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Human machine interaction and legal information in the autonomous vehicles: the opportunity of the legal design

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Abstract

The paper deals with the relationship between language and law and then examines the connection between autonomous driving and law. Therefore, the fundamental question includes both what are the best ways of transmitting legal information within autonomous vehicles as well as their correct understanding.

The issue of the lack of clarity of information from the private law point of view will then be addressed, focusing on the issue of error in view of an evolution of the category.

In this context it is considerable of the role of design and in particular of legal design, as a possible remedy to the communication deficit of legal information provided by the vehicle. In fact the solution can be seen in the opportunity to design human machine interfaces, which - also through an acoustic signaling, visual or tactile - provide clearly and unambiguously legal information on the autonomous vehicle. This in order to guarantee a security by design and to ensure support and mutual learning between the machine and the user.

Keywords: Automation - Autonomous vehicles - Human Machine Interaction - Legal information - Law by design - Legal design - Methodology - Interdisciplinary research.

Summary: Introduction. – 1. Autonomous driving as a multimedia habitat. – 2. The relationship between language and law. – 2.1. Legal information in autonomous vehicles. – 3. Data protection issues. – 4. Another example of potentially missing information: Adaptive Cruise Control and Child Presence detection. – 5. The lack of clarity of the information from a private law point of view: linguistic error vs obstacle/defective error in view of the evolution of the category. – 6. Hypothesis of solution in the design: the legal design methodology. – Conclusions.

Introduction.

The development of the new Internet Of Things (IOT) and Artificial Intelligence (AI) technologies will have a strong impact especially in the automotive field. In fact, the car of the future will consist of four essential elements: connection, electricity, autonomy and sharing[1].

In particular for the realization of autonomous driving it will be necessary to adopt technologies of connection V2X[2]. Vehicles will be equipped with high-performance communication systems to allow a continuous exchange of data between vehicles, roadside infrastructure and pedestrians. This level of connection will increase the ability to perceive

[1] 'Smart & Connected Car: un mercato da 1,2 miliardi' (2020), available on *https://www.osservatori.net/it/ricerche/comunicati-stampa/smart-connected-car-un-mercato-da-1-2-miliardi.*

[2] V2X (*Vehicle-to-everything*) is a system of communication of information between a vehicle to any entity that can influence the vehicle and vice versa.

the environment and coordinate manoeuvres in complex scenarios. All this should translate into safer, sustainable and efficient mobility.

Vehicles will be smarter and more autonomous, as will be seen below, but also shared. In fact, new forms of car sharing will develop.

This question requires a necessary reflection on the legal aspects that will characterise the automotive field.

1. Autonomous driving as a multimedia habitat.

Recently, automation is rapidly developing, and becoming a constant in everyday life, therefore it is no longer a question of a remote and future possibility but of a concrete reality.

In particular, technological development is producing remarkable results in the automotive field where new technologies have enabled vehicles to be equipped with useful systems to facilitate machine control and to support driver activities.

An autonomous vehicle (AV) is capable of moving safely with partial or no human help thanks to a complex system of sensors, software, etc. For this, the autonomous vehicle could be referred to as a multimedia habitat. All these components of the autonomous vehicles are capable of processing a huge amount of data in order to use them through the different multimedia systems characterizing the concept of the AV. That is enough to include AV in the concept of "multimedia habitat".

ADAS[3] (Advanced Driver Assistance Systems) do not take control of the vehicle but they merely assist the person who is driving at that time.

In 2019, the European Parliament adopted a Legislative Resolution on the proposal for a Regulation of the European Parliament and of the Council which established that in Europe will be mandatory the adoption of ADAS systems in vehicles to protect passengers, pedestrians and cyclists[4].This will also have real safety benefits.

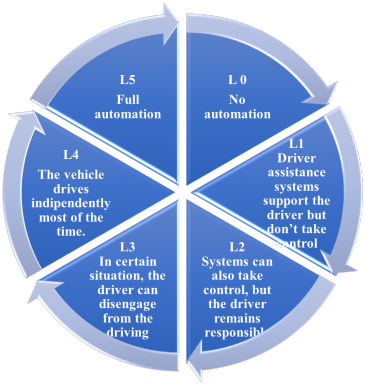
The European Parliament has confirmed that most of these systems will have to be adopted by all new approval models introduced on the market from May 2022. The new equipment will become mandatory from May 2024 for all the cars that are already on the market.

As regards autonomous driving, in 2014, SAE International (Society of Automotive Engineers) published an international standard that defined six different levels for

[3] ADAS are driving aid systems with effects on the driving choices of individual vehicles (driving behaviour) or vehicle sets. They are generally oriented to safety (active and preventive) and driver comfort. ADAS systems improve road safety by reducing the number of accidents and have an immediate indirect effect on the condition of the vehicle currents. On the point: *http://www.mit.gov.it/mit/mop_all.php?p_id=17684*.

[4] The mandatory ADAS (Advanced Driver Assistance System) will be: adaptive speed control; driver fatigue detection; engine start; adaptive speed control; driver fatigue detection; engine start after breathalyzer; automatic emergency braking; black box; running lane maintenance; collision avoidance with pedestrians and cyclists; distance detection; tyre pressure monitoring.
A study of SBD Automotive has found that in 2025 the European market of the ADAS will grow 70% and will be worth approximately 3,71 billion euros. To deepen: *https://www.ilsole24ore.com/art/nel-2025-mercato-europeo-adas-varra-371-miliardi-euro-ACpjm0K*

autonomous driving[5]. The classification is based on how much the driver has to take action, rather than on the capabilities of the vehicle.



Level 0: a traditional car with the exception of automatic emergency braking, which blocks the car when the sensors detect an obstacle in front of the vehicle.

Level 1 (Driver Assistance): the vehicle features a single automated system for driver assistance, such as steering or accelerating (cruise control).

Level 2 (Partial Driving Automation): the vehicle can control both steering and accelerating/decelerating. Here the automation falls short of self-driving because a human sits in the driver's seat and can take control of the car at any time.

Level 3 (Conditional Driving Automation): vehicles have "environmental detection" capabilities and can make informed decisions for themselves, such as accelerating past a slow-moving vehicle. But they still require human override.

Level 4 (High Driving Automation): these cars do not require human interaction in most circumstances. However, a human still has the option to manually override. Level 4 vehicles can operate in self-driving mode. Anyway, until legislation and infrastructure evolves, they can only use them within a limited area.

Level 5 (Full Driving Automation): vehicles do not require human attention. Level 5 cars won't even have steering wheels or acceleration/braking pedals. They will be free from geofencing, able to go everywhere and do everything that an experienced human driver can do.

Indeed, some international surveys highlighted that half of the participants showed distrust of autonomous driving and more than a third showed some anxiety. Concerns were mainly due to the fact that people do not trust the car enough to leave full control, especially in the emergency situations.

This means that the success of future automation systems will necessarily depend on the ability of manufacturers to create a solid human-machine team as well as on the quality of interaction, communication and cooperation, to achieve safety, efficiency and comfort. This cooperation has above all the purpose of increasing confidence in the multimedia habitat represented by humans and vehicles, to fully exploit the potential of automation to improve human life.

Accordingly, in the design of a complex socio-technical and high automation system such as the partial or total autonomous vehicle, an approach that places the human factor at the center cannot be ignored, particularly when it comes to its user interface design. In this context emerges the importance of the design focused on the human-machine relationship, as a suitable methodology to guarantee an effective human-machine cooperation.

2. The relationship between language and law.

What is the connection between autonomous driving and law? Law and automation both "work" with information. The law is a set of information, which need to be transmitted; in fact, legal studies have always revolved around the ways in which human beings process, share and use information[6].

Legal logic has always been a matter of study, but now more than a capacity for

[5] See *https://www.sae.org/news/2019/01/sae-updates-j3016-automated-driving-graphic.*
[6] R Caterina, *I fondamenti cognitivi del diritto* (Mondadori 2008) 1.

"persuasion" with good rhetoric, we need a strong logic to teach a robot[7].

The key issue is the best way of providing information and its correct understanding. Therefore, the solution requires that the conditions are created for these choices to be weighted, aware, informed.

This approach necessarily implies a close dialogue with the cognitive sciences and must be at the basis of the design of autonomous driving.

In support of the need for an interdisciplinary dialogue between law and the cognitive sciences, it should be considered that the jurist, who handles knowledge, decision or will problems on a daily basis, must decide whether the notions of common sense can be supplemented by the teachings of cognitive sciences.

The jurist who deals with informed consent cannot ignore some psychology issues such as factors that influence a decision[8]. Hence, the law must have a pragmatic approach, especially attentive to the way cognitive and decision-making processes are carried out.

This need to consider knowledge in the cognitive field is very clear, for example, in the field of consumer protection. Article 5, 3, consumer code[9], in fact, that provided the information to the consumer, must be communicated in a clear and understandable way, such as to ensure the awareness of the consumer, and also taking into account how the contract is concluded or the characteristics of the sector.

For this purpose, information requirements are introduced for undertakings. However, the question arises of how to modulate the content of these obligations, both in relation to the amount and quality of the information to be provided to the consumer, and in relation to the concrete ways of expression which must convey this information, considering the cognitive limitations that afflict the recipient of the communication.

The results of the psychology studies of the decision can be relevant in identifying the correct methods of communication of the information necessary to level asymmetries where consumers are in disadvantage compared to professionals.

Cognitive psychology has demonstrated the existence of a number of strategies that individuals employ in dealing with decisions. It whether such decisions are made in a state of uncertainty or lack of information[10], such if these are taken in environments whose information rate is so high that it puts in crisis the analytical skills of the individual[11].

Consequently, the law must necessarily study the cognitive structures of language and language itself, establishing a parallelism with the latter.

This assertion applies to all the words, spoken or written, of laws, judicial decisions, agreements between individuals, etc.

Thus, the problem of the law is fully identified with the problem of language[12].

The stability and continuity of the meanings that words take on gives rise to the trust of all the members of the linguistic community. Hence, the addressees of the legal provision

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[7] C Morelli, 'Avvocato 4.0: un mare di buone letture' (2020) available on *https://www.altalex.com/documents/news/2020/08/03/avvocato-4-0-un-mare-di-buone-letture.*

[8] R Caterina, *I fondamenti cognitivi del diritto* (Mondadori 2008) 4.

[9] Article 5,3 of Legislative Decree, 6.09.2005, n. 206 (consumer code): "*Information to the consumer, from whomsoever it originates, must be adapted to the communication technique used and expressed in a clear and comprehensible way, also taking into account the modalities of conclusion of the contract or the characteristics of the sector, such as to ensure consumer awareness*".

[10] D Kahneman, P. Slovic, A Tversky, *Judgment Under Uncertainty: Heuristic and Biases*, (Cambridge University Press 1982).

[11] A Tversky, D Kahneman, 'Availability: A Heuristic for Judging Frequency and Probability' (1973) 5 Cognitive Psychology, 207,232; D Kahneman, A Tversky, 'Prospect Theory: An Analysis of decision Under Risk' (1979) 47 Econometria, 263,291; D Kahneman, JL Knetsch, RT Thaler, 'Experimental Test of the Endowment Effect and the Coase Theorem' (1990) 98 Journal of Political Economy, 1325,1348.

[12] N Irti, *Riconoscersi nella parola* (Il Mulino 2020) 81.

trust that the words used by the legislator are bearers of a firm content[13].

2.1 Legal information in autonomous vehicles.

From now on, the paper examines the question of the "information" that are provided to autonomous vehicles in order to enable them to function.

Connected and Autonomous Vehicles (CAVS) are capable of communicating and receiving data from the external environment, road infrastructure and other vehicles through the use of state-of-the-art cameras, sensors and technologies, and then rework them through a software that can replace the driver in the performance of part or total of certain driving functions[14].

It follows that, if at present models of cars equipped with assisted driving functions are available[15] allowing automatic management of manoeuvres such as parking, anti-lock braking systems or adaptive cruise control. It is now possible to imagine the next arrival of fully automated cars, in which the human driver, completely replaced by the on-board software, will be nothing more than a mere passenger, almost as if using a train or an airplane and this would be the third level of automation.

The driver - passenger continues to play a leading role. In fact despite such a level of automation, the driver has to maintain a constant and maximum alert status, even when the vehicle is being monitored by the on-board software. The driver has to resume immediately driving whenever he is instructed to do by the programme or if there are circumstances that require it[16].

In this case, it is necessary to exploit again the interdisciplinary approach that analyses the mechanisms, the causes, the effects of the phenomenon of "human error" to try to finally answer the question whether it is possible to circumscribe with certainty a legal regime of error.

To understand how liability is defined, it is noted that there is a strong correlation between the risk of a road accident and the error made by the driver of the vehicle[17].

A study was conducted in the USA in 2016[18] analysis and monitoring of road accidents that has ascertained how the behaviour of the driver contributes to the accident. The study found that out of 905 accidents during the observation period, 87.7% had at least one error, mostly due to certain situations:

- non-optimal state of the driver, compromise by effect of alcohol or drugs; tiredness, sleep stroke, emotional state (crying, anger, sadness, agitation). In particular, the non-optimal driver conditions increase the risk of an accident by 5 times. In the case of drunk driving, the risk would increase by 36 times more. The emotional state of

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[13] Ibid 87-88.

[14] This refers to vehicles with V2X (vehicle-to-everything) connection technology, which incorporate V2V (vehicle-to-vehicle) and V2I (vehicle-to-infrastructure) technologies partly already existing on the market and with varying application not only in the field of road traffic but also aeronautical and maritime.
For further information see: S Pellegatta, 'Autonomous Driving and Civil Liability: The Italian Perspective', (2019) Giureta - Riv. dir. econ. trasp. amb., 135 ff.; MC Gaeta, *Liability rules and self-driving cars: The evolution of tort law in the light of new technologies* (Editoriale Scientifica 2019).

[15] Driver assistance: functions involving partially or fully automated driving, such as operational assistance or autopilot in heavy traffic, in parking, or on highways. See: European Data Protection Board, *Guidelines 1/2020 on processing personal data in the context of connected vehicles and mobility related applications*, adopted on 28 January 2020.

[16] R Lobianco, 'Veicoli a guida autonoma e responsabilità civile: regime attuale e prospettive di riforma' (2019) 3 Responsabilità Civile e Previdenza, 724.

[17] L Bensalah, 'Errare humanum est. L'errore nel diritto tra intenzionalità, razionalità, ed emozioni', (2018) 45 Trento Law and technology, Research Group Student Paper, 83,86.

[18] The study was conducted by the Virginia Tech Transportation Institute, "Dingus 2016". See: *https://www.internazionale.it/scienza/2016/02/27/incidenti-auto-motivi*

sadness or agitation increases the risk by about 10 times.
- Driver performance error.
- Temporary error of judgement (distances, timing, speed).
- Distraction (use of devices; interaction with passengers; external factors). The distraction of drivers would double the risk of accidents.

In Italy the subject is particularly important, so that two new crimes have recently been introduced in the context of road accidents. In fact, the L. n. 41/2016 introduced the article 589 *bis* of criminal code "Road murder" and article 590 of criminal code "Serious or very serious personal injury".

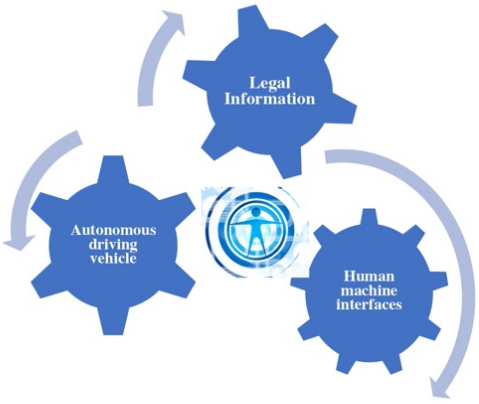
The European Commission in 2015 published a report aimed at suggesting to road safety professionals some good practices to reduce the risk of road accidents, considering the constant increase of the phenomenon of distraction and the commission of errors in the conduct of road vehicles.

Among the indications:
- wireless technologies and applications to reduce driver-device interaction;
- systems to limit distraction such as collision warning signals, lane departure warning, emergency brakes;
- educational and enforcement actions to monitor the application of existing laws;
- mobile phone call locking systems and advanced driver warning systems;
- drafting of common guidelines for the automotive and telecommunications industries with a view to defining standards for the installation of man-vehicle interface systems, of functions for the blocking of calls from mobile phones, of wireless devices on the dashboard of the car.

This, however, is a reasoning valid only up to the third level of automation. From the fourth level of automation, in fact, the driver would end up concretely losing his distinction from the simple passenger. Already at this stage the vehicle will be fully operated by the on-board software for the entire duration of the journey, without having to comply with the same obligations as in the case of a level 3 AV.

However, the scenario of the CAV level 4 calls for reflection. If with a level 3 CAV the information is provided to the pilot software and the driver must constantly remain on "alert", with a higher level CAV the human action should stop the entry of data, ie information, several of which have legal character, and to their transmission (including between autonomous vehicle and passenger-driver).

The fact that the legal information is not clear and immediate in its understanding contrasts with the need to guarantee a high degree of situation awareness in the operational framework of the user. In particular, inside the vehicle where the human machine interfaces provides legal information that communicates an obligation to be respected (and precisely on: privacy and data protection; shared control; support and mutual learning).



3. Data protection issues.

It is necessary to consider an aspect of the matter: the processing of data in autonomous driving and the awareness of the user on it.

On the point it was selected and analyzed an use case from the *AutoMate* project, in a separate paper. In particular, the use case was analyzed because it can be investigated to what extent and whether user data is collected and processed in autonomous driving[19].

Vehicle drivers and passengers may not always be adequately informed about the processing of data taking place in or through a connected vehicle.

It is not enough that the information is given only by the vehicle owner, who may not be the driver, and may also not be provided in a timely manner. Thus, there is a risk that there are insufficient functionalities or options offered to exercise the control necessary for affected individuals to avail themselves of their data protection and privacy rights.

This point is very important because during their lifetime, vehicles may belong to more than one owner either because they are sold or they are being leased rather than purchased. In addition, vehicles are increasingly being shared or rented, not just by companies, but also by individuals, and by the person whose data is collected, may not be able to object to some data processing[20].

There is both a lack of control and information asymmetry[21], but that is not the worst thing.

In Fact, the flow of data in and out the vehicle should also be triggered automatically as well as by default, without the individual being aware of it, avoiding his control on the data sharing functions of the CAV.

The consent about this flow of data should be collected.

When the data processing is based on consent, all elements of valid consent have to be met according to the GDPR[22], which means that consent shall be free, specific and

[19] L Aulino, M Saager, MC Harre, L Espindola, 'Consideration of privacy aspects in the area of highly automated driving. An intention recognition use case' *EJPLT* in course of publication.

[20] 'Connected Cars: What Happened to Our Data on Rental Cars' (2017) Privacy International, *https://privacyinternational.org/sites/default/files/2017-12/cars_briefing.pdf*

[21] European Data Protection Board, *Guidelines 1/2020 on processing personal data in the context of connected vehicles and mobility related applications*, (n. 15).

[22] Regulation (EU) 2016/679 (General Data Protection Regulation - GDPR) applicable as of May 25th, 2018 in all member states to harmonize data privacy laws across Europe.

informed[23] and constitutes an unambiguous indication of the data subject's wishes as interpreted in EDPB guidelines on consent[24].

For this reason, data controllers need to obtain valid consent from different participants, such as car owners or car users. Such consent must be provided separately, for specific purposes and may not be bundled with the contract to buy or lease a new car.

The same principles have to be applied when consent is required to comply with the "ePrivacy" directive, for example if there is a storing of information or the gaining of access to information already stored in the vehicle as required in certain cases by art. 5(3) of the "ePrivacy" directive.

It is necessary that CAV users (with no distinction between their owners and the "simple" users) are made aware of the data processing functions, of their purposes. In fact a similar unawareness constitutes a significant barrier to demonstrating valid consent under the GDPR, as the consent must be informed[25].

In such circumstances, consent cannot be relied upon as a legal basis for the corresponding data processing under the GDPR, unless the processing is necessary for the protection of the safety of data subjects (in this case, consent is not required according to article 6)[26].

It is needed to re-think the mechanism used to obtain consent, because the main one may be too difficult to apply in the context of connected vehicles, resulting in a "low-quality" consent based on a lack of information or in the factual impossibility to provide fine-tuned consent in line with the preferences expressed by individuals[27]. We can imagine, for example, the case of drivers and passengers who are not related to the vehicle's owner in the case of second-hand, leased, rented or borrowed vehicles.

In the absence of the possibility to effectively control how the vehicle and its connected equipment interact, it is bound to become extraordinarily difficult for the user to control the flow of data. It will be even more difficult to control its subsequent use, and thereby prevent potential function creep.

It is important to consider one last thing: the data need adequate protection. In fact, The plurality of functionalities, services and interfaces offered by connected vehicles increases the attack surface and thus the number of potential vulnerabilities through which personal data could be compromised. Unlike most Internet of Things devices, connected vehicles are critical systems where a security breach may endanger the life of its users and people around.

It is thus heightened the importance of addressing the risk of hackers attempting to exploit vulnerabilities of connected vehicles.

Considering everything, the writer is working on a research to propose a privacy disclaimer to be installed inside autonomous vehicles that is designed according to law by design methodology.

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[23] Art. 4 of the GDPR: "11. *'consent' of the data subject means any freely given, specific, informed and unambiguous indication of the data subject's wishes by which he or she, by a statement or by a clear affirmative action, signifies agreement to the processing of personal data relating to him or her.*"

[24] European Data Protection Board, *Guidelines 1/2020 on processing personal data in the context of connected vehicles and mobility related applications*, (n. 15).

[25] L Aulino, M Saager, MC Harre, L Espindola, 'Consideration of privacy aspects in the area of highly automated driving. An intention recognition use case', in course of publication.

[26] Eg. *Ecall device*, mandatory from 2018. On the point: MC Gaeta, 'The issue of data protection in the Internet of Things with particular regard to self-driving cars' (2017) DIMT 1 ff.

[27] On the point see: L Gatt, R Montanari, IA Caggiano, 'Consenso al trattamento dei dati personali e analisi giuridico-comportamentale. Spunti di riflessione sull'effettività della tutela dei dati personali', (2017) II *Politica del diritto* 363 ff.; IA Caggiano, 'Il consenso al trattamento dei dati personali' (2017) *DIMT online* 12 ff; L Aulino 'Consenso al trattamento dei dati e carenza di consapevolezza: il legal design come rimedio ex ante' (2020) II *Diritto dell'informazione e dell'informatica* 303,312.

In the case of resale of a connected vehicle, the ensuing change of ownership should also trigger the deletion of any personal data, which is no longer needed for the previous specified purposes. For this reason, it is reasonable that traditional mechanisms to obtain consent may be difficult to apply in the context of connected vehicles.

4. Other examples of potentially missing information: Adaptive Cruise Control and Child Presence detection.

Adaptive cruise-control[28] is an ADAS that uses a radar (or laser) sensor to monitor the distance from the vehicle that travels in front and, if this distance drops below the safety threshold, reduces the speed of the car. When the road is free again, the Adaptive cruise control automatically changes the speed to that set.

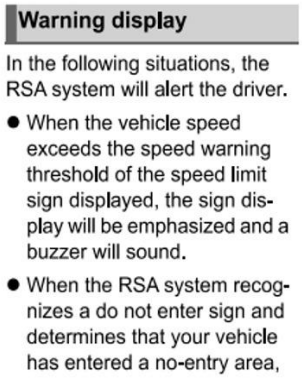
The question that arises is whether the ACC is set in the vehicle, which will then follow a predetermined cruising speed, but you are faced with a road sign that identifies a lower speed limit for that same road.

The question arises on how and whether the vehicle will inform the driver of the speed limit and whether there is a communication deficit in the provision of such legal information.

In fact in these cases the vehicle could either alert the driver with a warning light, inviting him to change the speed manually, or even better automatically adjust the speed to the limit provided for that road.

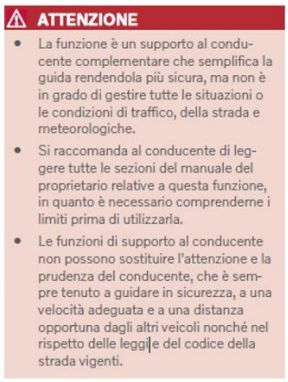
In order to verify the existence of communication limits in the provision of this information, a benchmarking study has been conducted[29], in which four vehicles were compared.

The analysis showed that in samples 1, 2 and 3, the vehicle, in case you find a different speed limit than that set by the ACC, will advise the driver - through a tell-tale - to change the speed with manual control.



Sample no. 1

Sample no. 2



Sample no. 3

In sample no. 4, the ACC maintains the set speed whenever no vehicle is detected in front of it. Otherwise it accelerates and decelerates according to the speed of the previous vehicle. Nothing says with reference to the speed limits.

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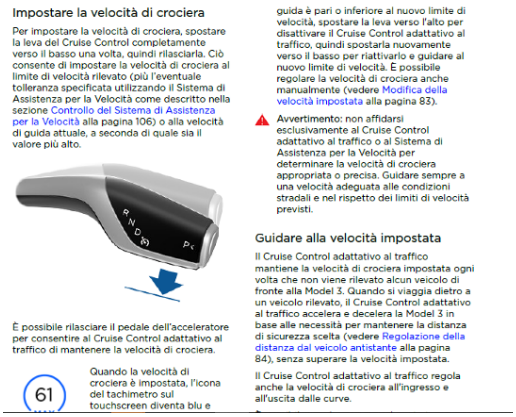
[28] The ACC system was first introduced in 1995 by Mitsubishi, which installed it (with a laser sensor) on a car destined for the Japanese market. Subsequently in 1997 and 1998 it was developed in Europe by other car manufacturers. Since then, this technology has spread to numerous medium-high range models and in fact represents a fundamental step towards autonomous driving. To know more: *https://www.quattroruote.it/guide/Guida-assistita/cos-e-e-come-funziona-il-cruise-control.html*

[29] Benchmarking means a methodology based on systematic comparison that allows companies to compare themselves with the best and above all to learn from them (definition extracted from *https://it.wikipedia.org/wiki/Benchmark_(economia)*



Impostare la velocità di crociera

Per impostare la velocità di crociera, spostare la leva del Cruise Control completamente verso il basso una volta, quindi rilasciarla. Ciò consente di impostare la velocità di crociera al limite di velocità rilevato (più l'eventuale tolleranza specificata utilizzando il Sistema di Assistenza per la Velocità come descritto nella sezione Controllo del Sistema di Assistenza per la Velocità alla pagina 106) o alla velocità di guida attuale, a seconda di quale sia il valore più alto.

È possibile rilasciare il pedale dell'acceleratore per consentire al Cruise Control adattativo al traffico di mantenere la velocità di crociera.

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Quando la velocità di crociera è impostata, l'icona del tachimetro sul touchscreen diventa blu e

guida è pari o inferiore al nuovo limite di velocità, spostare la leva verso l'alto per disattivare il Cruise Control adattativo al traffico, quindi spostarla nuovamente verso il basso per riattivarlo e guidare al nuovo limite di velocità. È possibile regolare la velocità di crociera anche manualmente (vedere Modifica della velocità impostata alla pagina 83).

Avvertimento: non affidarsi esclusivamente al Cruise Control adattativo al traffico o al Sistema di Assistenza per la Velocità per determinare la velocità di crociera appropriata o precisa. Guidare sempre a una velocità adeguata alle condizioni stradali e nel rispetto dei limiti di velocità previsti.

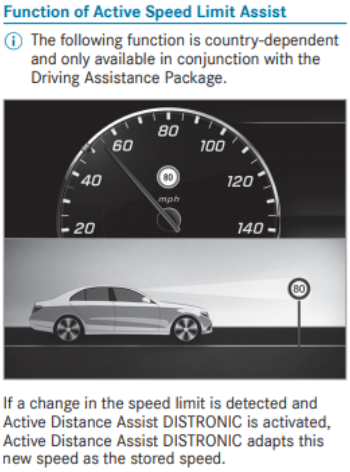
Guidare alla velocità impostata

Il Cruise Control adattativo al traffico mantiene la velocità di crociera impostata ogni volta che non viene rilevato alcun veicolo di fronte alla Model 3. Quando si viaggia dietro a un veicolo rilevato, il Cruise Control adattativo al traffico accelera e decelera la Model 3 in base alle necessità per mantenere la distanza di sicurezza scelta (vedere Regolazione della distanza dal veicolo antistante alla pagina 84), senza superare la velocità impostata.

Il Cruise Control adattativo al traffico regola anche la velocità di crociera all'ingresso e all'uscita dalle curve.

Sample no. 4

Instead, from sample no. 5, it emerged that in case there is a different road speed limit from the one set by "*Active distance assist distronic*", then the new speed adapts autonomously. There is no need for driver intervention.



Function of Active Speed Limit Assist

ⓘ The following function is country-dependent and only available in conjunction with the Driving Assistance Package.

If a change in the speed limit is detected and Active Distance Assist DISTRONIC is activated, Active Distance Assist DISTRONIC adapts this new speed as the stored speed.

Sample no. 5

Nevertheless, it is clear that the driver must be properly informed about how the system works in order to use it consciously.

This, however, may not be enough to ensure its proper use, as will be seen in the next paragraph.

Another case study concerns the Child Presence detection [30]. Today, the main cause of deaths of children in cars is due to the fact that the driver, upon arrival at their destination, accidentally forgets them in the vehicle [31].

[30] L Aulino, 'La sicurezza dei minori in automobile nello sviluppo della guida assistita: dalla disattivazione air-bag al dispositivo anti-abbandono' (2019) *DIMT online*, 1,17.

[31] According to data collected by a researcher at San Jose State University (Null, 2014), in 2014, there were at least 30 deaths from heatstroke of children in cars. Null states that from 1998 to 2014, an average of 38 children are dead annually from automotive heat stroke in the United States. An NHTSA survey of non-road accidents in 2007 found that hyperthermia (heatstroke) was the third most common non-road vehicle death scenario for children under 14 (NHTSA, 2009).

Furthermore, the child's inability to get out of the vehicle alone combined with a low tolerance for high temperatures, can cause him to suffer from heat stroke, even if left alone for a few minutes in the car.

Law no. 117/2018 and the subsequent Decree of the Ministry of Transport of 02 october 2019 introduced the obligation for parents to equip themselves with Child Presence detection precisely to deal with this emergency.

These devices can be designed as ADAS inside the vehicle or as devices in child restraint systems or independently of both.

In particular, pursuant to article 3 of the Ministerial decree, the anti-abandonment device can be:

a) originally integrated into the child restraint system;

b) a basic equipment or accessory of the vehicle, included in the information package of the vehicle type-approval;

c) independent of both the child restraint system and the vehicle.

These regulatory data are accompanied by article 3.2 of the *assessment Protocol - Child Presence detection*, issued by Euro NCAP in September 2019[32], according to which it is possible to deactivate this driving assistance system both temporarily (for a single trip) as well as permanently by the dealer (according to article 3.3).

In this regard, a survey was conducted (through a questionnaire on a sample of parents of children aged 0 to 4 years)[33].

The study found that 63% of parents would be in favor of the permanent deactivation, even for a fee, of the anti-abandonment function, with the possibility of reintroducing it if necessary; on the other hand, 37% of the interviewees were negative on this point.

Considering that these devices are in the planning phase, it is desirable that car manufacturers undertake to find innovative technological solutions that guarantee maximum safety for minors in the car, regardless of parental supervision.

5. The lack of clarity of the information from a private law point of view: linguistic error vs obstacle/defective error in view of the evolution of the category.

Technological development, in fact, does not mark the end of the law, if something, being able to determine the obsolescence of certain rules that are opposed, more often, the appearance of new legal problems, to solve which is necessary the intervention of the interpreter or the legislator.

In this case, a major problem is the lack of clarity of information, which may lead the contractor to make a mistake. In this aspect it is useful to make a small general premise followed by examples based on the cases previously considered.

According to an authoritative author[34], by mistake a false representation of the party with regard to the contract or its assumptions must be understood. It is the cause of cancellation of the contract when it is essential and recognizable (according to the article 1428 of civil code).

It is necessary to distinguish the error in the following categories:

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[32] Assessment Protocol- Child Presence detection – Draft. Version XXX, 26th September 2019.
Article 3.3: "*long term deactivation is only allowed for direct and indirect sensing systems and must be performed by a dealer. The inactive status of the system must be indicated by a dedicated tell- tele or text warning that is permanently visible for the duration of all journeys*".

[33] The questionnaire revealed that 96% of the parents interviewed were aware of the introduction of the obligation of child presence detection device. For more information, see L Aulino, 'La sicurezza dei minori in automobile nello sviluppo della guida assistita: dalla disattivazione air-bag al dispositivo anti-abbandono' (n. 30).

[34] CM Bianca, *Diritto civile. Il contratto,* 3 (3th edn., Giuffrè, 2019) 601 ff.

- *defective error* (or error of reason), which relates to the formation of the will of the party. In fact, the contract would not have wanted to conclude without the error of the party.
- *obstacle error*: concerning the declaration of the party. It is the case which the contracting party has properly formed its will but it has been incorrectly declared or transmitted[35].

In addition, there is a further distinction between:

- a *factual error* which falls on the contractual elements or external circumstances;
- *error of law*, which falls on legal rules.

The error that falls on the contractual elements is presented as the divergence between the objective meaning of the contract and the meaning that the party gives to it.

This would be the error that would be incurred for lack of clarity of information.

In order to be a cause of annulment of the contract, the error must be essential, so it must be of decisive importance according to an objective assessment[36].

The error must also be recognizable by the other contractor (according to the article 1431 of civil code).

It should be admitted that it could be complicated to adopt the civil regulation of error with regard to autonomous vehicles. A couple of examples are worth taking from the analysis in the previous paragraphs.

First of all, it is considered the case in which it is deemed necessary to give consent to the treatment in the autonomous vehicle. The consent is necessarily an essential element of the contract, which will presumably be considered and perfected after the stage of the mere sale of the vehicle, in order to further personalize these aspects in relation to the vehicle owner's profile.

Therefore, necessarily there will be a number of options, including some optional, which the driver may or may not select by providing a split consent in a sense. After all, it is possible to imagine that the car manufacturer will ask for consent not only for that data processing necessary for the operation of the same and its sensors, but also for research and development purposes within the company or sell them to third parties.

For each of these hypotheses it will be necessary to give consent separately.

If the manner in which you provide consent should be digital and "cryptic", it is highly likely that the driver may inadvertently provide consent to all types of processing rather than only to those desired.

In such a case it would not be illogical to think that there is an error:

1) *obstacle* error, although it has formed its own will, because of the cryptic nature of the system adopted, it has been transmitted incorrectly;
2) *factual* error, involving a contractual element;
3) *essential* error, since consent to the processing of data is an essential element of the contract in order to allow the proper functioning of a level CAV from the third party up.

This conclusion is reached on the basis that data protection is often perceived by the data subject as being unrelated to the economic operation he is undertaking. If this is true, the information can take on the role not only of filling the information asymmetry but also of starting the control of data subject on the procedure on which the processing activity takes place.

A consent expressed unconsciously due to an unsuitable method of collection of the same

[35] MC Diener, *Il contratto in generale* (2th edn., Giuffrè, 2011) 805,806.

[36] The non-essential error does not invalidate the contract but can be relevant in terms of pre-contractual liability. On the point, E Quadri, *La rettifica del contratto* (Milano 1973) 77.

could be precisely understood as an obstacle error because the will, having already formed, is then transmitted/declared in an unclear way.

Consequently, with a view to dissuasion, the interpretative extension of the obstacle error category is suggested.

There is also another particular situation, concerning errors that occur after the conclusion of the contract. It is useful to take the example of the ADAS.

If the ADAS does not clearly provide the information necessary for its proper use while it is active, there will be an error.

This is an error in the transmission of information occurred after the conclusion of the contract, so will be of a linguistic nature and will be unrelated to the completion of the contractual relationship.

It can be, in fact, a critical information provided by means of a light too similar to another, a sound signal easily confused with another, a tactile signal (vibration) weak enough not to be perceived in the presence of roads that cause a high level of vibrations and shocks to the overall structure of the autonomous vehicle.

These situations of error in the providing of information could also cause road accidents, the liability of which should be ascertained.

Obviously, it will be necessary to verify on a case-by-case basis, balancing the duties of the manufacturer with the diligence of the vehicle user, but, however, it concerns an error which, unlike the previous ones, is purely linguistic and communicative error.

Nevertheless, this is of considerable importance. It is an error, albeit a linguistic one, but it concerns a particularly important system of the vehicle.

The CAV's ADAS case, so, implies an obsolescence of the normal legal categories (since it will not be enough to reason in a traditional way).

In fact, if the error occurring after the conclusion of the contract, we have to admit that we cannot lead back that error to its classical categories described before. We can no more reason in terms of defective or obstacle error because these are very specific types of errors.

So it is necessary to find another category of error which considers those errors occurring after the completion of the contractual relationship.

This means that is necessary a rethinking of the error category, perhaps introducing new concepts, with reference to the "language" and the transmission of information trying to overcome the link with the phase of completion of the contract.

6. Hypothesis of solution in the design: the legal design methodology.

In this context it is considerable of the role of design.

The most important features of a good design are: visibility (so how to identify and perform possible actions) and comprehensibility of commands[37].

The interfaces between technology and people should not only meet legal and ergonomic technical needs but should also consider the experience and quality of interaction. They should be understandable and easy to use.

The development of new technologies has led people to be frustrated by the complexity of everyday things, precisely because they generate confusion, continuous errors, and an endless cycle of updating systems.

Some authors propose the adoption of human-centered design (HCM) as a solution. It is an approach that starts from human needs, skills and behaviors, which then adapts the

[37] D Norman, *La caffettiera del masochista. Il design degli oggetti quotidiani* (Giunti, 2019).

design[38].

Good design therefore requires good communication, especially from machine to person (indicating what actions are possible, what happened and what is about to happen).

Briefly, there is a good design when the machine alerts a problem to the human that understands it, intervenes and solves the problem.

This is also because the fact that the legal information is not clear and immediate in it is understanding contrasts with the need to ensure a high degree of Situation awareness[39] in the operational framework in which the user moves.

Inadequate SA is one of the main causes of accidents attributed to human error, so users should be guaranteed a complete SA, accurate and up-to-date at all times[40].

In this context, the theme of legal design[41], a human-centred methodology that aims to achieve an effective visualization of a legal content, facilitating communication and understanding through the use of textual, paratextual elements, and information visualization[42].

The legal design approach follows the principles of clarity, transparency, awareness, immediacy of information and understanding of the text. These principles belong both to the Italian legal culture[43] and more generally to the European one[44].

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[38] Ibid, 25-28. Anthropocentric design means starting from a good knowledge of human beings and the needs that the project intends to satisfy. This knowledge comes mainly from observation, because people are often unaware of their true needs and difficulties..

[39] The *situational awareness* (SA) is a metric related to the world of cognitive ergonomics that refers to the understanding of environmental elements in a given dimension space - time for decision makers. This concept was defined by Endsley as "*the perception of environmental elements in a given space-time dimension, the understanding of their meaning, and the projection of their status in the near future*". See M. Endsley, 'Toward a Theory of Situation Awareness in Dynamic Systems' (1995) Human Factors Journal of the Human Factors and Ergonomics Society, 32,64.

[40] Understanding the meaning of information, according to the SA model, represents the answer to the question "and then?" (so what?) the data that are perceived. In particular, the Endsley model describes the states of the AS and illustrates three phases of its training: perception (level 1 SA), understanding (level 2 SA) and projection (level 3 SA).

[41] The notion of legal design was coined by Margaret Hagan in M. Hagan, 'Law By Design' (Retrieved March 2018), in *www.lawbydesign.co/en/home/*. Legal design is the application of human-centred design to the world of law, in order to promote the usability and comprehensibility of legal instruments, and in particular contracts. Legal design is a method of creating legal services, focusing on their usability, utility and involvement. It is an approach with three main resource groups - process, mentality and mechanics - to be used for legal professionals. These three resources can help design, build and test better methods of legal action, which will involve and empower both legal professionals and individual users. See M. Hagan, 'Law by Design' (Retrieved March 2018), in www.lawbydesign.co/en/home/.

[42] Information visualization is the study of visual (interactive) representations of abstract data to strengthen human cognition. Abstract data include both numerical and non-numerical data, such as text and geographic information. On the topic see: S K Card, D Mackinlay, B Shneiderman, *Readings in Information Visualization: Using Vision to Think* (Morgan Kaufmann Publishers 1999); A Kerren, JT Stasko, JD Fekete, C North, *Information Visualization – Human-Centered Issues and Perspectives* (Berlin, Springer 2008); R Mazza, *Introduction to Information Visualization* (Springer 2009); R Spence, *Information Visualization: Design for Interaction*, (Prentice Hall 2007).

[43] The Consumer Code, in some rules, stipulates compliance with the principles of transparency and clarity in the drafting of contractual clauses. Art. 35 of legislative decree n. 206/2005 (cd. consumer code), in the first paragraph, states the obligation to draw up in a clear and comprehensible manner the clauses proposed to the consumer in writing; in addition, art. 48, establishes the obligation for the trader to provide the consumer with the information in a clear and legible; art. 51, 1 co., provides that for distance contracts the trader provides the consumer with the information in simple and understandable language. In addition, the need to ensure greater awareness of legal information is also enshrined in Articles 21 and 22 of the Consumer Code.

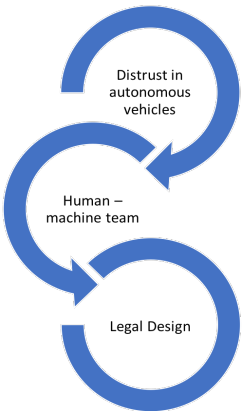
[44] The article 12 of European Regulation no. 2016/679 - on privacy and protection of personal data - provides that the data controller takes the appropriate measures to provide the data subject with all the information referred to in Articles 13 and 14 and communications referred to in art. 15-22 and 34, in a concise, transparent, intelligible and easily accessible form, in particular in the case of information specifically intended for minors.

Legal design can be seen like the final point of a very complex path, in which the jurist has understood the need to express clearly and directly following the logical architecture of the language that, it is the basis of computational thinking which, in turn, is the basis of coding (software language)[45].

It is considered that the meaning of the concept of legal design is very broad, as it includes a design technique oriented to values protected by law, cd. law by design[46].

It follows that the legal design methodology represents a possible remedy to the communication deficit of legal information provided through the vehicle.

In this regard, it would be appropriate to design human machine interfaces in this way: explain the legal information clearly and unequivocally also through an acoustic, visual or tactile signaling; avoid references to other documents; provide that such delivery methods are always supported by a previous impact assessment study of the communication construct, especially in cases where safety impacts occur, including the use of experimental models and the involvement of users as communicative effectiveness evaluators. These renewed interfaces could provide.



Conclusions.

Under a *de iure condito* perspective it is essential to adopt the design methodology law by design to a situation in which the partial or total autonomous vehicle has to provide users with compulsory legal information in order to guarantee their self-awareness.

This would also satisfy the precautionary principle and the principle of security by design and ensure mutual support and learning between the machine and the user.

Under a *de iure condendo* perspective, the European legislator should strengthen consumer protection. A rule should be introduced which punishes producer where legal information is provided to the consumer in a way that does not allow him to have a full situational awareness in the use of the product.

The GDPR also introduced the principles of privacy by design and by default where, in art. 25, requires that the design of the software minimizes the use of personal data and the risk to the data subject, both in the sense of making choices that tend to anonymize the data to be collected, both in promoting awareness of people who lend the consent to data processing. Also the W.P. 29, regarding transparency, has established the obligation to adapt the legal communication to the recipient.

[45] C Morelli, 'Avvocato 4.0: un mare di buone letture' (2020) available on *https://www.altalex.com/documents/news/2020/08/03/avvocato-4-0-un-mare-di-buone-letture.*

[46] This design methodology consists of several steps: framing the existing situation; focusing on the type of user; framing the challenge; developing ideas; understanding and prioritizing; developing a prototype; testing. See M. Hagan, 'Law by Design' (Retrieved March 2018), in *www.lawbydesign.co/en/home/*.

The same thing should be said about the cases in which the producer "causes" the error of the contractor in the phases of completion of the contract as exemplified in the example relating to the consent previously outlined.