the machines*, which is considered by many to be the first text to suggest the possibility of machines constituting a more evolved natural realm and subjugating humans (DOS SANTOS, 2014).

There are also several examples in literature, dramaturgy and cinema which portray this theme. Mary Shelley's 1818 novel *Frankenstein: or the Modern Prometheus*, deals with the story of Victor Frankenstein, an ambitious scientist who decides to create a human being. As soon as the creature named Adam comes to life, he is abandoned and then goes on to look for its creator in order to seek answers to the rejection (SHELLEY, 1997). In dramaturgy, there is the play *R.U.R - Rossumovi Univerzální Roboti* by Karel Čapek, of great importance for inaugurating the term "robot", derived from the archaic Czech word "*robota*" (toil) which describes the obligatory work of the servant (HORÁKOVÁ; KELEMEN, 2009). In cinema, the film *2001: A Space Odyssey* (Stanley Kubrick, 1968) also deals with the issue of artificial

intelligence, since it brings as one of the main characters the supercomputer HAL 9000, who, although considered infallible, makes a mistake that endangers an entire crew of astronauts.

Not only inserted in fiction, the performance of artificial intelligence is noticeable in numerous aspects of the daily routine of individuals. This impact is therefore being studied and the intention is to understand this relationship and its consequences in the various areas of law. Likewise, this relationship leads to the issue of civil liability, which is presented with the purpose of ensuring a solution to deal with problems currently linked to situations where there is harm to others.

In cases related to the use of systems equipped with artificial intelligence, the discussion regarding the institute of civil liability can be quite complex, since the arrangements of the machines are very diverse, often odd. There is also the fact that the subjects who produce and/or handle such automata are many, as well as related to different areas, not just a single branch of knowledge. It is also part of the question to identify the level of autonomy of the robot, in order to properly understand which liability regime will be applied. This is therefore a real issue that has been debated by many countries, including Brazil.

As pointed out by the European Union (2020), the rules of civil liability have a dual role in our society: firstly, they ensure that victims of damage caused by other people are compensated and, secondly, they provide economic incentives for the responsible party to avoid causing such damage. Liability rules always need to strike a balance between protecting citizens from harm and allowing businesses to innovate.

This study, through qualitative methodology, based on bibliographic, documentary research and data collection in international organizations available on the Internet, raises the question of civil liability which is caused by damage resulting from an act committed by an autonomous intelligent system. Firstly, the article introduces the concept of artificial intelligence, as well as the European Parliament's basic perceptions of the relationship between civil law and robotics. Then, it is investigated whether it is possible to find the artificial intelligence system as liable for the damage caused, as well as what are the fundamental requirements for the analysis of civil liability in the aforementioned conjuncture. In addition, it ascertains the possibility of excluding civil liability in the mentioned cases and the existence of regulations, at national level, which deal with the subject. In conclusion, the need to find a balance between victim support and technological advancement is reiterated.

2. Civil liability arising in cases of errors caused by artificial intelligence

According to Nguyen et al. (2019), artificial intelligence is a technique which allows computers to mimic human behavior, including machine learning, natural language processing, language synthesis, computer vision, robotics, sensor analysis, optimization and simulation. In this conceptualization, Machine Learning is a subset of artificial intelligence techniques which allows computer systems to learn from previous experience, based on data observations, and improve their behavior in a certain task. Deep Learning, on the other hand, enables opportunities of deep apprenticeship with the use of neural networks and genetic algorithms to improve and optimize the use of instruments (TEFFÉ, 2019). In this way, machines which use this system can understand complex abstractions of data through a hierarchical learning process, as occurs with the human brain.

The concepts listed above are essential to demonstrate that the greater the autonomy of artificial intelligence, the less it can be considered only as an instrument or a mere tool. When identifying in artificial intelligence the property of self-learning, it is assumed that human control would be less and less present and, consequently, it is questioned who would be responsible for a mistake made by this autonomous intelligence.

In 2017, the European Parliament adopted a Resolution with Recommendations on Civil Law Rules on Robotics, which indicated the urgency of regulating the development of autonomous robots and suggested the formation of a kind of legal personality for robots, in addition to arguing that a possible solution to the complexity of assigning responsibility for the losses caused by the most autonomous robots could be a mandatory insurance scheme (UNIÃO EUROPEIA, 2017). Items 49-59 of the aforementioned Resolution deal with the issue of civil liability itself; item 51 was tasked with appealing to the committee "a proposal for a legislative instrument on legal questions related to the development and use of robotics and AI foreseeable in the next 10 to 15 years."

The above-mentioned resolution, in this sense, identifies the need to produce a new normative instrument which can regulate the cases where the damage originates from the activity of autonomous systems, since the tendency to consider the existence of a normative gap persists. Notwithstanding this inclination, it is understood that there is a basis for examining the problems related to the damage caused by artificial intelligence in civil liability. As Tepedino and Silva (2019) well state, the foundations for the guardianship of victims should not be sought in new diplomas, but in the existing order, able to ensure a better treatment for the issue.

In the national legal structure, only natural or legal persons are considered right holders and may enter into obligations. Although the damages caused by autonomous systems may occur unexpectedly, for Brazilian law, artificial intelligence is not understood as an autonomous entity, so it is not allowed to be held liable civilly. In this way, an analysis of existing civil liability regimes is necessary to understand the feasibility of flexibility of the doctrine in the face of conflicts that pose such a situation.

This scenario is recognized by the doctrine as having a gap in civil liability. Usually, the operator or manufacturer of the machine is considered responsible for the consequences of his intervention, but the investigation raised is precisely about cases where there is no way to know if there is an individual fault in question. That's what the doctrine says:

[...] These AI may both function and be used as intended but still cause an injury that neither the consumer nor the manufacturer foresaw—an injury that was not within the product's original capabilities at the time of purchase. This creates a **liability gap**. (SWANSON, 2004, emphasis added).

Traditionally, civil liability is based on a disputed obligation by law to make good the possible damage caused to others. One perceives the presence of an original juridical duty, whose violation generates a secondary juridical duty, which is to indemnify the damage. It may be contractual, which involves a contract signed by the parties involved, or extracontractual, in which there is no contractual link between the agent and the victim.

Liability has as core element a voluntary conduct that violates a legal duty, which makes it possible to divide it into different species, depending on where the duty comes from and what the subjective element of that conduct is (CAVALIERI FILHO, 2012, p. 15). The analysis of civil liability in cases where the agent causing the damage is equipped with artificial intelligence goes through the analysis of numerous considerations, related to unpredictable damage, the possibility of holding an autonomous system accountable (*machina delinquere potest*) and also the exclusions of civil liability.

3. Unforeseeable damages and bugs: is it possible to hold an autonomous system accountable (*machina delinquere potest*)?

The European Parliament Resolution of 16 February 2017 demonstrates in its introductory considerations the concern about possible unpredictable acts coming from artificial intelligence, as verified in the topic AI: "[...] insofar as they can be equipped with adaptive and

learning abilities entailing a certain degree of unpredictability in their behaviour, since those robots would autonomously learn from their own variable experience and interact with their environment in a unique and unforeseeable manner" (UNIÃO EUROPEIA, 2017). Thus, it is a common feature in self-learning robots the propensity to perform autonomous acts, which can hypothetically lead to damage.

Matthias (2004) defends the idea that at the same level where the intervention of the creator on the machine diminishes, the influence of the operating environment increases. This strengthens the capacity of systems to make decisions and produce unpredictable results, both by programmers and users. Such unpredictability also occurs in establishing what is considered an error in the code of a program which causes its malfunction, the bug.

The unpredictable acts performed by artificial intelligence systems increase the doubt in what concerns the inquiry about the possibility of holding an autonomous system accountable for an unpredictable act. However, it should be noted that the signs of acceptance of this idea are still very weak, since they come from some initiatives that aim more at marketing. Despite this, these measures may anticipate future trends, such as Saudi Arabia's decision to grant citizenship to the sophisticated android Sophia, or the decision of Tokyo City Council to recognise the residence of a chatbot, Shibuya Mirai, capable of dialogue, with the skills and abilities of a seven-year-old boy, with all his "fellow citizens" (BASILE, 2019). In Brazil, the possibility of taking responsibility for a system with artificial intelligence until then is not a reality.

4. Essential requirements for civil liability analysis in cases of errors made by artificial intelligence

Civil liability is decomposed in the elements conduct - positive or negative -, damage and causal relation, the latter being the link between the first two. Thus, for there to be a duty to indemnify, the damage must be due to the agent's conduct. Since the Brazilian Civil Code of 1916, it is understood that this duty can only be imputed to the agent whose conduct is, directly and immediately, the cause of the damage. It is the theory adopted by the current Brazilian Civil Code, according to its art. 403, extended to non-contractual liability (SCHREIBER, 2007). According to Cruz (2005), the theory that was successful in trying to explain the conception of "direct and immediate" was that of the necessity of the cause (*necessariedade da causa*), formulated by Dumoulin and Pothier, considered a subtheory. According to this theory, the duty

to repair occurs only when the damage is an essential effect of a given cause, thus, although there are several factors that contribute to the damage, not all of them are causes. The causal relation, therefore, is not interrupted by temporal distance, but by the emergence of distinct cause. Hence the direct and immediate cause is not always the closest to the harm, but the one that necessarily brought it into a judgment of logical proximity.

The element of guilt, for a long time, was regarded as a presupposition of civil liability; however, with the appearance of new theories, it received different treatment by the doctrine and by the legislator. Gagliano (2015) presents it as what comes from the failure to observe a duty of conduct, previously exposed by the legal order in attention to social peace.

Maria Helena Diniz (2007, p. 13) states that guilt cannot be removed from the idea of liability only for the emergence of risk. According to her, guilt remains the basis of liability, and is also at its side as a basis for civil liability. There will be an obligation to repair the damage, according to Diniz, regardless of guilt, in cases specified by law, or where the activity normally carried out by the plaintiff implies, by its nature, risk to the rights of others.

In summary, the regime of subjective civil liability is embedded in art. 186 of the Brazilian Civil Code, which contains a general clause of liability for guilt, whereas art. 187 determines a general clause of illicitness of objective nature (REINIG; CARNAÚBA, 2016). The Brazilian legislation adopted the theory of objective liability also in relation to consumer rights.

Afastando-se, por conseguinte, do direito tradicional, o Código dá um fundamento objetivo ao dever de indenizar. Não mais importa se o responsável legal agiu com culpa (imprudência, negligência ou imperícia) ao colocar no mercado produto ou serviço defeituoso. É que a responsabilidade civil sem culpa, conquanto de natureza excepcional, se impõe no campo das relações de consumo como único meio efetivo de se viabilizar na prática o direito do consumidor (aquele que não tem como repassar seus prejuízos) ser indenizado quando lesado pela persuasão oculta ou pelos sutis comportamentos de mercado lesivo ao interesse geral (BENJAMIN, 1991).³

On the basis of these considerations, it is essential to define first of all the civil liability regime applicable to damage resulting from the acts of systems provided with artificial intelligence, that is, whether they fall within the subjective or the objective regime. The subjective regime is considered, in principle, when there are no presuppositions to fit the

³ Therefore, departing from traditional law, the Code gives an objective foundation to the duty to indemnify. It no longer matters if the legal guardian acted with guilt (recklessness, negligence or malpractice) when placing a defective product or service on the market. The civil liability without guilt, although of an exceptional nature, imposes itself in the field of consumer relations as the only effective means of making the consumer's right (in practice, the one who cannot pass on his losses) viable to be compensated when injured by persuasion hidden or by the subtle market behaviors harmful to the general interest (BENJAMIN, 1991).

objective liability. In this sense, it is imperative to examine the behavior of the person responsible for the intelligent system that caused the damage, since it is necessary to inquire about the reference standard for measuring the culprit conduct; the degree of intervention on the system in the analysis of user accountability; in addition to the question of the need to adopt different criteria for investigating the fault of the user and the fault of the system developer (TEPEDINO; SILVA, 2019). It is also important to analyze the importance of the user's actions and whether their interference on the system can increase their burden of liability in relation to the harmful event. Moreover, as already explained, even if the artificial system has acted directly, it is not the one who should be held responsible.

5. Exclusionaries of civil liability in cases related to artificial intelligence

In the event of framing the applicable regime as that of subjective liability, it is also pertinent to analyze the possible application of the exclusionaries of civil liability in those situations where the damages are practiced by intelligent systems. In summary, the exclusionaries occur in situations where, with the attack on one of the assumptions of liability, the causal link is considered broken, which does not generate the right to compensation.

The exclusionaries of civil liability are state of necessity; legitimate defense; regular exercise of the right; strict performance of legal duty; exclusive fault of the victim; fact of third; and unforeseeable case and force majeure. In this sense, it is questioned, for example, if a system equipped with artificial intelligence, when causing an accident in a state of necessity, would obtain the same traditional framework of this cause of exclusion of illicitness.

In these cases, despite technological innovations, these issues continue to return to the usual civil liability, that is, the case is analyzed with the usual view, without entering into the technological particularities of the issue. In this sense, the application of discipline already applicable to human drivers occurs, for example, in relation to autonomous cars (RUFFOLO, 2017, p. 40-41).

6. Considerations regarding regulations on artificial intelligence in Brazil

The European Commission established in 2018 an expert group on artificial intelligence, responsible for formulating the *Ethics Guidelines for Trustworthy AI*, in April 2019. Such guidelines are very important for the development of the debate on artificial intelligence and

they have as a premise the understanding that artificial intelligence, to be reliable, must be legal, ethical and solid (EUROPEAN COMMISSION, 2019).

According to Matsuda, Kudo and Konishi (2009), the Japanese government and private sector are investing heavily in artificial intelligence technologies. Several policy and funding programs are being implemented by government authorities. The Japanese government announced a general policy on the use of artificial intelligence and the Internet of Things, and discussions are being held focusing on certain important legal issues.

Legal debates on artificial intelligence are not restricted to the international level alone, even though they do not have the same influence at national level. For example, the Science and Technology Commission approved a public hearing request to discuss the subject of artificial intelligence in Brazil. Thus, the Brazilian Senate analyzes two bills or law on this issue, both presented by Senator Styvenson Valentim, the Bill nº 5.051/2019, which provides on the definition of the principles for the use of artificial intelligence in Brazil, and the Bill nº 5.691/2019, establishing the National Artificial Intelligence Policy (AGÊNCIA SENADO, 2020).

The two bills above aim to create an initial understanding of what an artificial intelligence which respects human rights and human dignity would be. According to the justification of Bill nº 5.051/2019, despite the advantages that artificial intelligence can bring, there are also risks associated with its adoption, and therefore, one cannot, in an inconsequential way, adopt artificial intelligence without a minimum regulation that brings the necessary guarantees for this transition (BRASIL, 2019). The justification of the Bill nº 5.691/2019 addresses the fact that autonomous intelligence can increase productivity by up to 40%, as well as the fact that it allows the optimization of time (BRASIL, 2019).

In this sense, we return to the perspective already understood by the European Commission regarding the dual role that civil liability rules have. They are important for ensuring compensation to the victims and, on the other hand, they have an economic and productivity function. Therefore, Bills nº 5.051/2019 and nº 5.691/2019, promote the soil to establish the basic principles for the proper use of artificial intelligence systems. However, it must be understood that such laws must work in order to guarantee basic assistance, but Civil Law still proves capable of answering other questions that may eventually arise related to the damage caused by systems provided with artificial intelligence.

7. Conclusion

Artificial intelligence transformations are inevitable and provide significant changes in everyday life. However, it is also possible for these autonomous systems to cause damage, which leads to a series of inquiries, which are also present in matters of civil liability.

The study presented several possibilities for understanding this issue, as well as it concluded the feasibility of the legal system itself to assess such situations in which the damage caused is the result of an act performed by an artificial intelligence system, without the need to formulate paradigms that can deal with the matter in an unsystematic and sparse way.

Despite this, the perfectioning of the study is indispensable, since it promotes the improvement of the debate and decisions on the subject, which are gradually more present. The new legislative efforts aimed at guaranteeing principles for the proper use of artificial intelligence and stimulating the progress of the formation of a favorable environment to the development of new technologies are proof that the technical/ legal transformations in the national territory, which are only in the initial phase, are essential to found the basis for the discussion of the issue.

It is pointed out, in conclusion, that the dogmatic of civil liability should act in order to grant to the victims of the mentioned damages the compensation of the losses generated, with the solution to their inquiries and legal demands. It is necessary, however, in order to provide the balance between indemnity and compensation with economy and productivity, to also think in the conciliation of such urgency with the evolution of science and technology, which needs these answers in order to promote technological progress. Only through such a balanced association will it be possible to ensure that the new autonomous systems evolve in the direction of providing innovations that are increasingly useful to humanity and increasingly less accompanied by seemingly insurmountable or difficult-to-solve issues.

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