I am Daniel Fădur, lawyer and road safety expert, I have created and/or managed organizations with large fleets of cars, I have driven more than 2 million kilometers in almost half the countries of the world and I am still learning and looking for answers why a model is good, why another is stupid and I always look for the logical solutions.

I am running for the title of **road safety expert of the year** and I am convinced that you will appreciate my work and the proposed solutions after studying this material and I hope that later, they will be transposed into regulations, through a European Directive and then again through national laws.

In road safety it is not enough to ask HOW, but more importantly WHY?

The road signalling are responsible for many of the road accidents.

The road signalling mean communication. Communication between the road administrator and traffic participants, drivers and pedestrians, as well as communication between traffic participants.

The road administrator transmits through the markings and road signs installed, messages that you must follow so that all traffic participants can move safely, without conflicts or risks.

Lack of communication, faulty communication, contradictory communication, or too subtle communication, leads to conflicts and most often to accidents, due to the fact that many of the traffic participants will not understand, or will not perceive **in time** the message and this is equivalent to the lack of communication. Communication must be firm, clear, easily understood by anyone, regardless of level of training and/or education, individual skills and abilities, speed of reaction, degree of attention and concentration which may differ from individual to individual to another and which can be affected both by psychological factors such as the disposition, family, social or professional problems of the individual, as well as by natural factors such as weather, climate, time of day, etc.

Road signalling must take into account the human factor, because man is not perfect, we all make mistakes, and with correct road signalling we must be able to eliminate human errors.

If the signals are correct, we will know the obligations and intentions of the other road users and act accordingly, so that the traffic flows harmoniously, without risks and without accidents.

Content

1. Right-hand priority rule

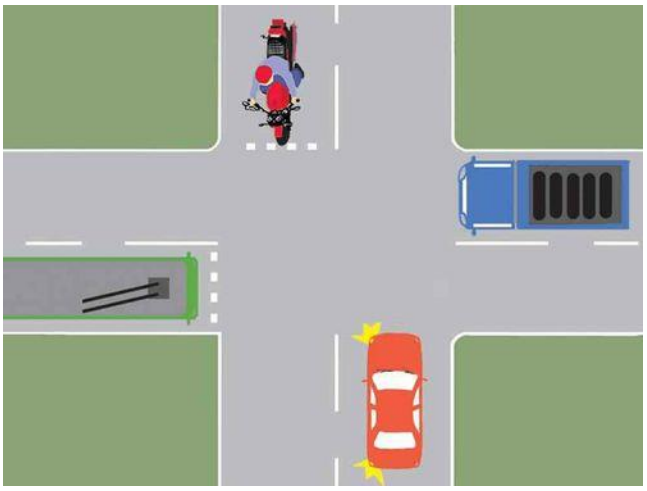
1.1 Safety

I've always wondered how the priority of passing through intersections was established, by democratic vote, or by flipping a coin? This rule defies logic!

You may remember that in the past and in roundabouts the right-of-way was for vehicles coming from the right, for vehicles entering the roundabout. The result of this rule was the total blocking of roundabouts. Someone analyzed what was happening, analyzed the logic of flows and fluidity, and subsequently changed that rather uninspired rule.

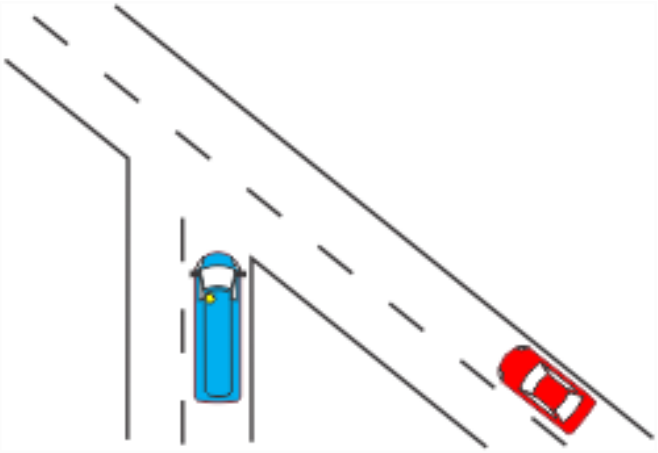
How is that right, **right hand priority or left hand priority?**

Those who established the right-of-way rule probably looked at an intersection like this and without analyzing the logic of the right-of-way, the physics of things and the dynamics of the movement, established that the right-of-way applies. TOTALLY WRONG!



In this intersection doesn't matter if the priority is right or left, but unfortunately not all intersections intersect at 90° like this one.

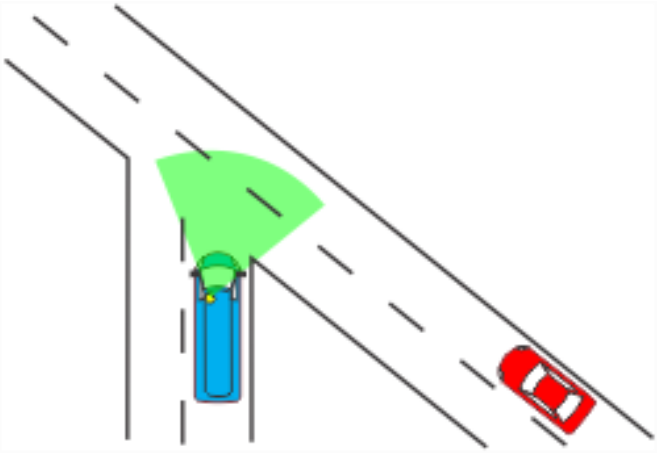
At the intersection in the following image, which should be the right of way?



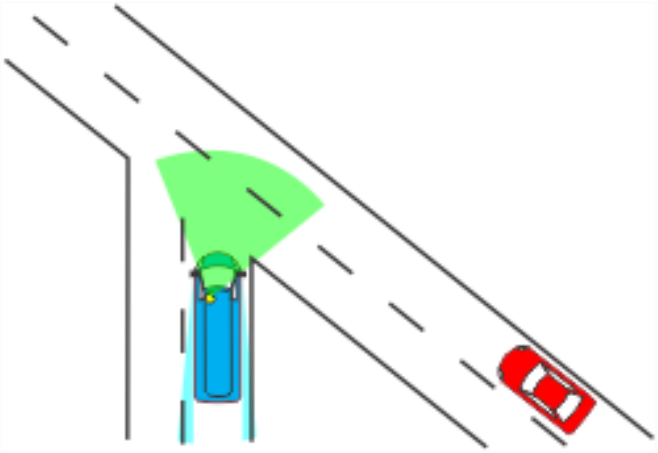
If you already have a driver's license, you will say that the red car has priority, because that's what you learned at driving school and because that's what the legal rules say.

The problem is that right now we are at the point where we can witness a collision between the truck and the red car.

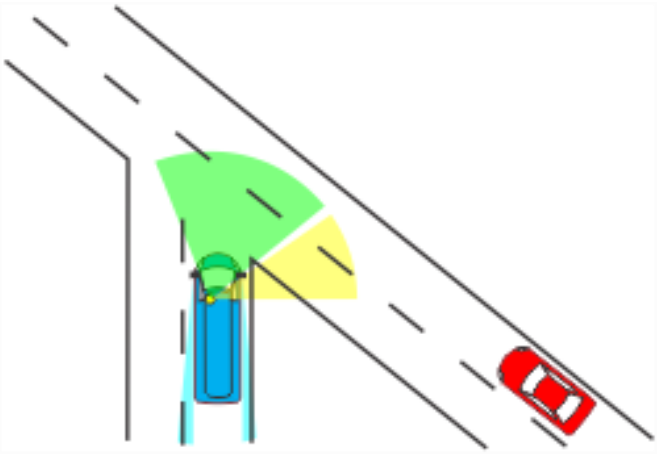
The driver of a commercial vehicle without rear windows has native visibility ahead through the truck's windshield.



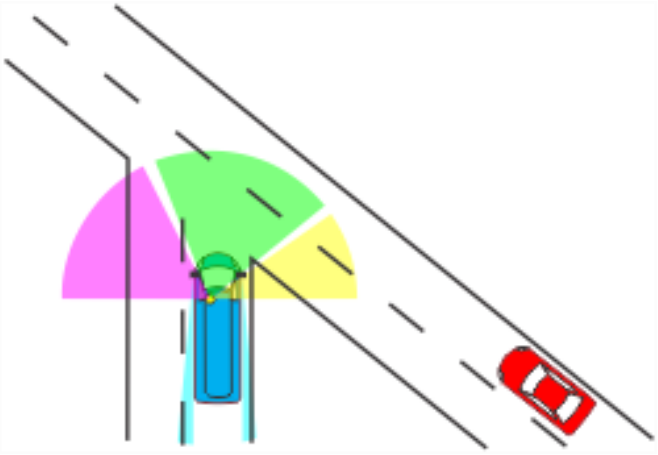
Behind, through the rear-view mirrors, the driver has visibility of approximately 15-20° on either side of the truck.



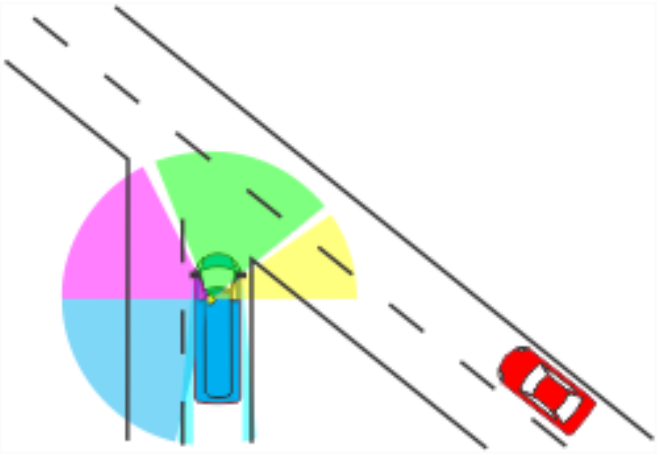
Turning the head to the right at 90°, the driver has visibility on the right side only as far as the right door window allows.



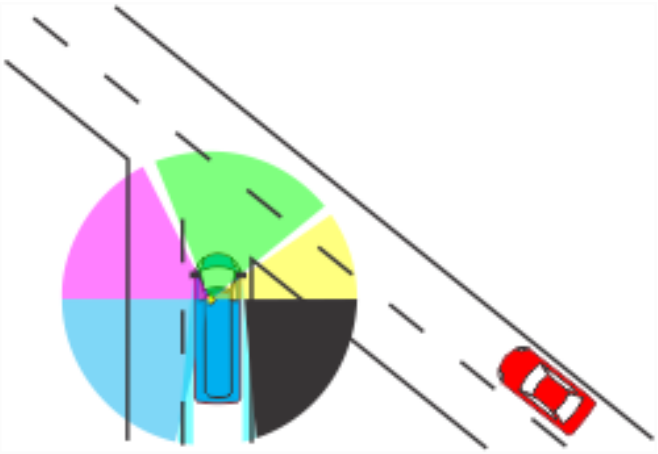
By turning the head to the left 90°, the driver has visibility on the left side only as far as the left door window allows.



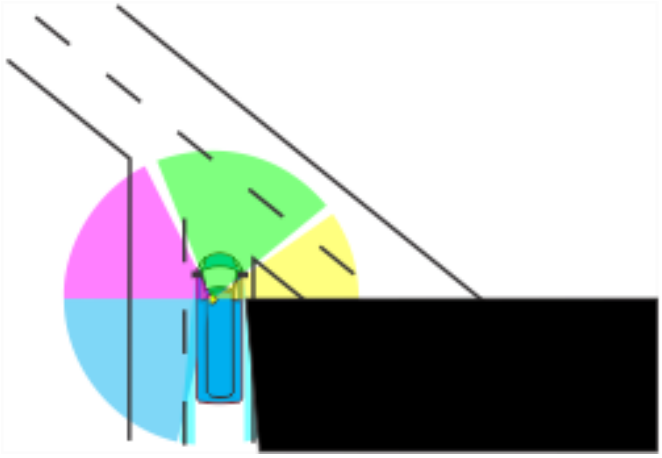
But he has the ability to stick his head out the window to get a view of the entire left side of the truck.



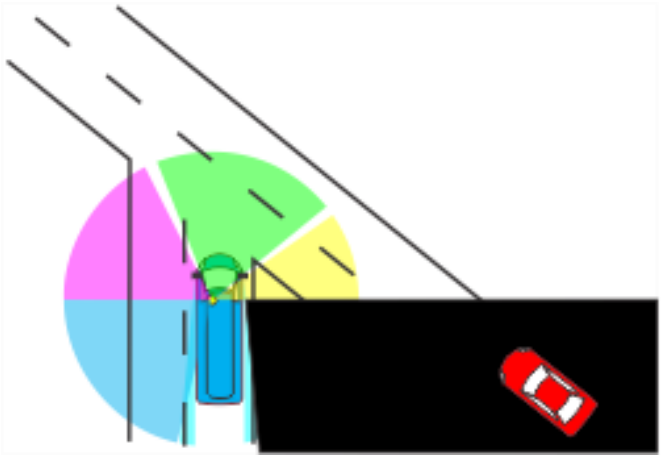
But on the right side of the truck, behind the glass on the right door, the driver no longer has any kind of visibility, this being a blind spot.



It is physically **impossible** for the driver of a commercial vehicle to secure himself from the right side from this angle.

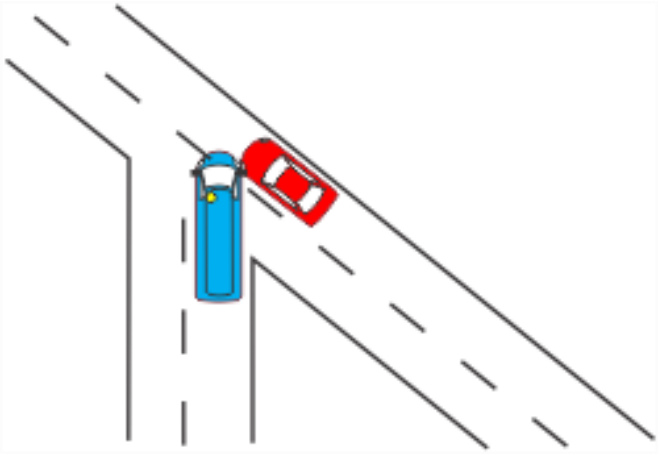


The red car and all vehicles coming from the right behind will not be able to be seen by the truck driver.

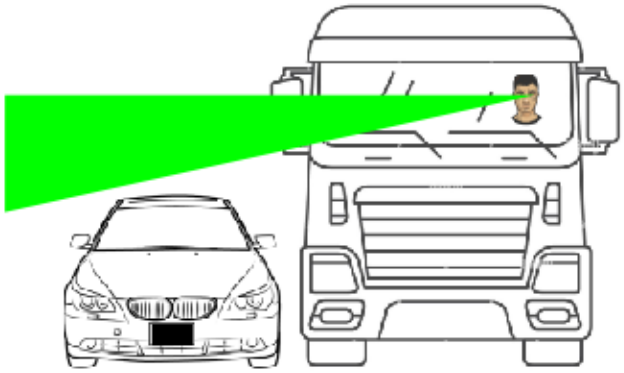


The driver of the red car knows that he has priority and will continue his journey.

While the truck is moving, the red car will reach the intersection, at which point the accident occurs.



Due to the difference in height between the truck and the car, the truck driver will not even realize what he hit, because from the height of the truck, the driver cannot see what is on the lower right, his field of vision being limited to the height of the right door window.



However, the right of way for vehicles coming from the right is found in many intersections, both in controlled intersections, where the priority of passage is established for the road on the right, where the red car is, and in uncontrolled intersections, where right-hand priority applies.

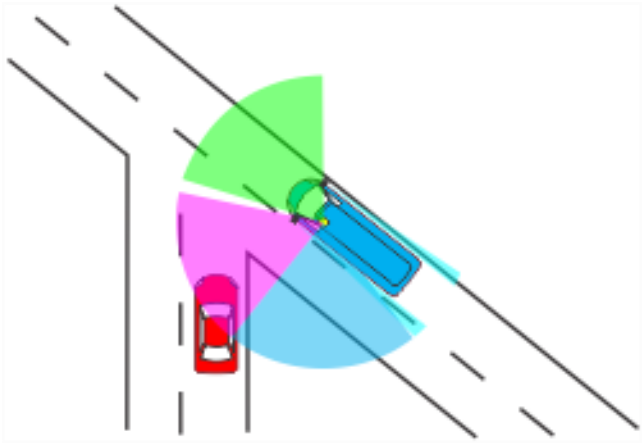
All drivers who will have to give way to vehicles on the right, at a sharp angle to the vehicle they are driving, risk causing a traffic accident and also risk the repercussions of the law.

Although the truck driver is physically unable to secure himself from the blind spot, in the event of an accident, he will be considered guilty according to the law, for not giving priority. They are the blameless culprits.

I see accidents like this every day (https://youtu.be/Sw8vPB3NrcU) and although I have suggested to the local authorities to change priorities in a few intersections, no one seems to understand the gravity of a road architecture that defies logic. Sometimes I feel like I'm a character in the movie *Don't look up*!

The traffic rules must ensure the 2 objectives: **Safety and Fluency!**

Right-hand priority does not provide safety either in controlled intersections or in uncontrolled intersections!

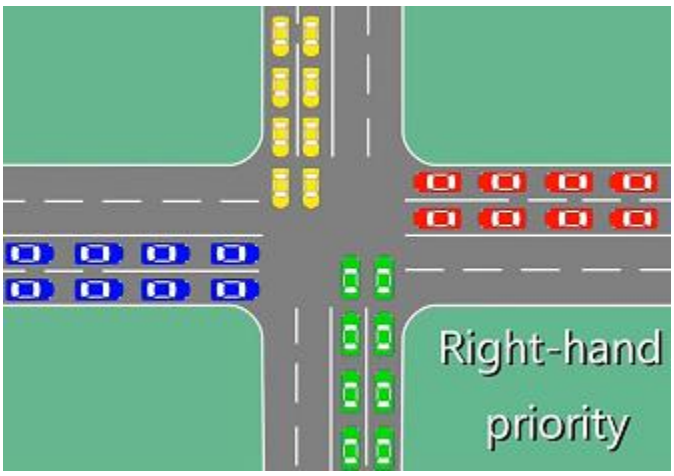


In the case of the general **priority on the left**, the truck driver would have stopped, secured himself properly and given priority to the car, because he has visibility on the entire necessary spectrum.

Right-hand priority is logical and makes sense, only for countries where vehicles drive on the left side of the road.

1.2 Fluidity

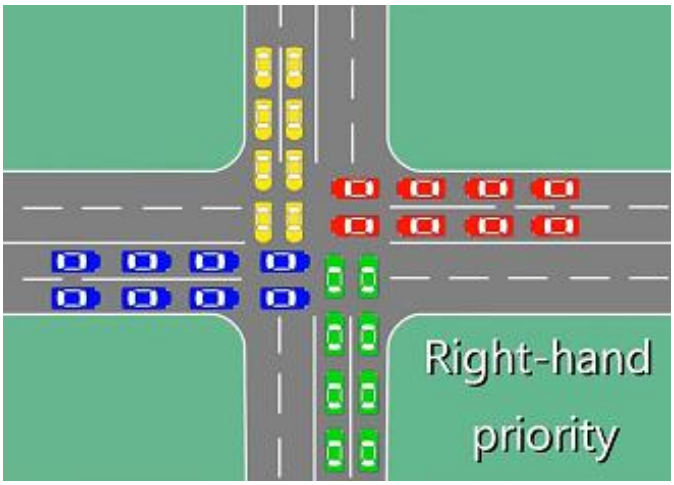
The four streams of cars arrive simultaneously at this intersection. The yellow car stream must give way to the blue car stream. The blue car stream must give way to the green car stream. The green car stream must give way to the red car stream. And the red car stream must give way to the yellow car stream.



In the next second, the entire intersection is blocked. Every stream of traffic has blocked the left flow and it appears to be a dead end situation.

This is what happens now, when the priority for those on the right is the rule and the legal solution.

Everyone is stuck and no one can get out of the intersection.



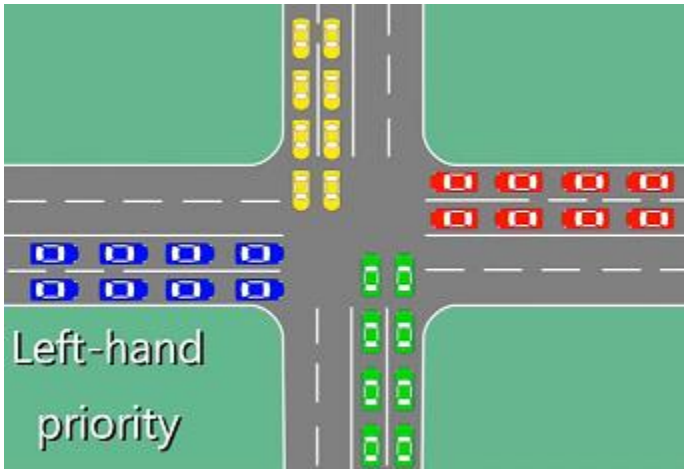
If we want fluidity in intersections, we should see the fluidity of liquids, because that's where the name fluidity comes from. If we can see the intersection as a container of water, as a sink we will be able to analyze the fluidity. Cars enter and exit the intersection, water enters and exits the sink. If the sink outlet is free, the water drains smoothly, as much water goes in, as much water goes out, as long as the outlet is free.

But if we block the outlet, that is, the water drain, then the sink will fill up without the outlet being able to be used. So we will have a blocked intersection that will be filled with cars, which cannot use any exit from the intersection.

So if we want to unblock the intersection, we have to unblock the drain, remove the plug. The same happens in intersections. If we block the exits, we block the intersections.

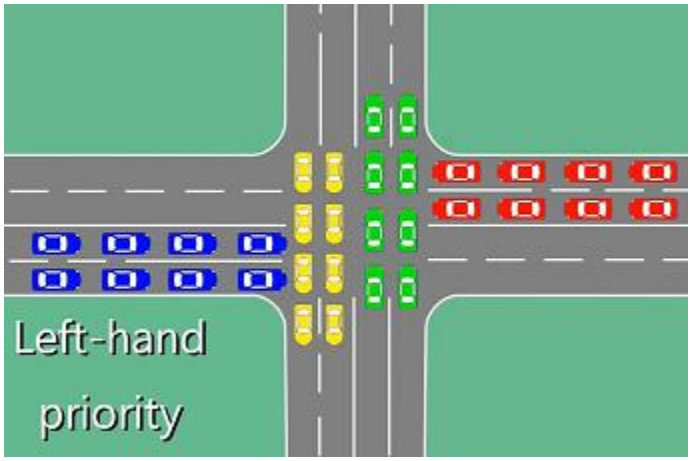
To unlock them, it is necessary to give up to the right-hand priority, which is a stopper for fluency, and to adopt the **left-hand priority**, which provides not only safety, but also fluidity.

Now, the blue car stream must give way to the yellow car stream. The green car stream must give way to the blue car stream. The red car stream must give way to the green car stream. The yellow car stream must give way to the red car stream.



Now cars only have to give priority when entering the intersection, and further, once inside in the intersection they have clear exit.

Priority for those on the right does not provide safety either in controlled intersections or in uncontrolled intersections! From now on, traffic is now flowing, without blocked intersections!



So, logic, physics and geometry should be the deciding factor in the rule of priority, and I hope that the irrational rule of priority for those on the right will be replaced as soon as possible by the general rule of priority for those on the left, and thus, all intersections from the world, controled or uncontroled, to receive, through national legislation, logical norms that present safety for traffic. A European Directive would be welcome, considering the inertia of the states to change, the bureaucracy and sometimes the degree of (in)competence of the specialists responsible for road safety.

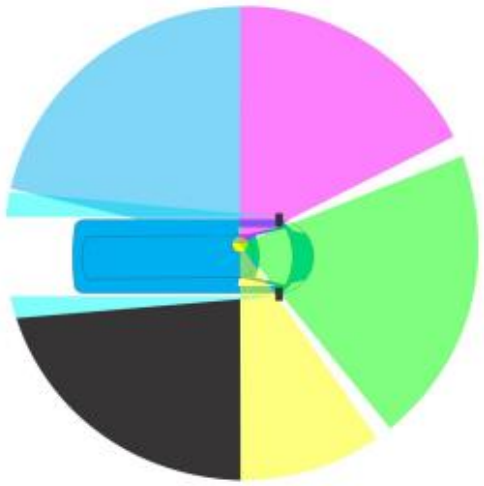
Some will say that it would be impossible to make this change, because drivers would be confused and the measure would be unsustainable. Well, Sweden changed the traffic from the left side to the right side of the road on H-day, September 3, 1968. Things were confusing for a few days, there were drivers who went the wrong way and went on the wrong side, but the things returned to normal in a short time.

So, logic, physics and geometry should be the deciding factor in the rule of priority, and I hope that the irrational rule of right-hand priority will be replaced as soon as possible by the general rule of left-hand priority, and thus, all intersections in the world, controled or uncontroled, to receive, through national legislation, logical norms that present safety for traffic, but also fluency.

France discovered the importance of blind spots and made a correct but insufficient decision. By Decree no. 2020-1396 of November 17, 2020, France obliges commercial vehicle drivers to mark the driver's blind spots on their vehicles.

It is a warning and awareness measure for road users, but right-hand priority continues to cause damage, victims and innocent culprits. An important European tourist landmark, in the Arc de Triomphe square in Paris, traffic is circular, without being a roundabout, and those entering the square from the right have priority!

Native front visibility
Visibility in rear view mirrors
Right visibility by turning the head
Left visibility by turning the head
Visibility left by sticking your head out the door window
Total lack of visibility



Right-hand priority, while fine, is not a solution, but **a major problem for traffic flow and safety.**

Video
English (subtitles available): https://youtu.be/iTws8NE6jnM
Română: https://youtu.be/l-M4mMTXfZs
Español: https://youtu.be/HuSVxNhFa64

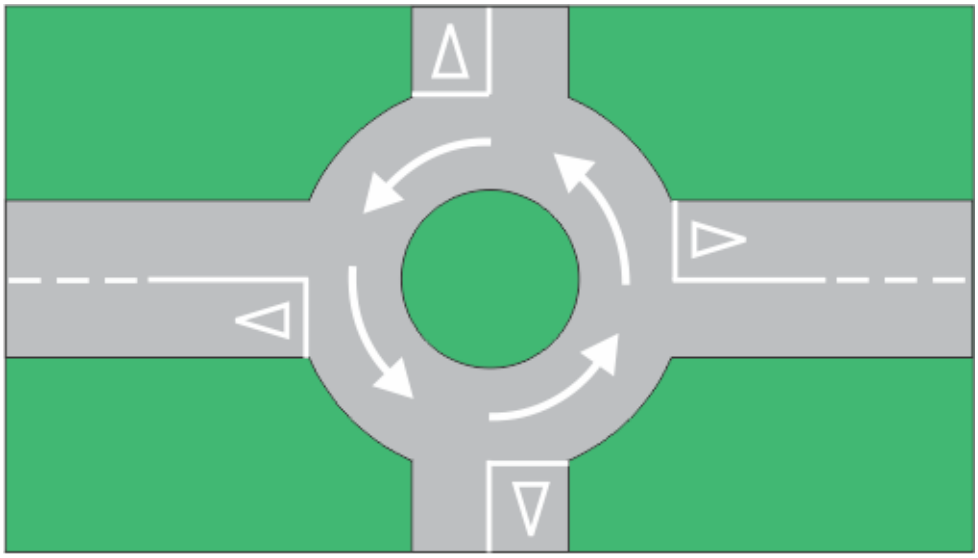
Conclusion:

The left-hand right-of-way rule is the logical solution for traffic flow and safety!

2. The roundabout

What is the roundabout? An intersection or a traffic node that includes several intersections?

If we are to look at a small roundabout, then we might think that it is an intersection with an obstacle in the middle, where the traffic proceeds in a circular way.



The term "roundabout" appears for the first time in the Vienna Convention of 1968, which refers to the roundabout, **without defining it**, in article 11, point 8:

In English:

a) Immediately before or on an intersection other than **a roundabout**,

https://unece.org/DAM/trans/conventn/crt1968e.pdf

In Spanish:

a) inmediatamente antes y durante el paso de una encrucijada que no sea **una plaza de circulacion giratoria**,

https://www.international-driving-permit.com/Convention-on-Road-Traffic/8-November-1968/SP/Capitulo-2-Reglas-Aplicables-a-la-Circulacion-Vial/Articulo-11-Adelantamiento-y-circulacion-en-filas.aspx

where "roundabout" takes on the meaning of "squarre with circular circulation".

In German:

a) unmittelbar vor und in einer Kreuzung ohne **Kreisverkehr**,

https://www.fedlex.admin.ch/eli/cc/1993/402_402_402/de

where "Kreisverkehr" means road node, according to https://de.wikipedia.org/wiki/Kreisverkehr

In French:

a) immédiatement avant et dans une intersection autre qu'**un carrefour à sens giratoire**,

https://www.fedlex.admin.ch/eli/cc/1993/402_402_402/fr

si https://www.securite-routiere-az.fr/c/convention-de-vienne/

where "carrefour à sens giratoire" means a special intersection with a central ring, according to https://fr.wikipedia.org/wiki/Carrefour_giratoire

In Italian:

a) immediatamente prima o in un'intersezione diversa da **una rotatoria**,

https://www.soprov.it/sites/default/files/cds_normativa/Convenzione%20mondiale%20sulla%20circolazione%20stradale%20e%20segnaletica%20Vienna%2068%20e%20Legge%20di%20Ratifica.pdf

"una rotatoria" means the one-way belt according to https://it.wikipedia.org/wiki/Rotatoria

In Romanian:

The word "roundabout" was translated as an intersection, at that time there were no roundabouts, and the translator did not know how to translate otherwise.

a) imediat înainte și într-o intersecție alta decât o **intersecție cu sens giratoriu**,

https://legislatie.just.ro/Public/DetaliiDocumentAfis/31023

We can notice that only in Romanian, the roundabout is translated as an intersection, and in French and Spanish legislation, the roundabout is treated as a special intersection.

The Vienna Convention of 1968 did not define exactly what a roundabout is, a positive thing today, because today's roundabouts are no longer what roundabouts were in 1968, and today's roundabout concept has evolved from the year 1968.

The roundabout was designed as a fast traffic node to avoid stops at intersections, with the obligation to give priority to vehicles only on one side, from the left and with the effect of streamlining traffic.

To find out what a roundabout is today, we should microscopically analyze a small roundabout, or see a large roundabout, to be able to unravel the secret of this road node.

Spain is a roundabout paradise (>80,000) and there are numerous giant roundabouts. So, I will analyze a giant roundabout in the territory of Spain.

In this Google Map capture

https://www.google.es/maps/@28.0711022,-16.5556718,3a,75y,119.1h,90.08t/data=!3m6!1e1!3m4!1sqkdbsX_ztnE4AhjX-VjyEQ!2e0!7i16384!8i8192?hl=ro&authuser=0

we can see that we are inside a two-lane roundabout.

If we were to say that the roundabout is an intersection, we would have to question mathematics, which is an exact science, and which tells us that two parallel lines never intersect, and in this picture you can see two parallel bridges that are part of - one roundabout.

Viewed from above

https://www.google.es/maps/@28.0706999,-16.5551407,18z?hl=ro&authuser=0, the same roundabout reveals that it joins both the **acceleration** and **deceleration** lanes of the highway over which is suspended.

If the roundabout is an intersection, I can't avoid the following questions:

- Can the **acceleration** lane in one way of the highway intersect with the **acceleration** lane in the other way of the highway?
- The **acceleration** lane on one way of the highway can intersect with the **deceleration** lane on the other way of the highway?
- The **deceleration** lane from one way of the highway can intersect with the **deceleration** lane from the other way of the highway?

The answer should be obvious to anyone.

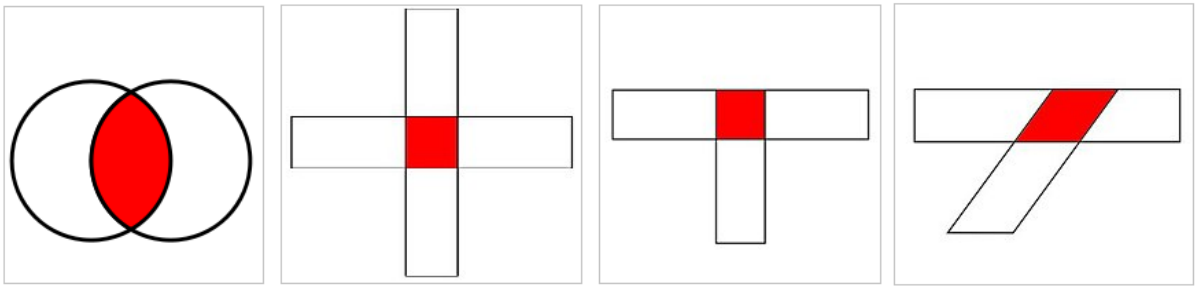
Thus, we can say that the meaning of the word "roundabout" as it is in Romanian, that the roundabout is an intersection, is totally wrong. However, in the laws of many states the roundabout is treated as an intersection, even if it is a special intersection.

Moreover, many people, some from institutions with responsibility for road safety, cannot admit that the roundabout is a one-way road. But, analyzing this roundabout, to deny the fact that in the roundabout the traffic goes in one direction, would mean that we no longer have a roundabout, but a belt with traffic in both directions, where those who enter this belt could to turn left after giving way to vehicles traveling on both the left and right sides. Or, the roundabout aims to avoid stops as much as possible and give priority only to vehicles traveling inside the roundabout on the left (right in left-hand drive states).

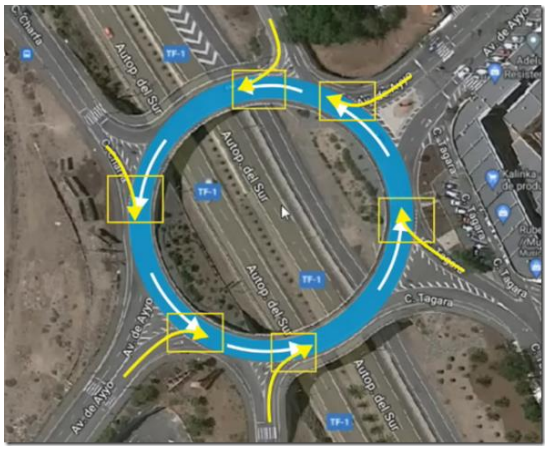
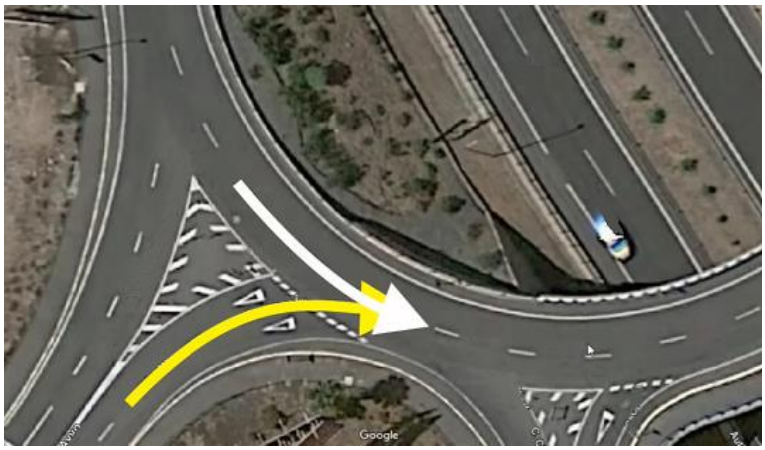
Thus, in the context of globalization, the free movement of citizens, the development of tourism, I think it is imperative that the roundabout has an internationally accepted definition that **the roundabout is a main circular road (with priority), where traffic is carried out in a one-way (one-way) and successively intersecting with secondary roads (no priority).**



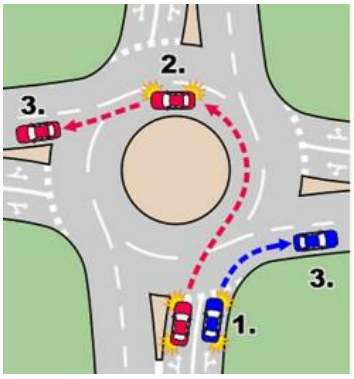
From a mathematical point of view, the intersection is represented by the set of common points of two lines, two surfaces or volumes, or the totality of the common elements of two sets:

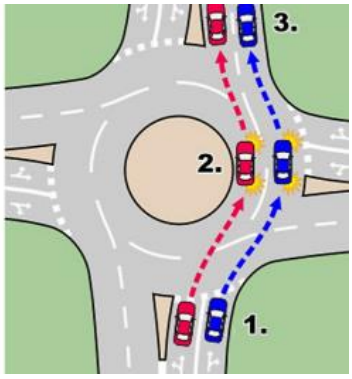


And **the intersection** with the roundabout means and should be defined as just **the place where the secondary road intersects with the roundabout**.

The lack of a definition for the roundabout leads to some of the most hallucinatory interpretations. The Internet abounds with solutions totally contrary to logic, both from "well-wishers" who want to monetize the information transmitted, as well as from driving schools, or responsible public authorities.



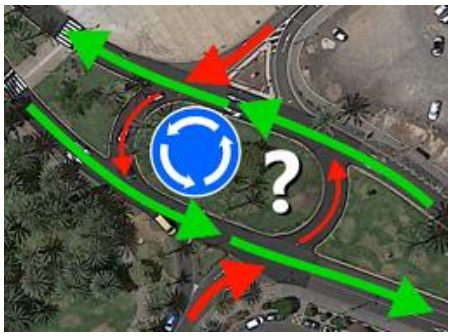
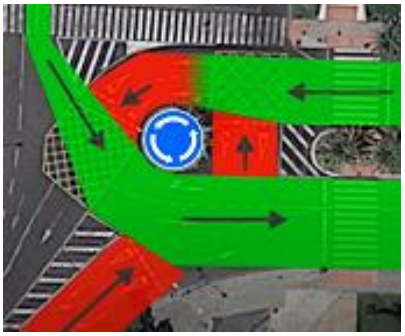


At least in Romania, the traffic police applied the law in a contradictory manner, assigning different meanings to traffic in the roundabout. 1/3 of the police officers of the country's counties considered that those who entered the second or third lane can exit the roundabout (by turning right) from the lane they entered, considering that they will exit in the "straight ahead" direction or "to the left", compared to the place where they entered the roundabout, 1/3 of the police officers of the country's counties considered that exiting the roundabout could only be done from the first (right) lane, and 1/3 answered evasively, without relevance or legal support. As a result of the lobbying we did at the parliamentary level, today there is a draft law (https://senat.ro/legis/lista.aspx?nr_cls=L739&an_cls=2022 and now at https://www.cdep.ro/pls/proiecte/upl_pck2015.proiect?cam=2&idp=20648), to define the roundabout meaning, so that the application of the law is uniform throughout the country, both by the police agents and by the courts, which also had a non-uniform and contrary practice.

Some road safety authorities and some road administrators consider that the direction "straight ahead" inside the roundabout is exiting the roundabout, and continuing inside the roundabout is turning left. Wrong.

The "Straight Ahead" direction represents the circular direction of the roundabout, roundabout exits are right turns, and the "left" direction does not exist in the roundabout.

In the Canary Islands, some roundabouts may be non-priority roads and roundabout entrances may be priority roads, because road administrators and traffic safety officials have not understood how to mark and signal these traffic nodes correctly, creating confusion for the millions of tourists, and also many accidents.


Watch video (YouTube)

Română https://youtu.be/ZOVNLixIXUY

Español https://youtu.be/rSjl3plfIpQ

English (subtitles are available in EU languages) https://youtu.be/8WDzduAlduE

Certainly, many people think that the square at the Arc de Triomphe in Paris is a roundabout. No, it's not a roundabout, it's just a square with circular traffic, and those inside the square must give right-hand priority to those entering the square. Moreover, the circular road does not have marked travel lanes and drivers are totally confused. Confusion is at its maximum for the millions of tourists who pass through this place and traffic jams are frequent because it is against logic to allow everyone in and lock them inside at the next square entrance.

Video: https://youtu.be/-2RCPpdmSVg

Or/and https://youtu.be/JgWhagB4d_g

Functionality

If in the case of roundabouts with only one traffic lane per direction, things are understood by most drivers (except in Greece), in the case of roundabouts with several lanes, traffic is chaotic, sometimes creating more traffic jams than in the case of a classic intersections. Video: https://www.youtube.com/watch?v=oWEkRcgdjpE&t=73s

This is because there are no clear and logical specific regulations for drivers, national laws do not define how multi-lane roundabouts should be driven, markings inside roundabouts are generally useless, and in some cases do not even exist (France). From personal experience, I found that only German drivers, or the vast majority of them, know the logic of the roundabout and drive correctly.

In the case of Spain, the authorities responsible for overseeing traffic safety recommend conflicting solutions that can lead to accidents, or at least the blocking of roundabouts.

The recommendation of the General Directorate of Traffic in Spain leads to conflicts and accidents:

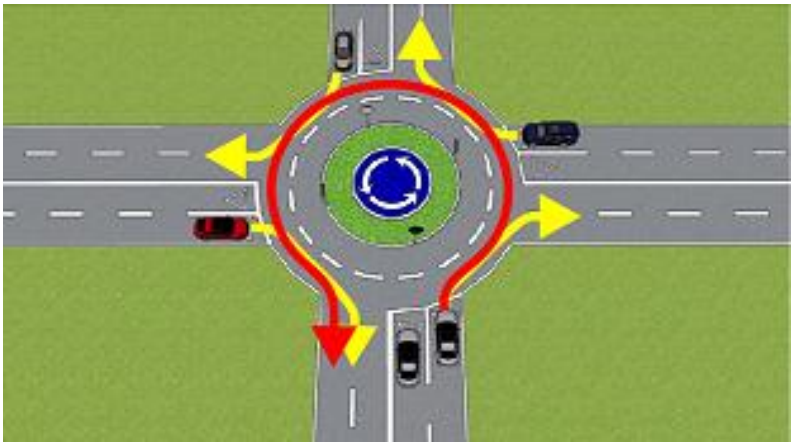
https://revista.dgt.es/es/multimedia/infografia-animada/2016/0519-Glorietas-animadas.shtml

You can watch the explanation of the logic error in this video: https://youtu.be/3U9VKX3Wi-s

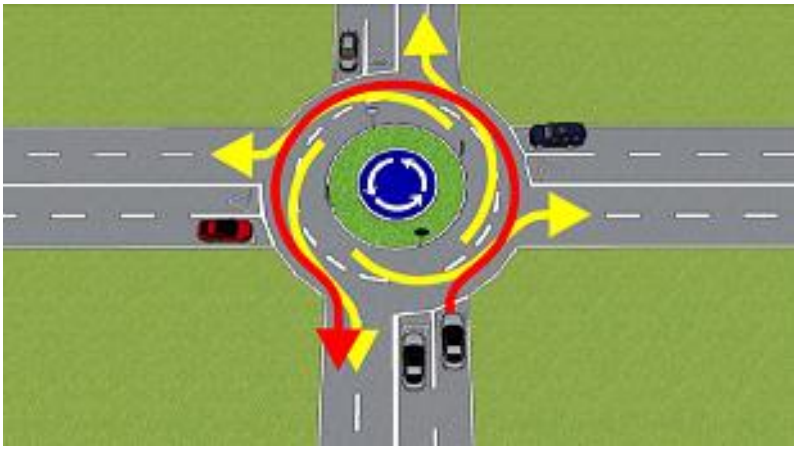
In the same way, or worse, driving schools and their instructors, form the future drivers who will never seek the logic of safe and smooth traffic, but will do as they learned in driving school, considering that this model is right.

Driving test examiners do not have any requirements regarding these aspects either.

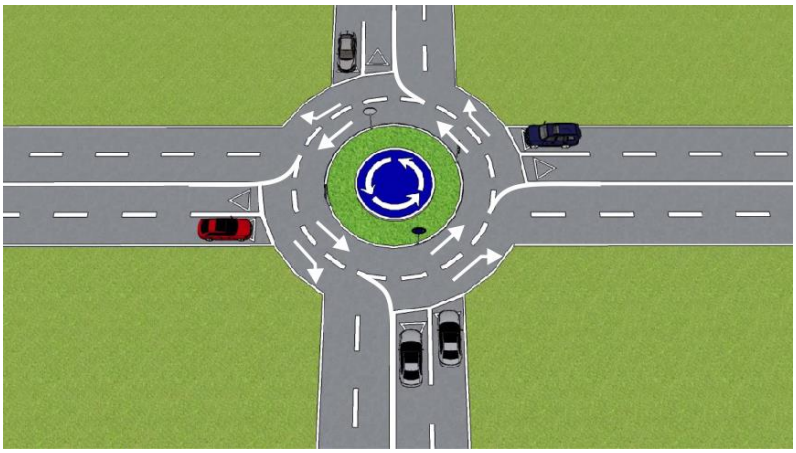
In Spain there are more than 80,000 roundabouts, most of them blocked due to drivers who mainly use the first lane (outer lane) of the roundabout, thus blocking all entrances and exits from the roundabout and affecting the traffic of vehicles traveling correctly in the roundabout.
Video:
https://youtu.be/oWEkRcgdjpE



A vehicle that will use only first lane (outer lane) of the roundabout until exiting the roundabout, will block the access of all vehicles that want to enter the roundabout and exit at the first exit,

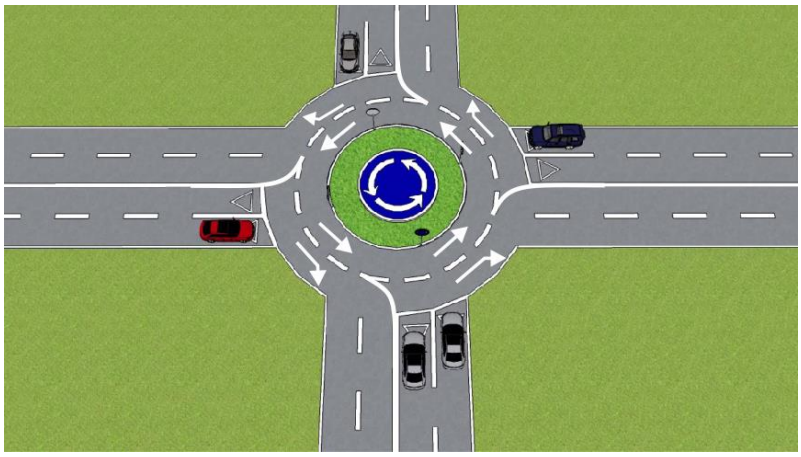


but also the exit of vehicles that entered the roundabout correctly and logically and want to exit the roundabout at the 2nd, 3rd, 4th or last exit.

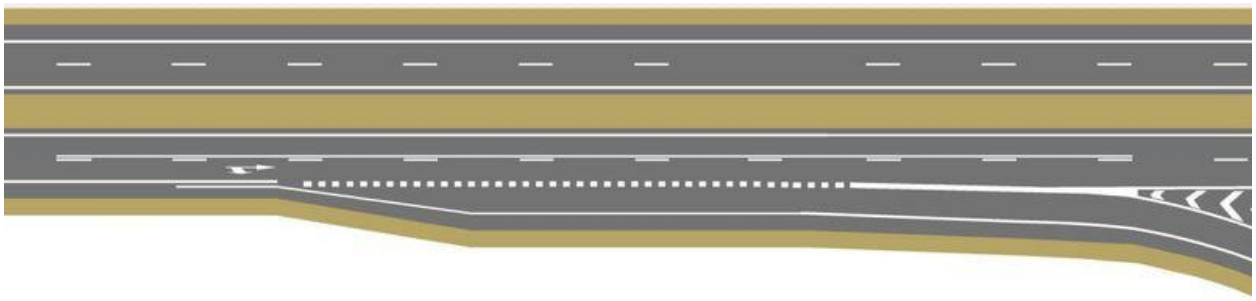


The laws of physics tell us that smooth traffic should avoid stops, and the roundabout was designed as a road node to avoid stops. For this, once you have entered the roundabout, you should have the transit of the roundabout without stopping and without intersecting with other vehicles traveling in other lanes.

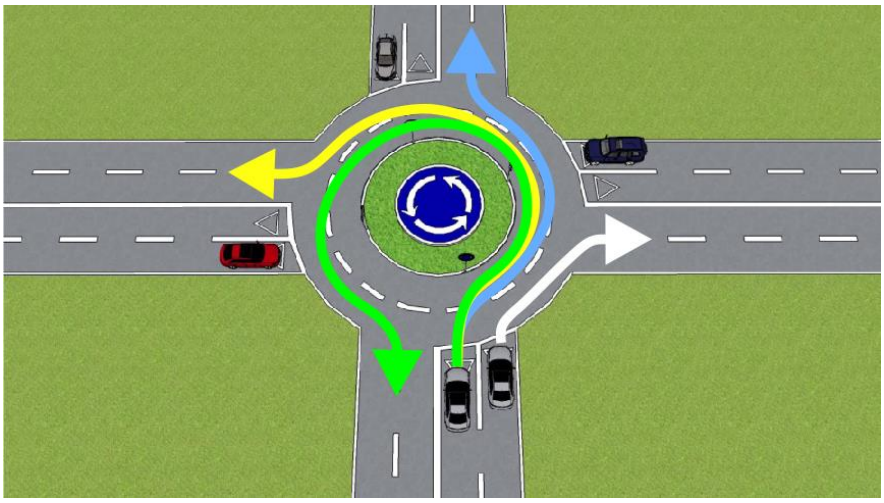
The logical solution for multi-lane roundabouts is for the first lane (outer lane) to be used for exit only,



like the deceleration lane on the highway.



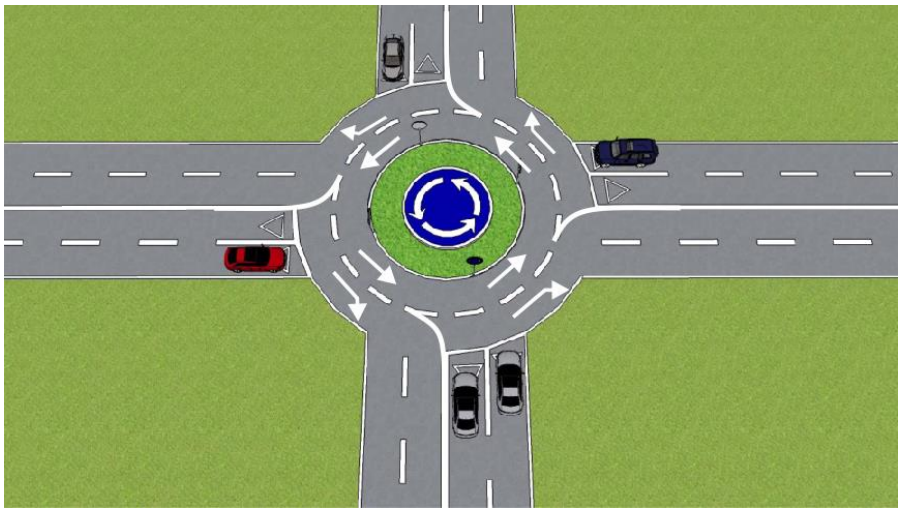
In this way we create **a junction** between those who want to enter the roundabout and those who want to exit at the first exit, and **a bifurcation** for those who exit the roundabout and those who continue moving inside it. Thus, those who will cross the roundabout and want to exit at the first exit, will enter the roundabout from the first lane and will be able to exit unhindered, after giving priority to pass at the entrance, only to those who choose to exit and access the first lane (outer lane).

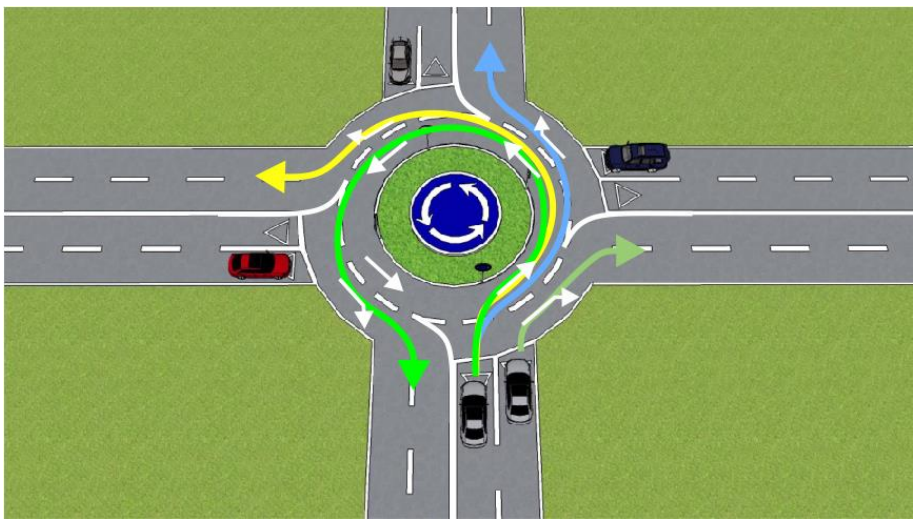


Those wishing to exit at the second exit or later, should enter the roundabout in the 2nd lane (inner lane), with an

intersection before the exit should change the second lane (inner lane) with the first lane (outer) and exit from the roundabout, without conflicts with vehicles from first lane, as those in first lane were forced to exit at the previous exit.

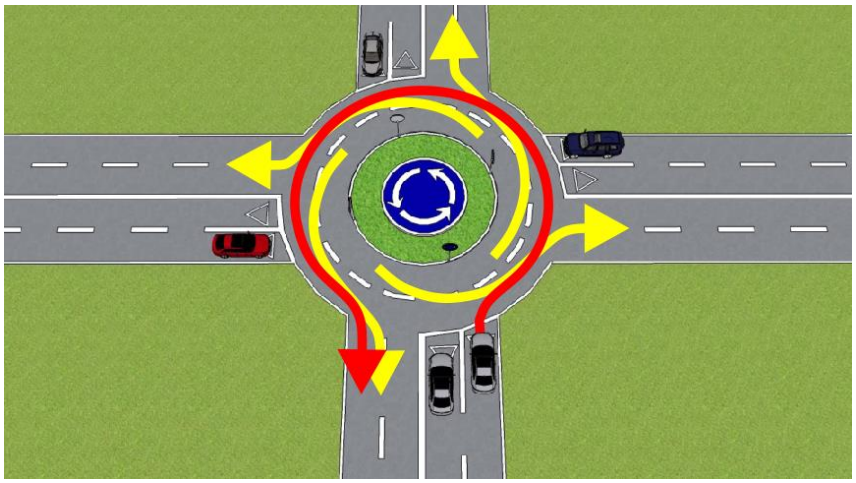
But, just a written rule would not be enough. In world traffic there are billions of drivers who have learned otherwise, often wrongly, and will not soon comply with the new rule of using the first lane (outside lane) only for exiting. In order for all drivers to be able to use the roundabout according to a new rule, a logical rule, it would be necessary for the general rule to be supplemented with the obligation of appropriate markings. Authorities should draw a marking with a clear pattern to follow in the roundabout, to drawing solid lines prohibiting the continuation of drivingthe roundabout from the first lane (outer lane) and right direction arrows.





In this way, after giving priority (to those on the left) when entering the roundabout, all vehicles will exit without conflicting with the path of other vehicles traveling through the roundabout, and those intending to exit at the first exit will do so from the first lane, which will always be free, improving both traffic flow and especially road safety. The principle of centrifugal force should be relevant in the dynamics of roundabout fluidity.

The first lane (outer lane) of the roundabout should be used for exit only, just as the deceleration lane on highways is used for exit only. In this way conflicts between vehicles traveling inside the roundabout and following different trajectories are eliminated.



On YouTube you will find a lot of videos of driving schools or competent authorities that not only defy logic, but are simply threats to road safety! Those learners who learn from those patterns will become a public hazard to traffic when they get their driver's license.

The correct option is the logical option. Everything that goes against logic is wrong, the laws of mathematics or physics are above worldly laws.

This is the correct version:

English (subtitles available): https://youtu.be/cAsddV3TLoE
Español: https://youtu.be/c06LDjOFPLE
Română: https://youtu.be/XPLB5UvuY2o

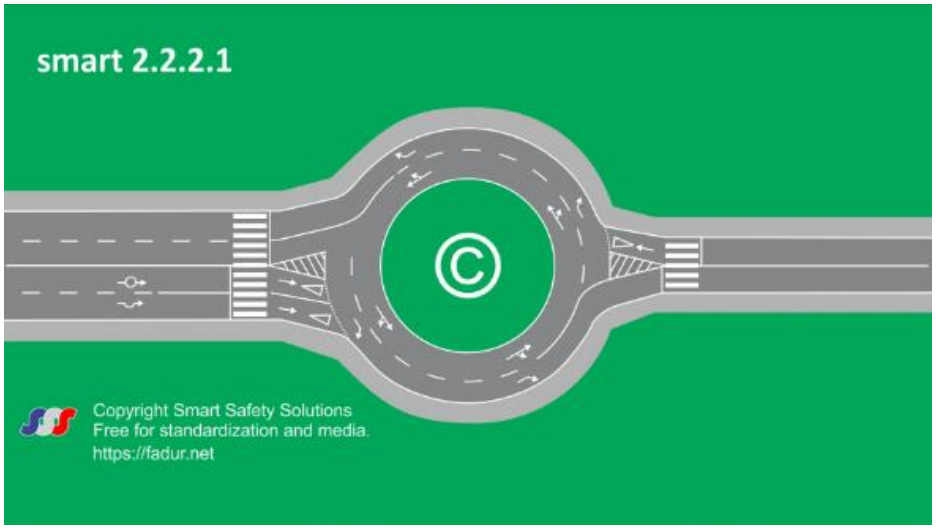
In conclusion, I believe that in order to raise the level of road safety, the correct definition of the roundabout and the application of road markings that are easy to identify and understand by all traffic participants are required, and in this way all the roundabouts in the world can be transformed in fast (fluid) traffic nodes, and traffic participants can transit them in complete safety.

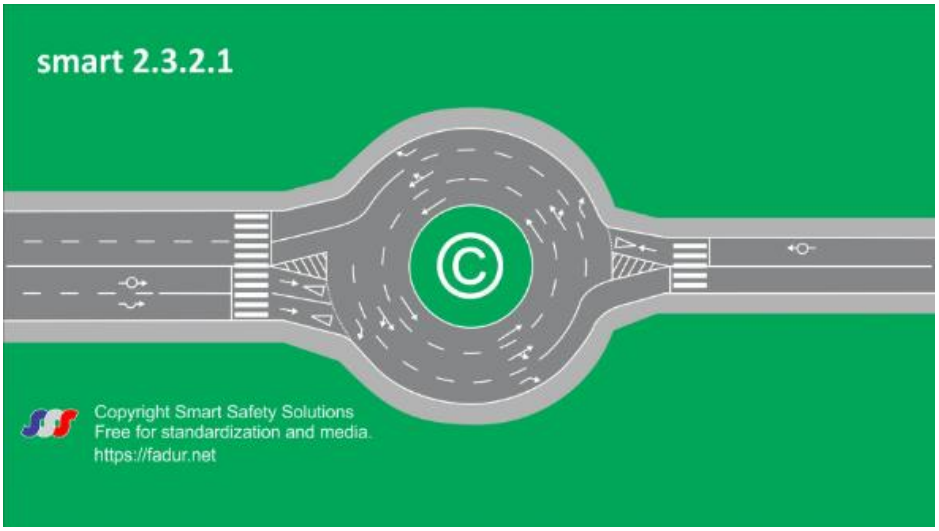
The **DEFINITION** I propose would be the following:

The roundabout is a traffic node consisting of a main one-way road with a circular way, which successively intersects with secondary roads on the right side (on the left side - in countries where traffic is carried out on the left side). **In multi-lane roundabouts, the first lane will be used exclusively for exit and the road administrator will mark the exits from the roundabout accordingly with solid curved lines. Stopping, stationary and overtaking are prohibited in the roundabout.**

SMART ROUNDABOUT©

I designed and drew different marking patterns, depending on the number of lanes and according to traffic flows, so that the fluidity is at maximum values without conflicts, which I called Smart Roundabout ©.

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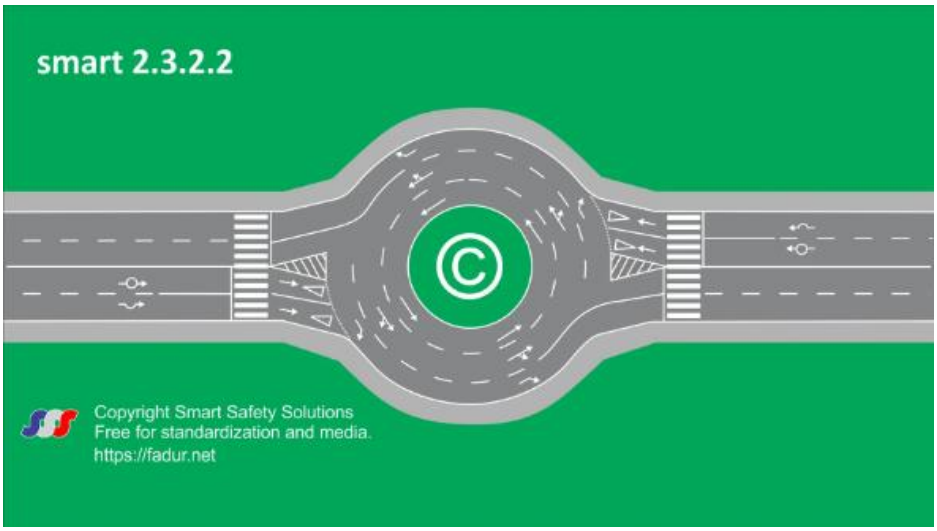
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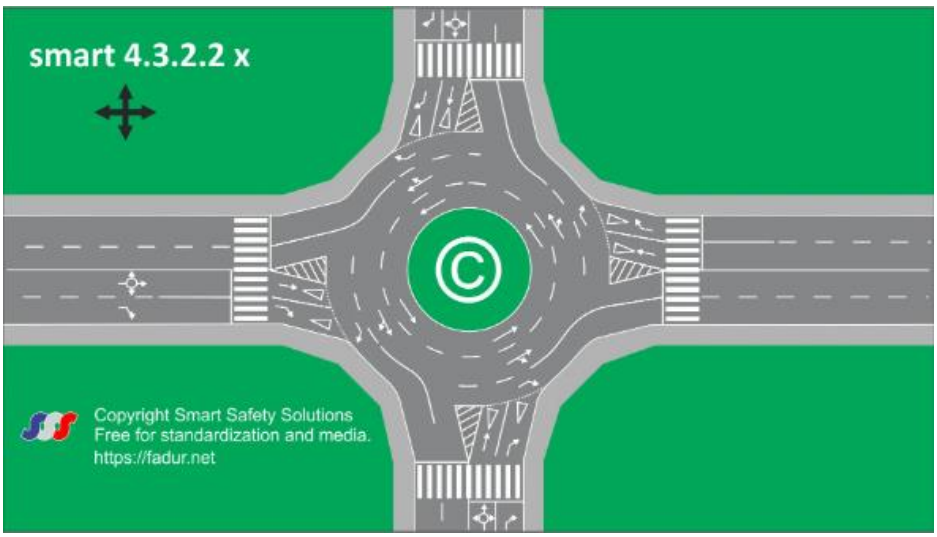
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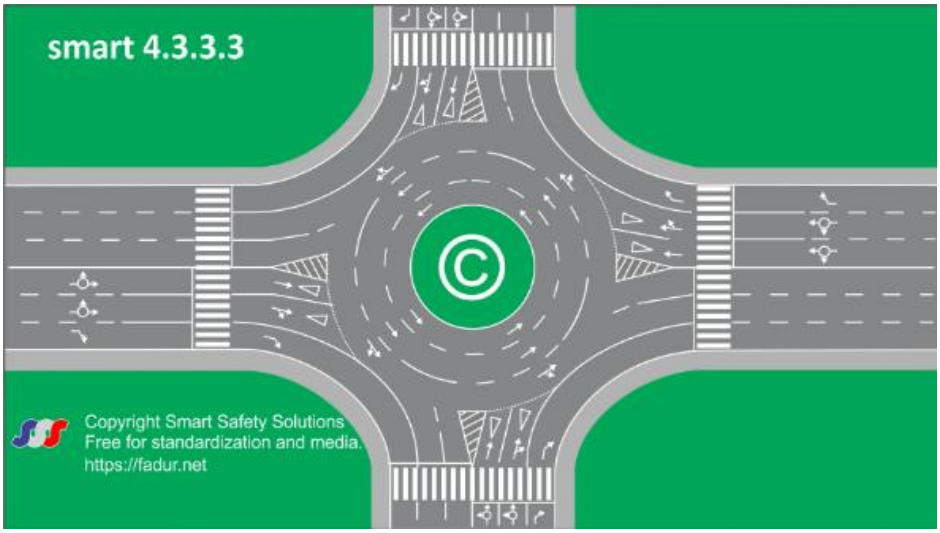
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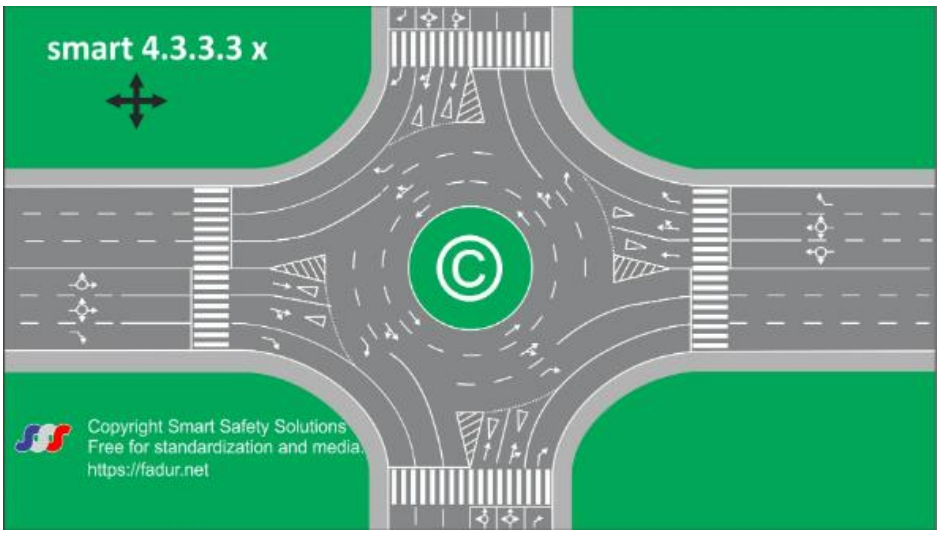
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You can find the Smart Roundabout© boards at a decent resolution here https://fadur.net/smart-roundabout/

I presented architectures of Smart Roundabout© with 2, 3 and 4 secondary roads. Models can be replicated for Smart Roundabouts© of any size or shape, and multiple secondary roads can be added (unlimited). If you have difficulties setting up a Smart Roundabout© on other streams and more secondary roads than shown in the maps, contact me and I will give you the best solution.

Economic

The Smart Roundabout © architecture saves a lot of money, both for the authorities and for the users:

TIME – eliminating conflicts means fluidity.

ACCIDENTS – without conflicts between road users, the risk of accidents is reduced to zero. No material, medical or social damage.

FUEL – no traffic jams, fuel consumption will be low.

POLLUTION – without traffic jams, the air in the area will be less polluted.

In this way, all roundabouts will receive the fluidity and safety for which they were designed.

WARNING: changing the architecture of a roadway, should take into account the human factor, the fact that people do the repetitive things from memory, acting reflexively according to previously known patterns. When changing the architecture of a roundabout, it is necessary that the first markings applied are temporary yellow markings, for a period of at least 3-6 months, so that all residents who have driven through that place before can identify by the yellow color of markings, the novelty aspect and thus to be aware of the changes made. Neither you, don't see traffic signs when you drive repetitively on the same road, and if the markings changed overnight, there's a 99.99% chance you'll run them over.

3. Parking

Although it seems a simple and free of danger matter, the architecture of the parking can influence the safety of the road users, parking entry and exit maneuvers, as well as accessing a vehicle in the roadway area can have repercussions both in terms of safety and fluidity.

Exiting the parking lot backwards is as dangerous as entering with back in a intersection, or backing out of the yard or garage.

Most urban street parking is on the side of the road, on the right side (and on the left side in the case of one-way road) and the parking spaces can be:

3.1. Parallel to the axis of the road,

3.2 Perpendicular to the axis of the road,

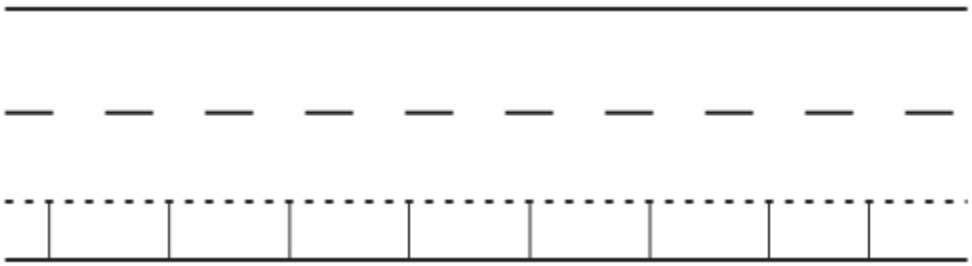
3.3 Oblique to the axis of the road and here we have two models:

3.3.1 At a sharp angle to the axis of the road.

3.3.2 At an obtuse angle to the axis of the road.

What is the most efficient parking model from the point of view of safety, but also of traffic flow? Some will ask what is the importance of parking lot architecture, not knowing that it is very important, both for fluidity and especially for safety. Is there any difference regarding parking model safety? Let's see.

3.1. The parking parallel to the axis of the road



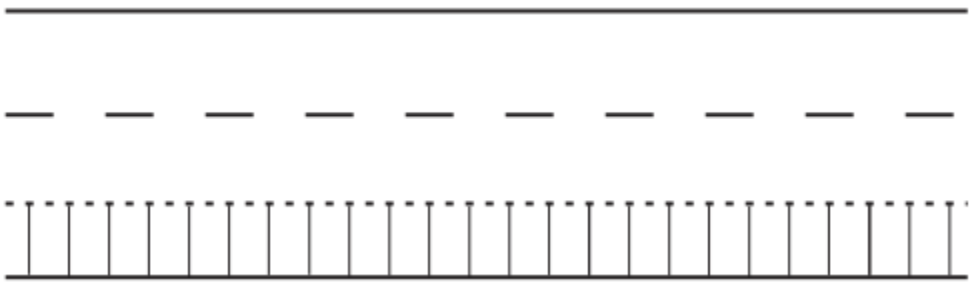
These are the most common parking models, but the number of parking spaces is less compared to other models, due to the fact that a parking space consumes the lengths of all parked cars and, in addition, a space between them. The entrance to the parking place is done under safe conditions. As soon as the driver notices a free place, he will stop the car in the traffic lane, and the cars behind are obliged to stop behind. To maneuver the vehicle, the driver has visibility in the rear-view mirrors.

Exiting the parking space is done facing forward, easily and safely, the driver has visibility both when entering and exiting, in the rear-view mirrors.

Access to the trunk is done safely, from the parking lot and not from the road.

However, there is a risk that the driver or the passenger on the left rear, will not be noticed in time in the road, when entering or exiting the car, especially when the road is on a curve to the right.

3.2. The parking perpendicular to the axis of the road



It is the most common model and provides a greater number of parking spaces compared to parking parallel to the axis of the road, but it is the most inefficient model of parking because it **presents the greatest risks in operation**.

Most drivers will want to access the vacant parking space by performing this maneuver by facing into the parking space. No vehicle will be able to execute the right turn maneuver and enter the parking space in the first lane of the direction of travel, due to the steering angle of the vehicles and due to the fact that the required circle arc is too small.

A larger circle arc is required to perform this maneuver. Thus, those who want to take a parking space will have to exceed the limit of the travel lane and thus will have to either execute the maneuver from the second lane or from the opposite direction. That means a traffic slowdown in more than one lane. Even for those who will enter from the second lane, or from the opposite direction, they may require forward/backward maneuvers to enter the parking space correctly.

When exiting the parking lot, drivers of vehicles parked perpendicular to the side of the road will not have visibility to ensure that no vehicle is traveling in the first lane at that time, in order to be able to back out of the parking space. Moreover, if a commercial vehicle without windows, or a taller vehicle, is parked to the right of one's own vehicle, visibility is reduced to zero, so entering the traffic lane will be done blindly, i.e. without the driver knowing if in that moment, a vehicle is moving on the first lane. The risk of accidents is maximum! As you can see in the image, you can only see the driving position for the first vehicle in the line-up, and only this driver will have visibility of the traffic on the first lane when exiting the parking lot.

For the other parked vehicles, the driving position is hidden by the vehicles parked on the right side. You can't see the driving position, and also the parking lot drivers can't see you either.

The exit from the parking lot will also be done in the second lane, or in the opposite direction, perhaps even at a wider angle than to entrance, when the maneuvers were carried out facing.

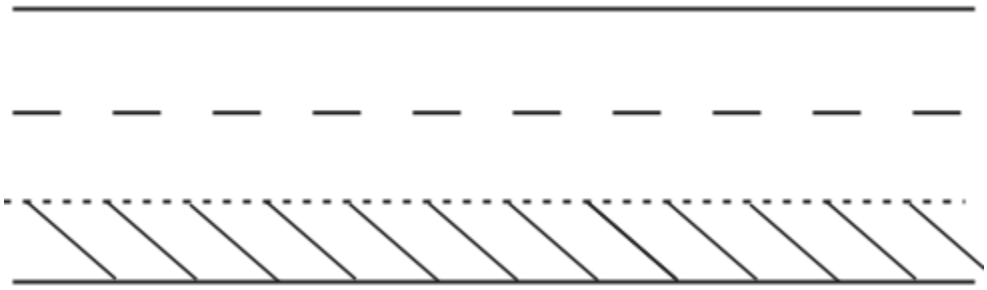
The maneuver to enter the carriageway, in the lane of the road with the back is a dangerous maneuver.

The driver's exit and entry from/into the car is done safely from the parking lot, but accessing the trunk for loading/unloading goods is done at the risk of the driver's presence on the roadway, in the path of vehicles in the first lane. At night the risk is increased.

If the driver is accompanied by a child, the risk of an accident is much higher, a child is not aware of the risk of his presence on the road!

3.3. The oblique parking on the axis of the road

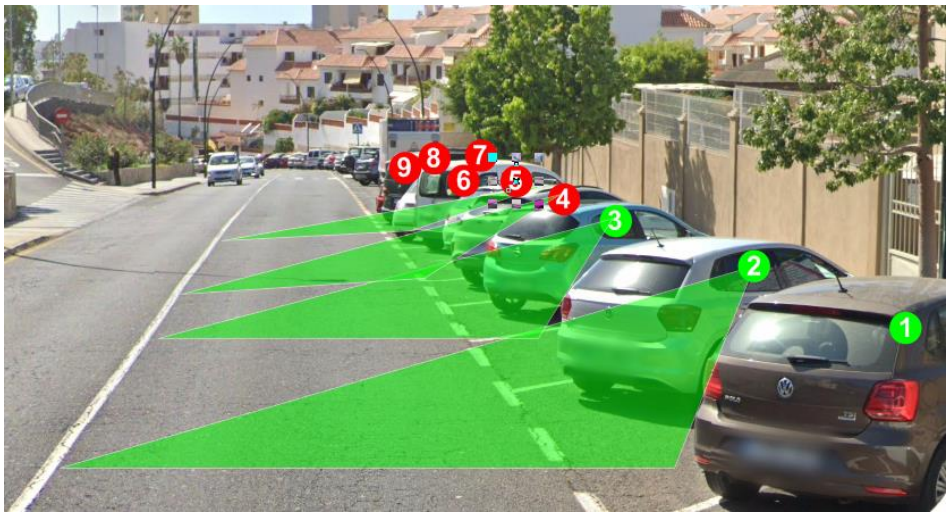
3.3.1 The parking at a sharp angle to the axis of the road



Parking at a sharp angle to the road axis is a frequently met parking pattern because more parking spaces can be configured than parallel parking to the road axis, and it seems to be a model favored by architects and road managers.
This parking model provides direct and quick access to the parking space, so drivers can enter the parking space without difficulty. Problems and risks occur on the way out.

When exiting the parking lot, short cars can obtain a correct exit trajectory, but for long cars it is necessary to exceed the space of the first lane and enter with the back into the second lane or the opposite direction.

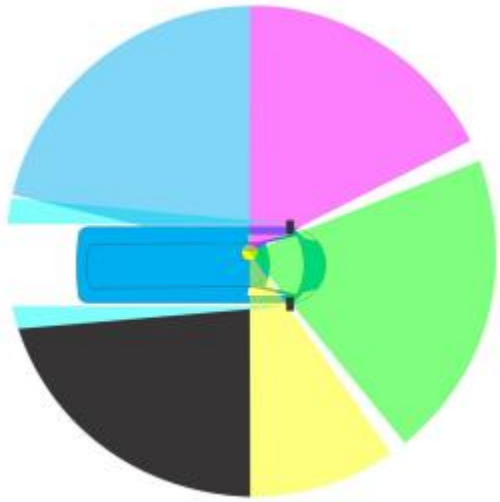
Drivers of vehicles parked at this angle have reduced visibility in a very small space to the corner of the car parked on the right, to ensure that there are no vehicles in the first lane when exiting, to be able to back out safe of the parking. As can be seen, we have no visual contact with the driver's position of parked vehicles except in the immediate vicinity, this means that their drivers will not see us when they intend to leave the parking lot either.



Also, if a commercial vehicle without windows, or a taller vehicle, is parked to the right of your own vehicle, visibility is reduced to almost zero, so entering the traffic lane will be done almost blind. The maneuver to enter the roadway backwards is a dangerous maneuver. The risk of accidents is high!

Drivers of commercial vehicles without rear windows are also unable to ascertain whether there is any vehicle on the road at the time, as this is the **blind spot** of commercial vehicles.

BLIND SPOT!



Native front visibility

Visibility in rear view mirrors

Right visibility by turning the head

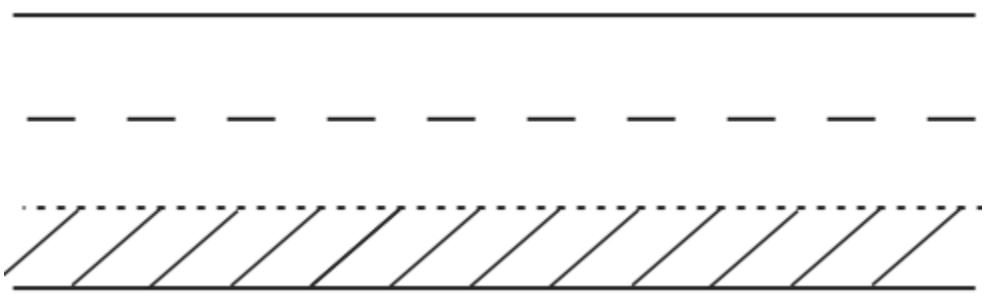
Left visibility by turning the head

Visibility left by sticking your head out the door window

Total lack of visibility

Accessing the trunk to load/unload goods is done at the risk of the driver's presence on the roadway, in the path of vehicles in the first lane. At night the risk is increased, the presence of a child, also represents a major risk.

3.3.2 Parking at an obtuse angle to the road axis



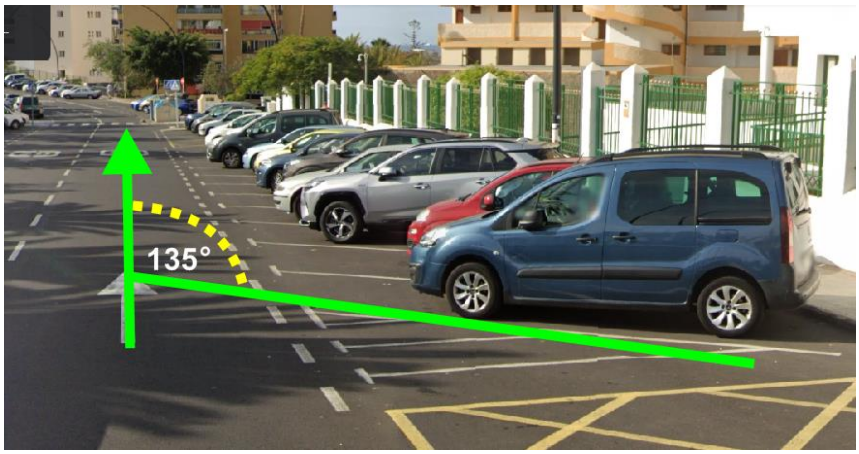
Parking in an obtuse angle to the axis of the road is a very rare met parking model, although it is the pattern that offers **the greatest safety** and the best fluidity.

The entrance to the parking place is done under safe conditions. As soon as the driver notices a free space, he will stop the car in the traffic lane, and the cars behind are obliged to stop behind him, the parking maneuver making in safe.

At the exit, no matter what type of vehicles are parked on the side, all drivers will have maximum visibility when starting the car, being able to secure themselves at a long distance, if at that moment other vehicles are driving in the first lane. As can be seen, we have visual contact with all the driving positions of parked cars and by default and their drivers see perfectly if there is a vehicle in the road lane to give it priority.

Accessing the trunk as well as access to the car is done from the sidewalk, or from the parking space, without any risk for them or for traffic safety.

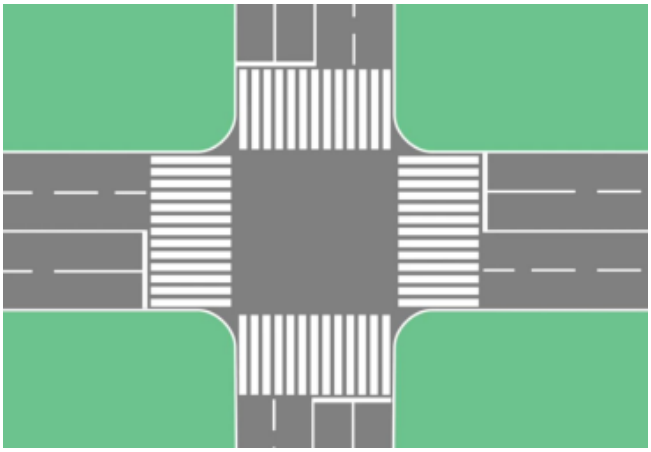
In Conclusion: the oblique parking lots, at an obtuse angle to the axis of the road, are the safest and easiest to access and should be the standard model in street parking architecture if we want safety and fluidity.



VIDEO

English https://youtu.be/9qJAi7jVzSA
Español https://youtu.be/jLBx48cO9pw
Română https://youtu.be/xN46D4YC4DY

4. Crosswalks: safety, fluidity, slow speed

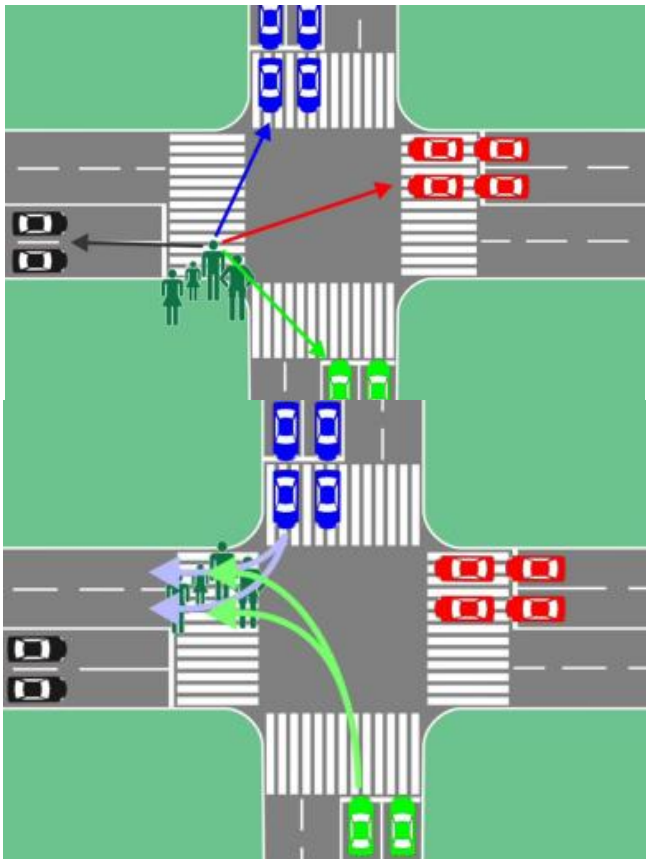


According to statistical data, most traffic accidents take place in towns.

Many of them take place at, or near crosswalks, and very many in intersections. Everyone thinks they know everything about crosswalks, their architecture and placement. Unfortunately, most crosswalks in the world are designed and located incorrectly, generating both insecurity and traffic jams, as well as an increased risk of accidents.

At least I have identified **5 problems and solutions** to this type of architecture.

4.1 The danger when crossing the street

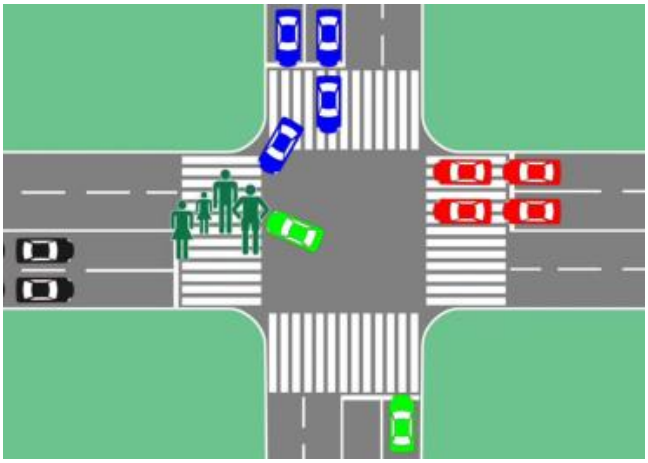


In most states of the world, crosswalks are located at the corner of intersections.

Crossing streets at the corner of intersections, even on crosswalks, requires ensuring pedestrians from four directions: left, right, front and back, and not just left and right, as wrongly formulated in the traffic laws of many states.

Vehicles traveling on the road parallel to the crosswalk may turn left or right and surprise you crossing the street on the crosswalk.

If the drivers of these vehicles are attentive and skilled, there should be no problem, but things can be a bit more complicated for less talented or experienced drivers, because executing a turn involves several operations such as: signaling, insurance from different angles, gear changing, braking and distributed attention, but here comes the problem - visual field and especially peripheral visual field.



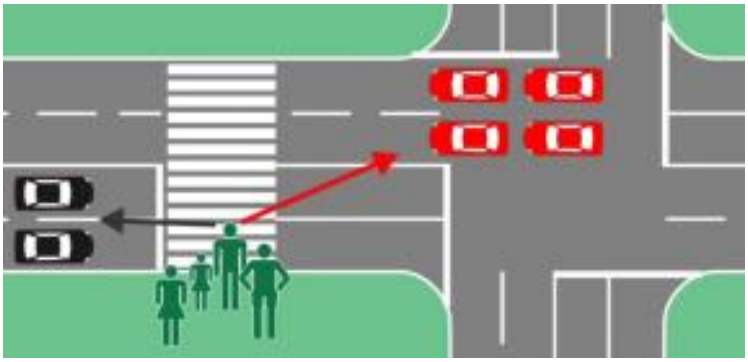
Many vehicles have blind spots at the A-pillars, the pillars between the windshield and the front door glass, which are doubled. This could cause the drivers of these vehicles not to notice the pedestrian in the crosswalk in time, or at all. In the case of these vehicles, the blind spot is approximately 15-25°.

If the speed of the vehicle is not correlated, the accident is already a number in the statistics.

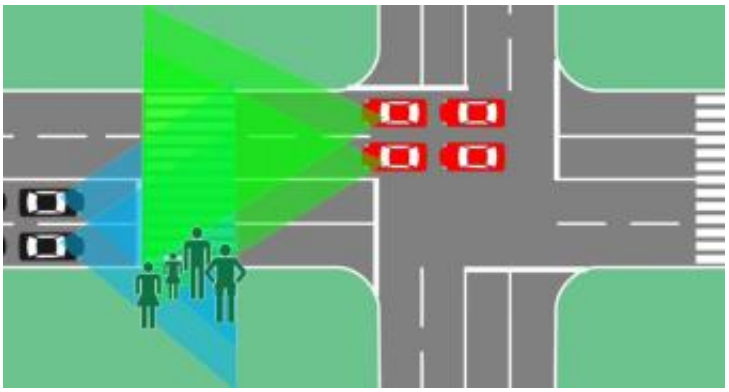
The solution: Crosswalks should never be at the corners of intersections.

Things have a different dynamic and a different perspective if the crosswalks are located some distance from the corners of the intersection.

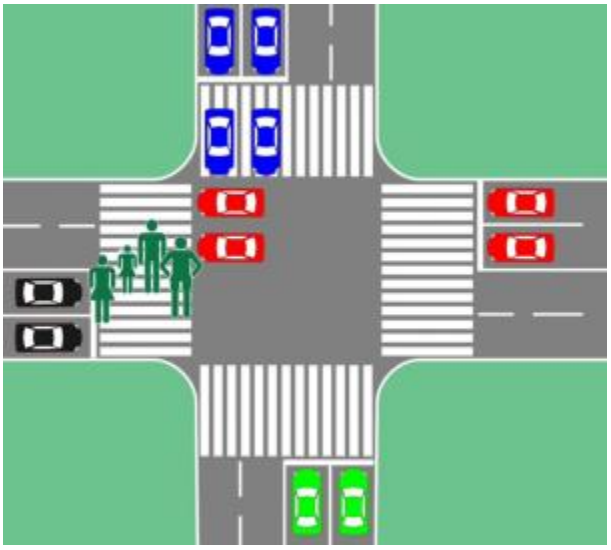
In this case, pedestrians will only have to secure themselves from the left and right sides.



All drivers of vehicles on this road segment will have in their field of vision, through the windshield, all pedestrians from the crosswalks, or in their proximity.



4.2 Intersection blocking



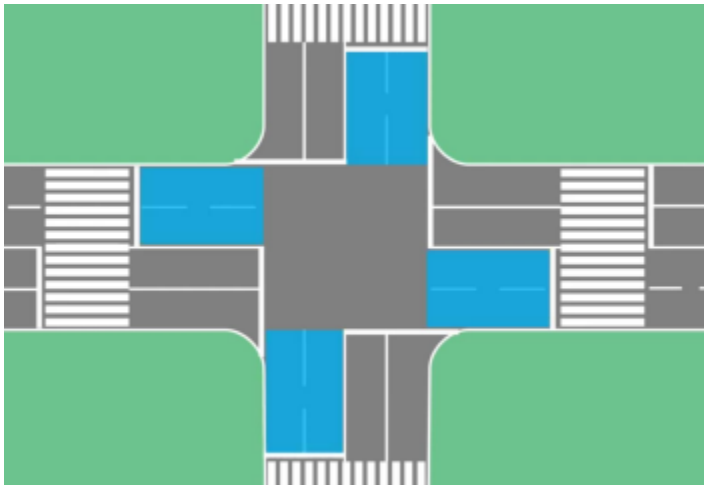
It can often happen that vehicles yielding to pedestrians in the crosswalk or engaged in crossing have to stop in the way of vehicles coming from the side.

Because we live in a dynamic society and we are all in a hurry, many of the drivers will enter the intersection from the priority or free directions, until the entire intersection is saturated and blocked, but all the adjacent traffic will also be disrupted and blocked, thus reaching to waste several hours a day, stuck in traffic.

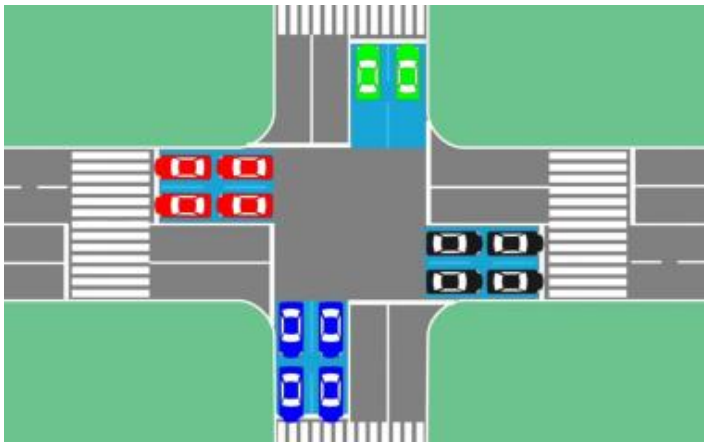
This is what happens when you can't get past the corner of the intersection and are forced to block traffic.

The solution: Crosswalks should never be at the corners of intersections.

If the crosswalks are located some distance from the corners of the intersection, we will create a buffer space for those who want to exit the intersection and must give way to pedestrians on the crosswalk, or who want to engage in crossing.

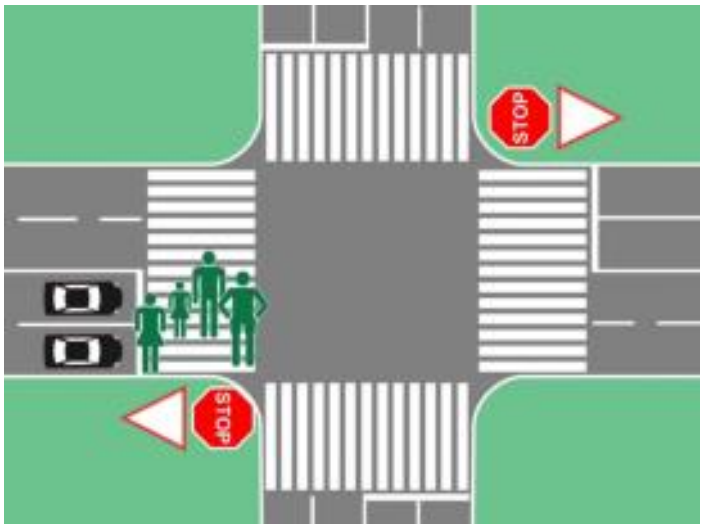


In this way, vehicles that have crossed the intersection will exit the intersection by entering this buffer space, without unnecessarily blocking the intersection.



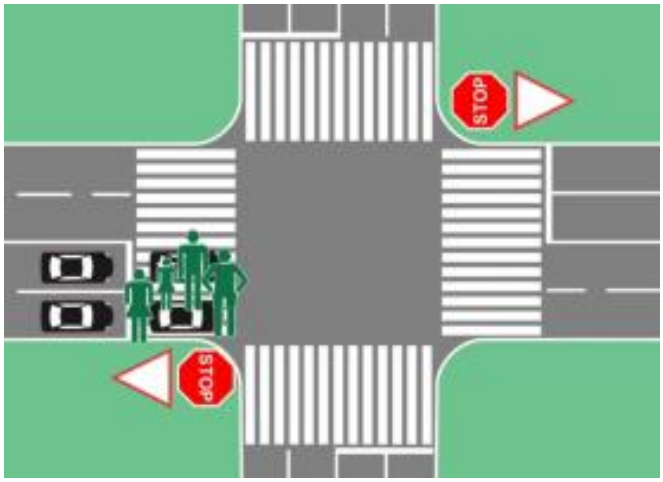
4.3 Intermittent blocking

Before entering the intersection there is a pedestrian crossing and you must automatically give way to pedestrians.



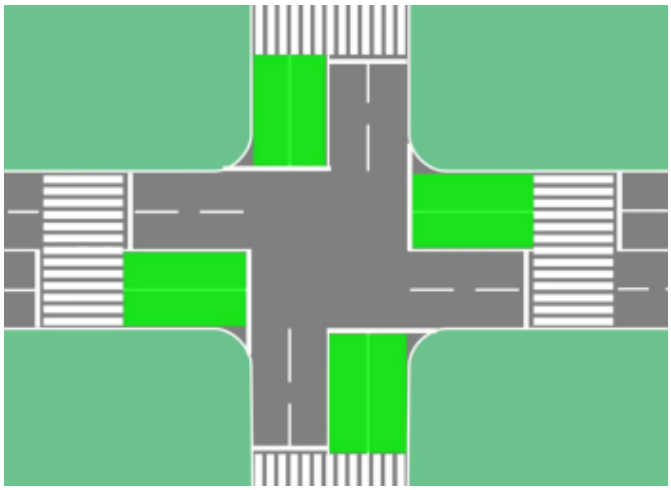
After giving priority to pedestrians, you advance to the corner of the intersection for maximum visibility and must give way to vehicles traveling through the intersection on the main road, or priority road.

While you are waiting for vehicles from the priority road to pass through the intersection, other pedestrians may appear who want to cross the street, obviously on the crosswalk. There is a risk of not noticing a distracted and hurrying pedestrian and hitting him when you start to cross the intersection.

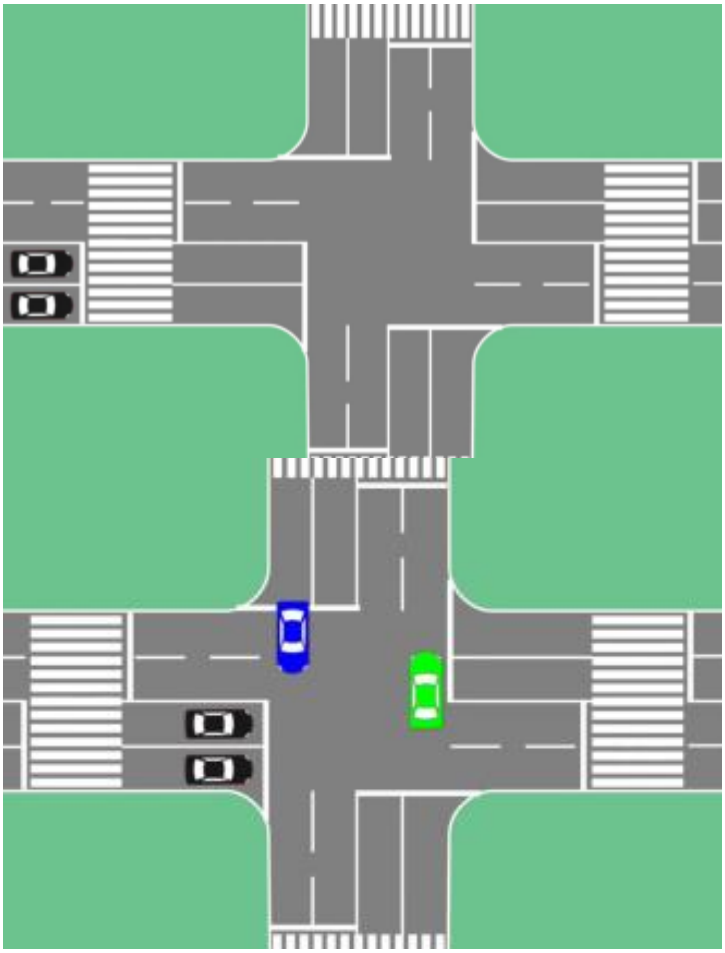


The solution: Crosswalks should never be at the corners of intersections.

If crosswalks are located some distance from the corners of the intersection, we will create a buffer space for those who want to enter the intersection and must give priority to vehicles from the main road, or priority road, without conflicts with pedestrians who engage in crossing.



Now, in this situation, you stop at the crosswalks where you give way to pedestrians, after which you move forward in the buffer zone towards the corner of the intersection.

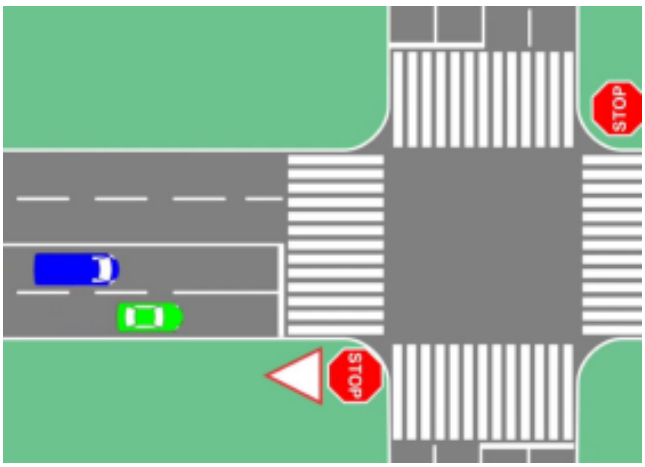


And here, you will give priority of passage only to vehicles on the main road, on the priority road, without entering into conflict with any pedestrian who would like to cross the street. When the intersection is clear, you can continue crossing it without any risk.

In this way we eliminate conflicts, eliminate risks, eliminate possible accidents.

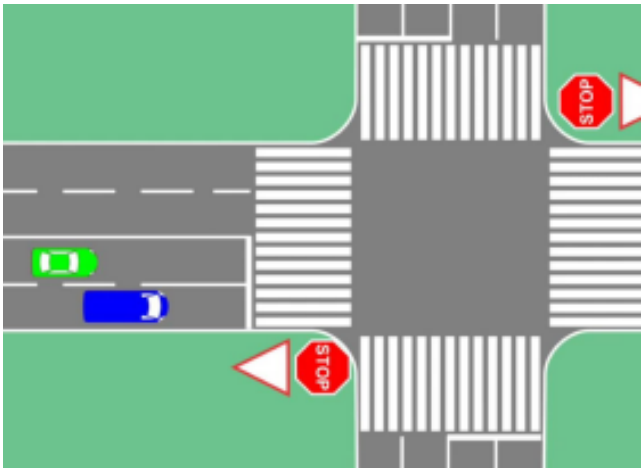
4.4 The impossibility of applying visible markings

Vertical markings are part of road signage, only their effectiveness is reduced when vehicle traffic is carried out on several lanes, and there are height differences between vehicles in different lanes.

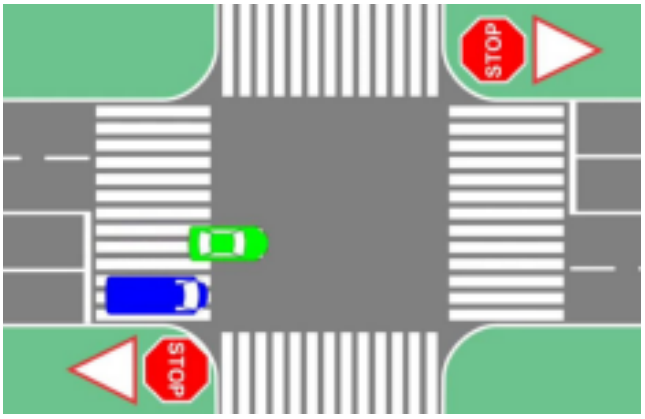


In this situation, in second lane we have a truck, and in first lane we have a car. The height of the truck and its driving position allows the truck driver to see above the height of the car the Stop or Yield sign at the corner of the intersection. But, a truck in the second lane is only in the situation when it intends to turn left in the intersection.

In all other situations, the truck will be in the first lane and the car in the second lane. In this situation, the driver of the car will not be able to see the Stop or Yield sign at the corner of the intersection, due to the fact that he does not have direct visual contact, due to the truck being taller and blocking his visibility.

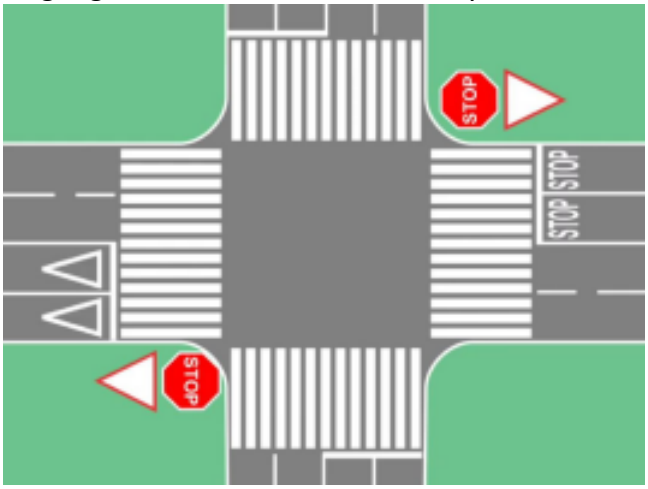


There is an increased probability that the car will enter the intersection without checking, because it does not see the Stop or Yield sign, nor the truck's intention to stop at the corner of the intersection, because it does not see the truck's brake lights.



We also encounter the same situation if the Stop or Yield signs are covered by vegetation, but also if the sun blinds us at sunrise or sunset, during fog, snow or rain, when visibility is low.

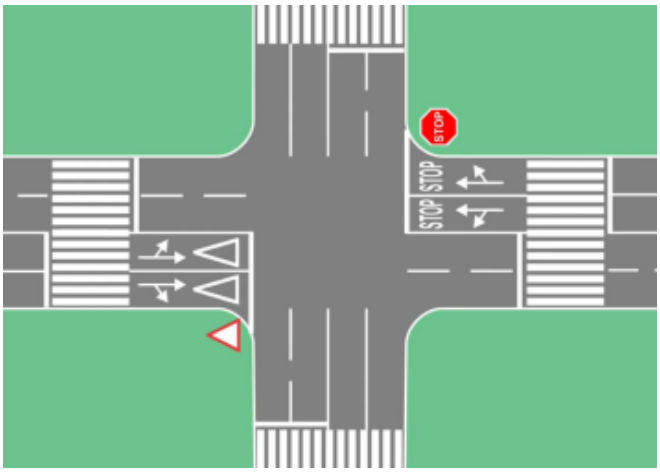
In this configuration of crosswalks architecture at the corner of the intersection, the Stop or Yield markings applied to the asphalt before the crosswalks are pointless and do not make sense. Stop and Yield signs are markings that are placed at the intersection and are intended to be seen by vehicle drivers, in order to know what is the priority of passage in relation to other vehicles.



Stop and Yield markings should be mandatory at all intersections, because they are in the field of vision of all drivers and cannot be ignored or overlooked due to natural causes, or if the driver is inattentive, distracted, tired, or under the influence some substances. Prevention should be the primary goal.

The solution: Crosswalks should never be at the corners of intersections.

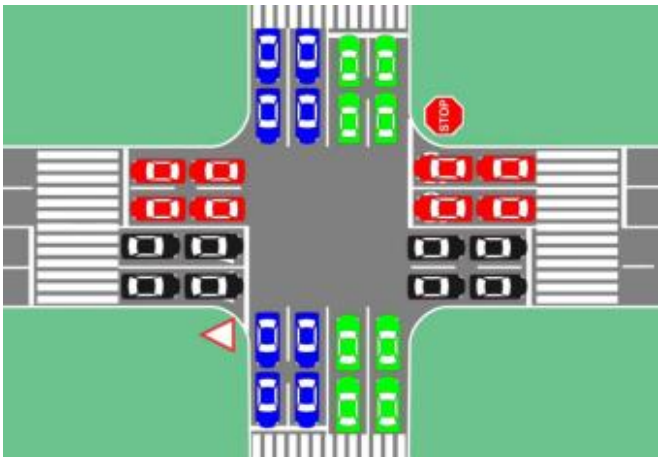
If the crosswalks are located at some distance from the corners of the intersection, in the buffer space created between the crosswalk and the corner of the intersection, both directional markings and Stop or Yield markings can be applied. In this way, no driver will be able to miss the meaning of the obligation to stop or give way.



What is the optimal distance for the placement of crosswalks?

Based on measured or known traffic flows, the buffer zone between the corner of the intersection and the crosswalk should be a minimum of 6 meters for low traffic, so that this zone can accommodate at least one car per lane.

For heavy traffic flows, where buses or other long vehicles frequently travel, the buffer zone between the corner of the intersection and the crosswalks should be at least 10-20 meters, so that this zone can accommodate at least two cars per lane and /or at least a bus.



Please watch this video:

Română: https://youtu.be/Fgm7HVDpc84

English (subtitles available): https://youtu.be/7l6-E5fOaT0 (from 00:00 up to 09:12)

Español: https://youtu.be/NnKMQimGSXI (de 00:00 a 09:21)

4.5 Geometry of crosswalks, solution for excessive speed

Excessive speed is another major cause of traffic accidents!

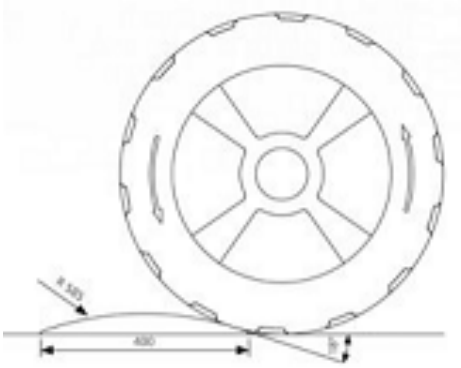
Crosswalks can be the solution to speeding traffic, without speed cameras, without cameras, without cops, without the stress of fines. The Canary Islands are the best example, having the best crosswalks architecture in the world.

Speed reducers, or raised crosswalks, are the solution that forces drivers to reduce their speed to the speed limits imposed by the road administrator.

The best-known and most common solution are speed limiters made of rubber, plastic or concrete, with small widths, which do nothing but destroy the joints of the cars. The rolling surface on this device is so small that the damping assembly consisting of the tire, the spring and the telescope of the car's joint, have to endure a hard, fast and short compression, upon entering the surface of the speed limiter, decompression when the wheel reaches the crest, when following the slope and the second compression when the wheel reaches the road side again.

All of this happens in a fraction of a second, given that:

- At a speed of 30 km/h, a vehicle travels 8.33m/sec.
- At a speed of 10 km/h, a vehicle travels 2.78m/sec.



And the width of the limiter, the length traveled by a vehicle over it, is only ~40 cm.

The effect felt by both vehicle occupants and the mechanics of the car relatively the same at both 30 km/h and 70-100 km/h. This speed limiter model will not intimidate or deter on speed-men.

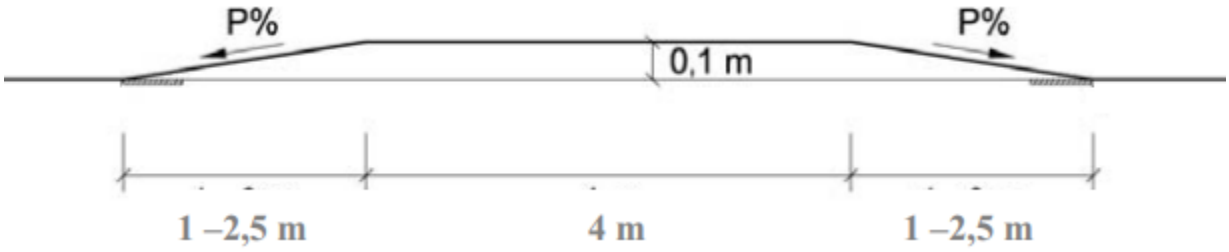
Unlike these speed limiters, joint and suspension destroyers, raised crosswalks are the comfortable solution for those who obey the posted speed limit, and can be very expensive for those who step on the gas pedal too hard. The angles of attack and clearance can be calculated differently, for different speed limits, and their length (6-10 m) makes it possible to pass smoothly, without negative effects on the suspension or joints of the car.

In the first part of the crosswalk, vehicles will encounter a ramp with a length of 1 - 2.5 meters.

The top of the crosswalk has a minimum length of 4 - 6 meters.

And the exit slope from the crosswalk will also have a length of 1 - 2.5 meters.

Spain, but especially Tenerife, has successfully implemented this type of elevated crosswalks, and the results are extraordinary. There are almost no drivers going over the legal speed limit, even on highways, thanks to the relaxed driving manner given by the low speeds in the towns, where these crosswalks have made traffic calm possible.



- At the speed imposed by signs and/or markings, a vehicle passing over these elevated crosswalks will barely feel the bump;
- At a speed 10 km/h above the speed limit, the vehicle and its passengers will feel the bump slightly;
- At a speed 20 km/h above the speed limit, the vehicle and its passengers will feel the bump quite hard;
- At a speed 30 km/h above the speed limit, the occupants of the vehicle will feel the bump very violently and the vehicle may be damaged;

This is the only crosswalk violated by a few hurried tourists that I saw in Tenerife.

A broken bumper, a radiator or a broken oil pan will surely stop speedsters from stepping on the accelerator in the future.

At the same time, this type of crosswalk makes it possible for it to be easily accessed by disabled people in wheelchairs, the crosswalk being at the level of the pavement.

The role of speed reducers is to maintain a speed that should have already been reduced by other measures (for example: signaling, roundabout, etc.).

To achieve the desired efficiency, the distance between consecutive speed reducers must be between 50 and 200 m, although the recommendation is not to exceed 150 m between 2 such crosswalks.

Video:

Română: https://youtu.be/Pl-C_58Px_Q

English (subtitles available): https://youtu.be/7l6-E5fOaT0 (from 09:12 until the end)

Español: https://youtu.be/NnKMQimGSXI (de 10:00 hasta el final)

Conclusion

Elevated crosswalks, configured with correct angles of attack and clearance, are the best solution to calm traffic at moderate speeds (30-50 km/h), especially in states where the speed limit is often violated, and speedmen are a real danger to traffic safety.

5. Vehicle lights

5.1 The third brake light must be mandatory for all vehicles in traffic**.**

NTSB (National Transportation Safety Board) estimated that 80% of deaths and injuries resulting from rear-end collisions could be prevented by collision avoidance systems, which are available in some cars but not required in all.

About 1.7 million rear-end collisions occur on US roads alone each year (Source: The Washington Post). For other territories we did not find statistical information available.

The law firm Sam C. Mitchell & Associates published on its website, that 40% of all car accidents are rear-end collisions.

You are behind the wheel, and after looking in the rearview mirror, speedometer, radio, navigation, etc., etc., you see one of these images:

These are tail light or brake lights?

Are you confused?

- At 50 km/h a vehicle travels 13.89 m per second.
- At 80 km/h a vehicle travels 22.22 m per second.
- At 120 km/h a vehicle travels 33.33 m per second.

To which is added the **reaction time** of the driver to change the foot from the accelerator to the brake pedal, and then the **braking distance**!

Often a second of confusion could mean a rear end accident. An accident means property damage, medical costs, trauma, or even death.

Let's repeat the experience with these images.

Tail light or brake lights?

I think it is clear to everyone without any confusion that these vehicles brake and the driver behind will react immediately without wasting a second.

The third red light is the brake!

In a second of hesitation you will travel over 14-33 meters without doing anything. You'll lose another second before your brain makes the decision to brake and put your foot on the brake pedal, meaning you've traveled over 28-66 meters before you start braking behind a vehicle that's already in braking over 28-66 meters.

A second can make the difference between accident and safety, between life and death!

When lose a second or more: https://youtu.be/KO2b9-hlsiU

When things are clear: https://youtu.be/cEV0f0n75Og

While more and more states have made it mandatory to use daytime running lights as well, the perception of brake lights has decreased, it can be difficult or confusing for drivers in queues for various reasons.

If in the case of cars there is a legal obligation for manufacturers to install a 3rd brake light from many years, in the case of trucks, vans, trailers, semi-trailers, buses, motorhomes, trolleybuses, trams, etc., there is no such obligation.

Furthermore, the installation of such devices to effectively signal commercial vehicle braking is prohibitive from a regulatory point of view.

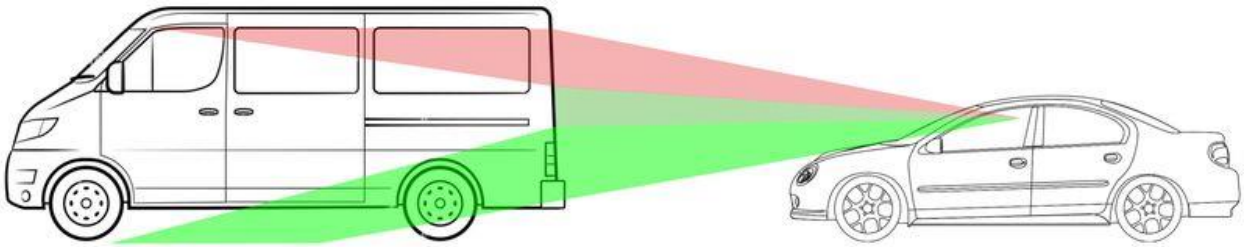
Article 6.7.4.2.2. from Regulation no. 48 of the Economic Commission for Europe of the United Nations (UN/ECE):

For S3 or S4 categories devices: The horizontal plane tangential to the lower edge of the apparent surface shall: either not be more than 150 mm below the horizontal plane tangential to the lower edge of the exposed surface of the glass or glazing of the rear window, or not be less than 850 mm above the ground. However, the horizontal plane tangential to the lower edge of the apparent surface of a S3 or S4 category device shall be above the horizontal plane tangential to the upper edge of the apparent surface of S1 or S2 categories devices.

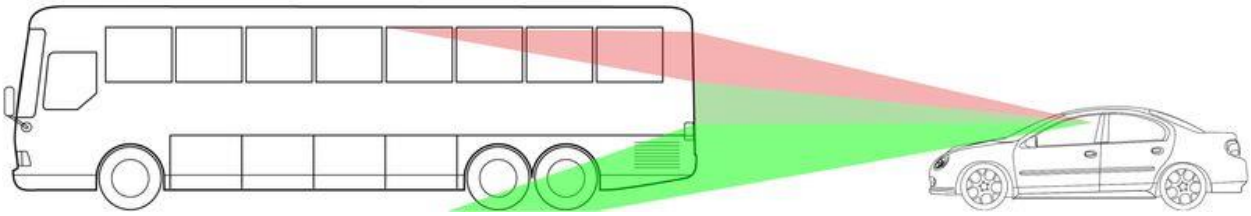
In the case of cars with windows, the logic of placing the 3rd high beam light as close as possible to the rear window space of the vehicle is correct, because often the rear driver will look through the rear window of the car in front of him, and the 3rd light must be in his visual field.

In the first part of the statement of this rule, we note that the requirement is that the lower edge of the 3rd brake light is not more than 15 cm below the window, but in the case of commercial vehicles, we do not have a rear window.

The visual field of the driver driving behind a commercial vehicle will be as low as possible, in order to be able to see the road markings on the asphalt and any possible obstacles (a hole in the asphalt, an object that accidentally ended up on the road, etc.).



Thus, the provision regarding the 15 cm maximum distance from the edge of the rear window becomes illogical in the case of a commercial vehicle, the rear driver of a passenger car will almost never look through this window (if it exists) and certainly never through the window of a bus or truck.



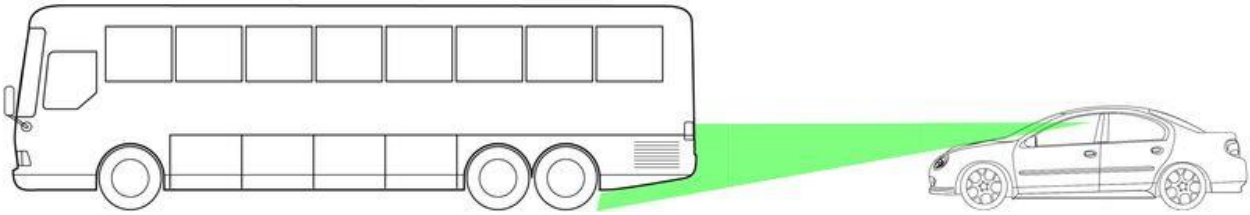
Moreover, if the car behind has the sun visor down, the driver will not even have a field of vision to the 3rd brake light which is installed much too high, in the case of some buses.

In the case of a truck, trailer, semi-trailer, van, the provision regarding the distance of the 3rd brake stop to the rear window of the vehicle is completely useless.

The solutions currently found by some commercial vehicle manufacturers who have understood the need for the 3rd brake light, while complying with the rule, are totally ineffective.

Alternative rule *"not less than 850 mm above the ground",* it is again useless and against logic, as long as all drivers driving behind a commercial vehicle will have their gaze and field of vision directed towards the bottom of the vehicle in front in order to be able to view the road markings on the tarmac and possible obstacles, so below the height of 1 meter from the

ground.



Basically, this rule blocks any possibility of upgrading old cars or commercial vehicles to logical safety requirements.

Road rules and regulations have 2 major objectives: **Safety and Fluidity**.

Which solution provides greater security?

A vehicle without a 3rd brake light,
where is the confusion present?

Or a vehicle with a 3rd brake light
in the rear driver's visual field?

The license plate is a visible surface for any vehicle and the electrical wiring would not affect the passenger compartment, so it is the best place to locate the 3rd brake light for both old cars and commercial vehicles. Even though they are old, these cars are and will be present in traffic for a long time, especially in states where purchasing power is low.

Neither the seat belt, nor the rear fog light, nor other devices were mandatory before, but the need for safety imposed by regulations, that even on old cars these devices should be installed.

In the case of motorcycles, which have only one brake light, I think the best solution to signal the brake, without any confusion, would be the requirement that the brake lamp for motorcycles be constructed from a horizontal light bar, with the minimum length of the registration plate, located in a different lamp than the lamp for the tail light.

5.2 Lights

What do you see in this picture?

But in this picture?

Did you answer that there is a barrier in each of the 2 images?

In the first picture it is indeed a barrier, full picture here.

For the 2nd image, the answer is false, although intuition, social experience, memory, gave you a different answer. Full image here.

What message does the horizontal red line convey? Well, any rational person with a minimal life experience, who has lived close to civilization and everyday traffic will associate the horizontal red light with a barrier.

However, more and more car manufacturers have launched a new lighting fad, putting the tail/parking lights across the entire rear surface of the car, merging the lights from the extremities, and I've noticed this especially with electrified cars.

For a Coca Cola Christmas ad, this design would be great, but in traffic, this design is dangerous.

This design is not only **very tiring for the eyes of the drivers behind**, both during the day and especially at night, but it is a design that can create **confusion**. A horizontal red line says it's a barrier, or a policeman's signal stopping traffic. In addition, the distinction between tail light and brake lights it is done with difficulty. It would take any driver at least a second to understand when these vehicles start braking, so I would lose a few tens of meters of braking.

In this picture is a Seat Leon braking. The distinction between the tail light and the brake light is very little perceptible. The 3rd brake light is on the common line with the tail light. If the driver of this car brakes while I'm looking at the speedometer, the radio, the rearview mirror, admiring nature, or just being distracted and inattentive, for sure, i will lose precious seconds until to realize that the car in my front, braking.

I find this type of design extremely dangerous! Safety doesn't have to be a fad.

The lights rule on vehicles should remain simple and clear:

- 2 low intensity red lights, at the rear extremities of the vehicle, for the tail light

- 3 red lights of higher intensity (2 lights at the extremities and a central horizontal light in the visual field) for the brake.

In this way, any driver behind will be able to understand from the first second if the vehicle in front starts braking, without hesitating and without losing a single second of the time and space needed to brake.

To the delight of car manufacturers, the horizontal light on the entire rear surface could represent the brake light rather than the position light, because as I said before, a horizontal red line in the understanding of most drivers represents a barrier that say Stop. **But** the light intensity over this large area could be extremely cumbersome to the driver of the vehicle behind waiting at the traffic lights.

And if a horizontal line means a barrier, what could two horizontal lines mean? First of all, blinding and discomfort for the drivers behind, but also confusion for them, when the driver of this car will brake. This is the homologated light model for the Hyundai G90. Extremely dangerous!

This video https://youtu.be/EB_VZ6EMEls captures the difference between the tail light and the brake light much more clearly, because the camera lens increases the light contrast. In reality, the human eye perceives contrast differently, the contrast being much lower and the risk of accident much higher.

5.3 Horizontal daytime or position lights

What could this horizontal bar of white light be?

Well, since we discussed about horizontal tail lights earlier, you've probably figured out by now that this is the front light, or the front daytime running light.

It's a nice light for a car show, but in traffic, for a driver who knows that the front position

lights are 2 white light sources located at the extremities of the vehicle, this model could be confusing as well as distracting the attention of other drivers.

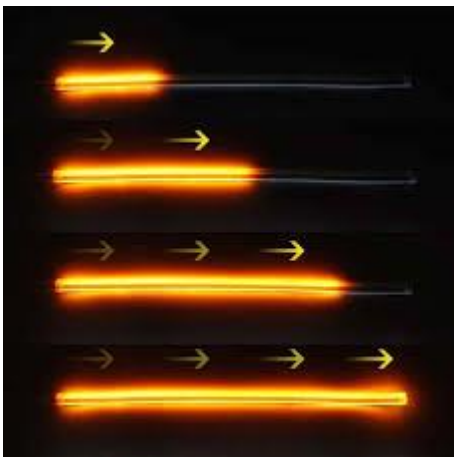
The position/front lights should remain the conventional ones, 2 white light sources at the extremities of the vehicle.

5.4 Signal lights

It has already been a long time since many car manufacturers put light plays in the signal lights. And to top it off, it were homologated.

Signaling of the change of direction of travel, as well as hazard/emergency lights, must be visible lights and attract the attention of those in traffic, and their intensity must be strongly perceptible.

In contrast, the light in the passenger compartment of the car turns on and off with variation in intensity, because the human eye perceives brightness, or the lack of it, more slowly, ensuring the comfort of the driver and passengers, in order not to expose the retina to sudden changes in brightness.



Dynamic signaling is dangerous because it makes the light signal less perceptible as there is a variation in light intensity from low intensity to high intensity. This makes the play of light less contrasting and less perceptible, especially since the dynamic makes the maximum light intensity only occur for a very short time.

Light signaling must be easily and immediately perceptible, especially in the case of emergency signaling, when the yellow indicator lights are also combined with the brake lights. The higher intensity of the brake lights could cover the intensity of the yellow lights, at least in the first part of the dynamics.

5.5 The surface and luminous intensity of the brake or tail lights

Fashion should not affect road safety. I know I'm repeating myself, but I'm sure you've also noticed that the surface of the lights is getting smaller and smaller in the lamps of some cars. This image was captured at a distance of about 25-30 meters.

As can be seen, the lights of this braking vehicle can barely be seen due to the too small lighting surfaces. If the image had the sun behind it, or in the driver's field of vision, the brake lights would not have been noticed.

- At 80 km/h a vehicle travels 22.22 m per second.
- At 120 km/h a vehicle travels 33.33 m per second.

If the vehicle in the picture had braked suddenly, I would probably have lost at least a second to perceive it, resulting in an accident.

On this Peugeot, the difference in visibility between the tail lights and the brake lights is only the 3rd brake light, because the surface of the brake lights in the side lamps are so small that they are barely noticeable, even though the camera lens is much more sensitive than the human eye. If the 3rd brake light fails, the risk of an accident is certain.

In the Opel Mokka, the brake lights at the ends of the car have a lower light intensity than the 3rd brake light, barely visible, and in combination with the signaling, the distinction between the 2 light is almost zero.

It is a serious error that these vehicles were approved with these lighting deficiencies because they can cause confusion, and confusion, or a second delay of reaction, leads to accidents. Video https://youtu.be/iQ9RRPMdxUk

We know that the homologation of vehicle lights takes into account the luminous intensity of the lamps, which must be within the parameters of the regulations, but if the luminous surface is too small, or too large, it affects the perception of light by individuals.

If in conditions where the tail or brake lights are clean and the asphalt is dry, and the daytime visibility is good, these lights are barely perceptible, in conditions of rain, fog, dirt, slush, mud, snow, the perception of these lights, with a small exposure surface, will be further diminished.

The fashion trend is to either minimize or overextend the lights. If this trend continues, what will happen at the next generation of cars?

Without active involvement of the authorities, we will either have LED billboards or tiny LED signals like a phone flashlight.

5.6 Emergency lights

Although there are rules and regulations for new cars to be equipped with emergency brake assist devices, they are ineffective when braking is done slowly because the device does not sense sudden braking and does not activate the hazard lights.

In the situation when we drive on a crowded highway in column, at cruising speeds, and somewhere in front there is a traffic jam due to an accident, a broken down vehicle, or a blocked traffic junction, there is a risk that those behind the column will not notice this in time and lose precious seconds in the braking process and thus collide with those in front of them.

I used to say that road signaling mean communication. If the drivers of vehicles arriving in a traffic jam do not signaling their reduce speed by more than 20 km/h, those behind them will not understand from the brake lights alone that something is happening in front of them to cause them to brake suddenly, so most people, when they notice the brake lights of the vehicle in front of them, will just take their foot off the throttle pedal. Then, when they will realize they are getting too close to the vehicle in front, they will brake suddenly, but they will have lost precious seconds and tens of meters of distance needed for reaction time and braking time.

- At 80 km/h, a vehicle travels 22 meters per second
- At 100 km/h, it travels 28 meters per second
- At 120 km/h, it travels 33 meters per second
- At 130 km/h, it travels 36 meters per second

These are the precious seconds that make the difference between safety and tragedy. A driver needs at least 2 seconds to start braking the vehicle he is driving. This means that **he has lost 44**

- 72 meters behind a vehicle that has been braking for a long time. To this lost distance, the braking distance is added.

The automatic braking systems that are mandatory from 2020 for new cars are a great solution, but ADAC (Germany) tests have shown that these systems still have functionality issues and cannot provide total safety. Furthermore, for older vehicles that do not have these systems, the risk of rear-end collisions remains relevant, given the slow replacement rate of the fleet. It will be decades before the entire European car fleet will benefit entirely from electronic systems that offer safety to all road users.

Lack of communication makes it possible for many accidents to happen inside traffic jams, and contrary communication is even more dangerous. For example, in the Canary Islands there is a local invention that is not known to the millions of tourists who visit the islands every year. Canarian drivers signal left when they reach a traffic jam, or then they stop at pedestrian crossings.

When you see in the first lane of the freeway that the vehicle in front of you is signaling left, you expect that vehicle to overtake, which means that it is accelerating or at least maintaining speed, not that he will slowing down or will stopping. When you see in the second lane of the highway that the vehicle in front of you is signaling left, you think that he is in a hurry and wants to tell the driver in front of him to change the lane, to clear the second lane, not that he will slow down or that will stop.

Even with my extensive driving experience, I am extremely confused when I see left turn signals flashing, because I never know if there is a traffic jam ahead, or if the vehicle in front of me is overtaking.

Confused signaling is just as dangerous as no signaling at all. You can't send the message that you're overtaking and you will slow down or stop, because those behind you will react according to the messages you send through the signals.

An international norm is needed, which states that when a vehicle slows down by more than 20-30 km/h from the (legal) cruising speed of the road, it is mandatory to turn on the emergency lights manually, so that all those coming from behind, to be able to notice in good time that the vehicles in front of them are entering a traffic jam, or that the traffic is moving at

a lower speed than the legal (cruising) speed and in this way will have time to reaction and braking time.

Video (timeline: from 09:45)

English (subtitles available): https://youtu.be/IZTM8jL4f-U

Español: https://youtu.be/FW3tYwRDB4g

Română: https://youtu.be/jcMQlDBJtn4

In conclusion, I believe that in order to raise the level of road safety, it is necessary to adopt urgent measures for all the signatory states of the conventions regarding traffic on public roads to adopt effective measures through complementary rules that establish:

1. **The 3rd brake light should be mandatory for absolutely all vehicles and must be located in the field of vision of the rear drivers.**
2. **Horizontal tail lights, on the entire surface between the extremities of cars should be prohibited, and vehicles already in circulation should be recalled to the workshops to reduce these lights, only in the area of the extremities.**
3. **Dynamic signaling should be banned in favor of classic flashing signaling and I think this can be done very easily from the car's software.**
4. **The illumination surface of tail, turn and brake lamps should be done by changing them with lamps that provide better brightness, with a minimum surface of 40-50 cm², or an optimal surface determined by specialists.**
5. **Brake lights should never overlap with position lights, that is, they should be drawn in different geometric spaces, even if they are located in the same lamp.**
6. **Emergency (hazard) lights must be switched on manually by drivers of vehicles approaching a traffic jam or a traffic situation that requires speed reduction by more than 20 km/h from cruising speed.**

6. Entry and exit lanes, in and out of the highway

The highway is the place where traffic accidents are the most serious, due to the speed at which they occur.

Highway architecture must provide minimum safety features. However, I have come across many poorly designed highways, approved by those who should have refused the implementation of these projects, because they are real traffic safety bombs.

Acceleration lanes never should overlap on deceleration lanes and their length should allow any vehicle that has the right to travel on the highway to reach the minimum speed to enter the highway speed lane without risk, or to decelerate in safety until entering the traffic in the vicinity of the highway.

6.1 Length of acceleration and deceleration lanes

For example, the Canary Islands, the 5th tourist destination worldwide, visited annually by tens of millions of tourists, do not expect the surprises they will discover.

In the image below, Google Map capture https://www.google.com/maps/@28.0876086,-16.7288594,3a,75y,210.81h,92.36t/data=!3m6!1e1!3m4!1s9qXWcGSD65nP3VQlP7Hnbw!2e0!7i16384!8i8192 ,

it can be seen that the highway exit and deceleration lane **intersects** with a whighway entrance, after which the deceleration lane overlaps with the acceleration lane. In other words, those who exit will brake in front of those who need to accelerate.

And at the end, the common acceleration and deceleration lane bifurcates into two short lanes, which cannot hold a heavy traffic, neither for those exiting nor for those entering the highway.

The deceleration lane (right) has the sign and marking Stop, to give priority to another entrance to the highway, and the acceleration lane (left) is blocked by bollards that do not allow further acceleration and do not overlap with the next entrance into the highway.

At the end of the acceleration lane (left lane), the vehicle that failed to reach cruising speed (in 50 meters), or that cannot enter the freeway speed lane due to vehicles in the first lane of the freeway, is forced to brake and possibly stop.

Thus, entering the highway will not be possible at the cruising speed, but starting from zero and entering the path of vehicles in the speed lane, which travel at speeds between 80 km/h (trucks) and 120 km/h (cars). I think it is obvious to anyone that this situation is not even remotely in the spirit of the concept of road safety. Those in the highway speed lane will find themselves with obstacles they cannot avoid, because they do not have enough time, reaction distance, or effective braking distance (which is influenced by the type and weight of the vehicle), to brake on time and safely. Moreover, the vehicles behind will face an even more difficult situation if the distance between the vehicles from speed lane is not large enough.

This acceleration lane have only 113 meters long, but there are many other ramps that are only 100 meters long, or less. https://www.google.es/maps/@28.0667943,-16.7212631,3a,75y,284.56h,65.53t/data=!3m6!1e1!3m4!1sPz6OQTZ77oTYccsiW2RSCQ!2e0!7i16384!8i8192?hl=en

Acceleration and/or deceleration lanes of highways must be long enough to allow all vehicles permitted to travel on highways, to reach the cruising speed of the highway speed lane, and their length should be at least twice the distance required for a low-powered truck, loaded to maximum capacity, to reach cruising speed.

In this way, the necessary distance must be ensured for a truck to be able to achieve the start from 0 and run to 80 km/h - the cruising speed of the first lane of the highway, and then at least the same distance to ensure the safe entry of the vehicle in the speed lane, between 2 vehicles that are in line.

English (subtitles available): https://youtu.be/IZTM8jL4f-U

Español: https://youtu.be/FW3tYwRDB4g

Română: https://youtu.be/jcMQlDBJtn4

6.2 Common acceleration/deceleration lanes

Shared acceleration and deceleration lanes were most common at the cloverleaf junctions, which have shown through time use to be the solutions that produce conflicts between engaged vehicles, traffic jams and often accidents. These shared lanes are also found where the authorities have decided that it is necessary to connect a small community to the highway, and the solution of the shared acceleration/deceleration lane was the solution with the lowest costs.

When we talk about safety, life or health of people, the costs should be weighed better.

As can be seen in the image above, those exiting the highway intersect and conflict with those entering the highway. Those exiting will brake in front of those entering, who must accelerate to reach the cruising speed of the highway speed lane. Those in the speed lane will have to brake behind those entering the speed lane at a lower speed.

There is already an article on Wikipedia that points out the design flaws of this model, and at the end of the article are presented in a separate link, the solutions that the United States authorities have chosen to fix these design flaws.

https://en.wikipedia.org/wiki/Cloverleaf_interchange.

However, in many places we find common acceleration/deceleration lanes, the Canary Islands are one of these places where the authorities have allowed this because there is no centralized management to study and to aprove the solutions proposed by the road administrators. From

what I have found out, the approval of projects and road signalling is done by different officials from town halls, or local councils, by people without skills in this very important field of road safety.

In Romania, the country with the most accidents and victims (dead and injured) in the European Union, far from the average of the Union, the approval of construction and road signaling projects is theoretically done by the traffic police, but in practice we encounter hallucinating solutions that show the source of statistical figures. Romania is now discovering the economic advantages of highways, as several highways are under construction, each of which contains very dangerous elements, because neither the authorities nor the drivers who have not had the opportunity to drive abroad, have basic information about traffic on highways.

From the website of an NGO that monitors the road infrastructure, I discovered that the ring highway of the capital Bucharest has 4 cloverleaf junctions that will generate conflicts, traffic jams and accidents, but no one seems to be interested in fixing the problems that I have signaled.

MAXIMUM RISK of traffic jams and ACCIDENTS! All road junctions are of clover type.

A3 with A0 https://proinfrastructura.ro/proiecteinfrastructura.html#map=15/44.574/26.183

A2 with A0 https://proinfrastructura.ro/proiecteinfrastructura.html#map=16/44.409/26.255

A0 with DN4 https://proinfrastructura.ro/proiecteinfrastructura.html#map=16/44.346/26.227

A0 with A1 https://proinfrastructura.ro/proiecteinfrastructura.html#map=16/44.461/25.884

The node DN7 with A0: fluency problems in DN7 when accessing A0

https://proinfrastructura.ro/proiecteinfrastructura.html#map=17/44.53/25.948

These accident-generating projects are financed by European funds. For these reasons, I believe that European funding should only be granted to safe projects, which do not endanger traffic safety, and I believe that it is imperative that before such funding is approved, the projects are approved by experts with experience in road safety within European Commission, or individual experts who could be accredited by the European Commission.

7. Road markings and reflective elements

7.1 STOP and Yield markings

Although I have already referred to the **STOP and Yield markings** on the asphalt, in the "crosswalks" chapter, I think this topic should be emphasized once again because it is the marking that can make the difference between safety and an accident.

Vertical signaling can be unnoticed by drivers in case:

- a car drives parallel to a higher vehicle that blocks the driver's visibility,
- the sun is at sunrise or sunset and blinds the driver,
- vegetation blocks the visibility of the traffic sign,
- weather conditions of rain, snow or fog make the distinction of traffic signs much more difficult through a windshield affected by rain, snow, dense fog.

At the same time, the signs with the maximum speed limits should be compulsorily doubled by markings on the asphalt.

In this way, the driver's attention is drawn in a positive way, to the speed limit that he must respect, especially when he is overtaking, driving in the left lane and in the right lane there is a higher vehicle and he cannot see the vertical sign, vegetation, or the sun prevent him from seeing the speed limit sign.

This should be a mandatory rule for all signatory states to international road traffic conventions.

7.2 The reflectivity of markings is a very important element for traffic safety.

Unfortunately reflectivity rules and standards differ from state to state, if it exist, and the differences are astronomical. For example, Romania does not have reflectivity standards for road markings and signs, but there are some instructions from the National Company of Highways and National Roads, which provide for reflectivity coefficients (mcd*m²*lx) for new markings, lower than for used markings from other states. Although the Traffic Police is responsible for authorizing and checking road signs, it does not have any reflectometer to measure the reflectivity of road markings and signs.

And these instructions of the National Highways Company are only applicable in theory and only for national highways and roads. For the other categories of roads, there is no standards, and the administrators of these roads apply paint without any retroreflectivity, because it is cheaper. However, road markings are completely missing on more than half of the roads in Romania, Bulgaria, but also in other Eastern European countries, and reflective elements such as reflective roadside posts, reflective plates on road or bridge parapets, reflective inserts on side road markings are not even known to some states.

Bad or missing road signalling are responsible for more than half of road accidents. In many cases, the authorities ignore the human factor. Man is not a machine, and as machines also make mistakes, road signalling must have the role of prevention.

Road signalling should be standardized with minimum and mandatory elements for all signatory states to international conventions on public road traffic, or at least in the European Union, so that road users are safe, and where road administrators do not fulfill their minimum obligations, to be held liable civilly, contraventional or criminally, in case occur of road accidents.

The bottom line is that in states where the rule of law is in question, corruption makes it possible for these markings not to be made to the detriment of those using the public road, without anyone being held accountable for the mismanagement of resources that should be allocated to road maintenance and the accidents that they occur as a result of bad signaling. As an example, in Romania alone, over 2,000 people die annually, in a real population of approximately 12-13 million inhabitants, over 8,000 people are seriously injured in road accidents, and more than half of the number of road accidents are due of bad road signalling.

8. The devices with dispaly inside the cars

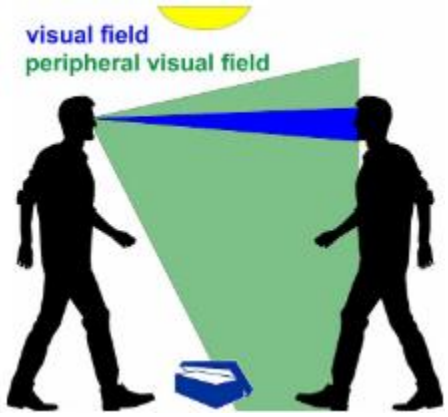
Dashboards with electronic displays are another component of modernity in the automotive industry. They replace old analog dashboards with digital screens that can display a variety of information and data about the car and driving conditions.

These displays can be configured to show relevant and important information for the driver, such as speed, fuel level or the status of safety systems, and in addition, they can be customized and modified to suit the preferences and needs of each driver.

In many cases, these displays can be connected to navigation systems or smartphones, allowing the user to access and control various functions and applications.

Dashboards with electronic displays offer a modern and sophisticated look, adding an extra touch of style to the interior of the car and are considered to be an evolution of technology and design in the automotive industry, but from a road safety point of view I believe they they can distract the driver, with tragic effects.

The first rule when starting driving school is to never look at the pedals, the gear shifter, or the car radio.



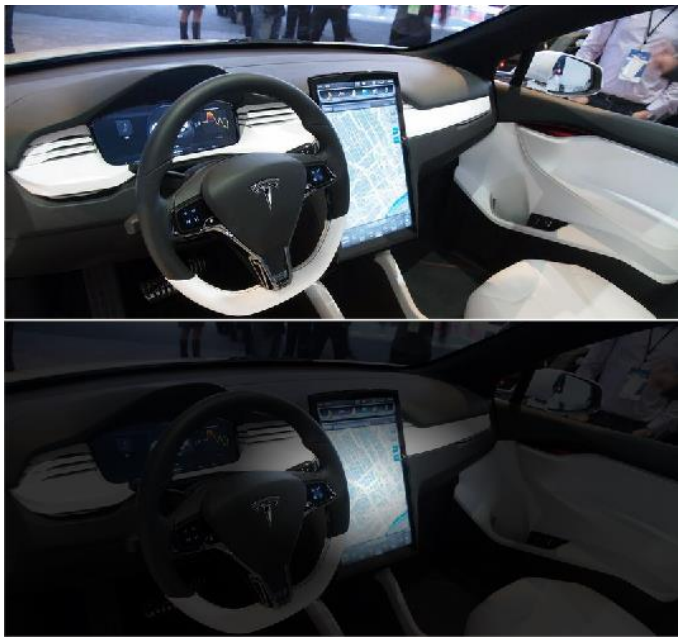
The human visual field has developed throughout evolution predominantly downward and less upward. Thus, any person will have in the peripheral field of vision a larger area at the bottom of the viewed point than above and less at the sides. You don't have to take my word for it, you can do a simple test, put an obstacle on the floor and everyone who passes by that spot will see and go around the obstacle, whereas if you stick or hang an object on the ceiling, no one will notice him.

The peripheral visual field decreases in intensity the more the farther away the viewed point is. This is the peripheral visual perception, which any person can notice, even without having studies in this field.

If the electronic display is between the steering wheel and the windshield, we can say that it is in the driver's peripheral field of vision and will easily notice any alert it receives, and the look of the digital instruments will have part of the windshield area in the peripheral visual field, so will have less control over the road.

If the electronic display is outside the driver's peripheral visual field, in the middle of the dashboard, or below it, the driver will lose all visibility of the road, because the road will be on the periphery of the peripheral visual field.

The further the information display instruments are from the road line and the windshield, the more the driver will be deprived of visibility of the road.



A futuristic interior is very nice, but the more optical and acoustic elements there are in the car, the more the driver will be distracted from the main concern, which is to drive the vehicle safely.

- At 50 km/h a vehicle travels 13.89 m per second.
- At 80 km/h a vehicle travels 22.22 m per second.
- At 120 km/h a vehicle travels 33.33 m per second.

To which is added the **reaction time** of the driver to change the foot from the accelerator to the brake pedal, and then the **braking distance**!

A driver needs 3 to 6 seconds to view and understand a navigation map.

Every second lost by the car driver can turn into a tragedy, and statistical data shows that millions of people are affected annually due to road accidents.

The World Healt Organization tells us that each year approximately 1.3 million people die and between 20 and 50 million people suffer non-fatal injuries, many suffering a disability as a result of their injuries, and the economic and social value of these accidents is quantified at approximately 3% of GDP, in most states.

Most of these accidents are due to carelessness, and drivers are increasingly distracted by technology, gadgets and apps. Do we need all these apps and gadgets? Of course NOT.

To avoid distracting drivers, traffic safety rules should oblige vehicle manufacturers to limit the access and operation of gadgets that are not in the field of vision (between the steering wheel and the windshield) when the vehicle is in motion, and navigation devices they should be rethought so that the information is much simpler and the display of basic information is done in the driver's visual field.

The head-up display seems to be the safest technical solution, because optical navigation information is always in the driver's field of vision.

If you do visibility exercises in your own vehicle, you will find that when you look at the dashboard instruments between the steering wheel and the windshield, you will have a part of the road you are traveling on in your visual field, only eyes movement being necessary. If you look down on the center console of the car, where you will have to move your head, the road will go out of your peripheral visual field and you will no longer have any reference to what is happening on the road.

9. European technical inspection

Within the framework of the free movement of people in the European Union, the transit of vehicles between states has increased from one year to the next. Although the technical inspection rules have been harmonized at the level of all EU states, and the standard of technical inspection of vehicles is the same in all states of the Union, there are still many vehicles driving in other states with expired technical inspection. Personally, I have been in this situation several times, without the possibility to correct this omission.

The MOT date is not a calendar date for vehicle owners to keep in mind like a birthday or Christmas. Furthermore, for vehicle combinations such as a truck pulling a trailer or trailer, the MOT date of the truck may differ from that of the trailer.

There is often the possibility that a vehicle leaves the country where it is registered, to another country of the European Union before the deadline for the technical inspection, and the purpose of the journey is successively changed with multiple destinations and for a longer period of time than the one originally proposed. In this way, that vehicle could exceed the margin of 30 days in which the technical inspection is valid, without the possibility to carry out this inspection on the territory of another state and for it to be recognized in all EU states. It is true that some states accept roadworthiness tests for vehicles registered in other states, but this inspection will only be recognized in that state, and if that vehicle has to travel several states to the state in which it is registered, it is practically impossible for that vehicle to arrive in his state with a valid technical inspection certificate. In this situation you can find cars, vans, caravans, trucks, trailers, semi-trailers, motorcycles and other vehicles.

The technical inspection of vehicles should not be a barrier to the free movement of people and goods within the EU. Vehicle technical inspection assistance and certification should be internationally recognised, at least for technical inspections carried out in workshops in European Union states, when this inspection is carried out following a standard verification procedure in the EU.

As long as the states of the European Union recognize the roadworthiness test carried out for a vehicle registered in the state in which the vehicle is registered, the roadworthiness test carried out in one state should also be recognized for vehicles registered in other states. In this way, the possibility and conditions are created for all vehicles to circulate on European roads in technical safety conditions.

And because I told you that I was several times in the situation of driving on the territory of a state with an expired technical inspection in the state where the vehicle was registered, I want to draw attention to the fact that the control authorities of the states can be fooled due to language barriers. A traffic or border policeman will not know what are the documents that certify the technical inspection of vehicles from a more distant state than, perhaps, those in the vicinity, and even in this case he is not sure that he is well informed.

In this way, it is possible for vehicles registered in other states to circulate on the roads of one state, with technical problems that cannot be detected by simply viewing the vehicle, but which are extremely dangerous for traffic safety. A defective or worn telescope (shock absorber) can cause a vehicle to skid, a faulty braking or steering system can cause serious accidents both in towns and on highways where traffic speed is higher, etc.

Controls and filters at the border, or within the states are not effective, that is why special attention is needed on the technical inspections of vehicles traveling internationally, and these inspections should be able to be done and recognized by all states, for all the vehicles. As long as the states recognize technical inspections made for vehicles registered in those third countries, and the procedure is identical for all states, a Directive to recognize technical inspections of vehicles, no matter in which state it was done, and a community database, which to record informations with the inspection of all vehicles by registration number, or by vehicle identification number would be very useful for all those involved in road safety.

10. European vehicle card

In the context of globalization, the development of tourism and commercial transactions without borders, more and more vehicles transit the countries of the European Union. Theoretically, the control bodies know the documents of vehicles registered in other states, but in practice things are different, sometimes with serious consequences for traffic safety.

In order to easily identify information such as the owner, technical inspection, mandatory vehicle insurance, I think it is imperative that vehicles registered in the European Union states can be identified through a unified system, available in all the languages of the European Union, and access to this common database to be gradually made by the organizations, institutions and persons who access or process them.

In this way, the vehicle registration certificate and/or vehicle identity card could be replaced by the European vehicle card, where a QR code would also could be available for easy access to relevant vehicle information.

In addition to the vehicle's technical data, owner and address, this database could contain valuable information for traffic safety watchers such as:

- Technical inspection: when and where it was done, the mileage, as well as the expiration date;
- Compulsory insurance: by whom it was made and when it expires;
- The accidents in which the vehicle was involved and the damages suffered;
- Identification data of the owner such as phone number and/or email address.

While I was writing this material, a piece of news caught my attention, namely that of the European digital driving license. Well, the norm should be extended to both the registration certificate and the Vehicle Identity Card, which would be equally useful for the owners or users of vehicles, not to mention a virtual identity card of citizens Europeans, it would be just as useful, but the latter is not the subject of road safety.

Registering a used vehicle in another state can be a frustrating experience.

While any state recognizes the right of vehicles from another state to drive on its internal territory, it recognizes roadworthiness testing carried out in the third state where that vehicle is registered, its registration can be a major problem.

For example, a car registered in Germany, with the technical inspection done only a month ago, which has as additional equipment a towing hook and an LPG installation, cannot be registered in Spain, because it does not pass the technical inspection. To be able to overcome this obstacle, the vehicle owner will have to dismantle the towing hook and disable the corresponding electrical installation, even if he has European homologation certificates for these components. For the LPG installation, the vehicle owner can obtain against payment, from an authorized workshop in Spain, documents showing that the installation was installed there. In other words, a vehicle registered in Germany (or anywhere in the EU), can drive in Spain only with German plates (or with the plates of the state in which it is registered), but cannot receive Spanish registration plates. I'm not talking about the bureaucratic procedures, which are sometimes hallucinatory. Before the technical inspection, it is necessary for an engineer to inventory the vehicle, to find out how many wheels, doors, seats, windows, or what dimensions it has, so that then, the engineers at the technical inspection station completely ignore that report, because they have access to all vehicle data online.

A European vehicle card could remove any burdensome or unnecessary bureaucratic obstacles or procedures, and registering a vehicle from one state to another could be done in a similar way to registering a used vehicle after a change of ownership in same country.

11. Final conclusions

If you take a survey you will find that every driver thinks they can be a traffic cop and every traffic cop thinks they are an expert on road safety. According to this theory, there are as many road safety experts as there are drivers, or traffic policemen. I'm not talking about the specialists from relevant ministries, town halls, or road administrators, who, although they design or approve solutions with serious deficiencies, consider themselves experts in road safety.

Road safety affects absolutely the entire population of the world, not just one social or professional category or class. From the newborn moving from the maternity at home, to those who leave us, walking on the last road, we are all exposed to road safety rules.

Defective road signaling is responsible for half of road accidents, and often this is done based on norms, standards and solutions contrary to logic, or mathematical or physical laws, with fatal consequences. I have previously shown that WHO data says that approximately 1.3 million people die and 20-50 million are seriously injured annually, with effective costs of ~3% of GDP, but also with other unquantified costs.

In many states there are no road safety departments, and where there are pseudo-specialists, there are no budgets, tools, strategies or objectives, procedures or competent people to check new road construction projects, or to control compliance with the application of appropriate markings, or their restoration due to wear and tear. For example, the traffic police in Romania, the country with the most traffic accidents in the European Union, does not have any reflectometer to measure the reflectivity of road signs, and on more than half of the roads in Romania there are no markings or reflective signaling.

In theory, the road administrator is liable contraventionally, civilly or criminally for the accidents caused due to the bad condition of the roads, or the road signnalization, but in practice this happens only exceptionally, and those responsible for traffic safety seem to be in complicity with the road administrators , because I have not heard of the latter being penalized, or held accountable for the quality of the roads or deficient road signage.

Only drivers and road users pay for the damage caused. The guilty without guilt, versus the responsible without guilt.

If some norms and road architecture defy logic, the human factor is completely ignored in many cases when road architecture is established. To build the future, it is essential that we first fix the present. Artificial intelligence will of course be an important factor in the development of road safety topics, but unfortunately, we humans are able to block or break artificial intelligence through our actions, or inactions. We need to learn to communicate better when it comes to road safety, but above all, we need to better understand the psychological aspects and human behaviours. When we achieve this, we will have safer traffic.

What's sadder is that we all contribute taxes and fees to road infrastructure and signage and we don't always get the safety conditions promised or set by the rules (if any). Often people with responsibility do not understand anything about road safety. I already have a lot of experience in communicating with the responsible authorities, and in many of the stupid answers received, these people denote gross incompetence.

States are inert and hardly adopt changes in road laws, either because the procedures are complicated or because the officials in charge do not understand traffic safety matters well enough.

That is why I believe that it is absolutely necessary that all these objectives presented in this material should be included in a **Directive** that would outline the guidelines of a European traffic safety project, as I also believe that within the European Commission there should be a road safety department to promote norms, standards and effective models of road architectures mandatory for all states.

Road safety must be a science and not just political, democratic, or lobbying decision.

At the same time, I think it is important that the EU Road Safety Department be able to monitor the implementation of the models in all the states of the Union, but also be able to issue travel alerts for tourists or professionals who will drive vehicles in the states of the Union and thus know the problems that they may encounter.

Evolution means change. Who can't change anything, can't evolve.

Assuring you of my highest consideration, I thank you for your attention to this material.

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