Why smart people do stupid things

BIVV-IBSR

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Traffic psychology for every day

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Contents

Foreword

When I started to develop driver improvement courses in Belgium in 1996, I was amazed by the fact that traffic offenders already know a lot about the possible consequences of their behaviour. Nevertheless, they persist in their misbehaviour and find it very difficult and mostly unnatural to change and to comply with traffic rules and difficult traffic situations.

During many long conversations with several groups of different offenders (DUI, speeding, driving without insurance, aggressive drivers, etc.) some of the underlying processes became more clear. Besides motives, attitudes, personality traits and certain addictions, less extreme factors play an important role in committing offences. In fact, these factors influence everyone in traffic and can lead to inappropriate behaviour or reactions. This makes us all potential offenders. A survey on literature in traffic psychology, but also in social psychology, has provided more scientific evidence for some of these processes.

In this document, I have tried to put all this experience into a broader framework to serve as a first introduction to the psychology of traffic behaviour. It is not only intended for trainers of driver improvement courses. Also driver instructors and traffic education trainers can use this as background information. For this purpose, it is written in a more popular and easy-to-read language with only a few references to more scientific articles or handbooks.

This work would not have been possible without the cooperation of all the DI trainers of the Belgian Road Safety Institute and the input of Rob van Beekum (CBR- the Netherlands). Many thanks to them for sharing their knowledge and ideas. Finally, I want to also thank all the participants of the DI courses who were prepared to talk about their experiences, their feelings and motives. Without their openness and honesty, it would have not been possible to write down this introduction in a non-theoretical way.

22 July 2015

Reading guide

We all make mistakes, especially in traffic. Luckily not all these mistakes lead to dangerous situations and fatal accidents. Sometimes they are not even noticed by other road users. And even if they were, they are just passing by. Otherwise, some people would get irritated and get angry about these errors. Chapter one describes the different mistakes and errors and gives evidence about the link between offences (as one form of mistakes) and road accidents.

Chapters 2 and 3 provide more insight into the nature of traffic behaviour. Several different kinds of human behaviour are involved: from automatic motor behaviour to high cognitive skills and processes. A more theoretical model of traffic behaviour gives an overview of the most important aspect of human psychology that influences driving behaviour.

The two next chapters (4 and 5) talk about the limitations of our capacities. Chapter 4 focusses on perception and attention processes and reveal some specific phenomena by which we make up our own reality. In the next chapter (5) some concepts from social psychology are illustrated. We learn about the way we fool ourselves and how we think about situations and persons in traffic.

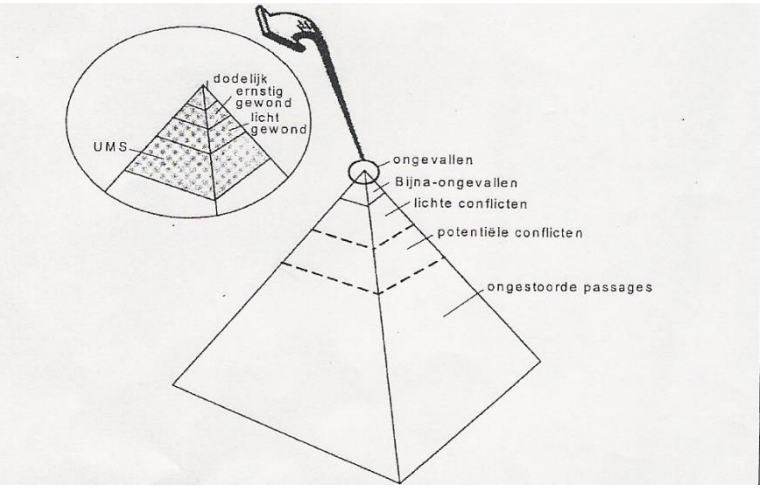
Chapter 6 and 7 are more concentrated on behavioural change. After a few years of experience driving becomes a habit. When these habits lead to dangerous or unpleasant situations, we should probably change them. But changing habits is a difficult thing. We have a lot of reasons to avoid this changing process. Chapter 6 gives us more insight into this unwillingness to change. The next chapter gives a few ideas to improve changing.

Again, this document is not scientific research; it's meant for practitioners. Those who want to find more theoretical and more profound information are invited to read the articles and books of the references.

[1] What are these 'stupid things'?

When we think about stupid things in traffic, the first thing that comes to mind are accidents. Accidents are of course the most embarrassing side-effects of traffic. Every day, a lot of people die in traffic, and in Europe it is one of the most important causes of death in young people.

On the other hand, compared to the density of traffic, the quantity of vehicles and movements, traffic accidents are more an exception than a common fact. This is especially true from a more personal point of view. The probability of an accident with injuries is 5.1 in 1 billion km in Belgium[1]. Converted into a personal driver who in general drives 15,000 km per year with his car, he has a chance of being involved in a traffic accident with injury once in 160 driving years… it seems impossible. Accidents with only material damage are more frequent. Belgian insurance companies indicate that 6.55% of all the insured vehicles declared a claim in 2012[2]. For a personal driver, this means that the chance of being involved in a car crash with only material damage is one in 6 years.



The Hydén pyramid [3] (1987) gives us a more realistic view on the proportion of accidents in traffic.

When we talk about 'stupid' things, we do not focus only on real accidents, but we also take into account near-accidents, conflict situations and potentially dangerous encounters. All these situations are in fact potential accidents and are therefore an important source to be investigated when we try to improve the driving of an individual.

[1] Focant, N., (2013) 'Analyse statistique des accidents de la route avec tués ou blessés enregistrés en 2012 en Belgique', Bruxelles, Belgique, BIVV-KCC
[2] XXX (2014), 'Evolutie van de schadefrequentie 2004-2013 in de BA-motorrijtuig verzekering' www.assuralia.be
[3] Geciteerd in Horst, R. van der & Martens M., 'Human factors en verkeersveiligheid: de mens als maat der dingen' in Tijdschrift Vervoerswetenschap 44e jaargang juni 2008.

Accidents analyses show in general that about 90% of fatalities in traffic are caused by human factors[4]. Human behaviour is the crucial factor, even with the increasing implementation of in-car technology. Until the fully automatic car is a common fact in a completely interactive environment, we still have to look for improving measures to deal with this behavioural failure.

Different failures?

While driving, we make all kind of maladapted or faulty behaviour – this is human. Not every failure leads to a dangerous situation and there is also a great difference between failures. Raeson[5] (1990) distinguishes four types of errors in human behaviour. Two of them (slips and lapses) are more unintended actions, and two (mistakes and violation) are seen as intended actions.

Unintended errors

A lot of tasks are carried out in a more automatic way and escape our consciousness. We react without thinking or without taking every detail of the situation into account. This can lead to minor errors.

- SLIPS are attentional failures: tasks are carried out incorrectly or in the wrong sequence. Examples are: putting on the windscreen wipers instead of the indicators, trying to pass another vehicle without noticing that he has put on his indicator, misreading the signs and exiting a roundabout on the wrong road, etc.

- LAPSES are more memory-related failures: by carrying out the task, we miss a step in the sequence of events. Examples are: leaving the car and forgetting the keys, driving in the wrong gear, having no clear recollection of the road just travelled, etc.

Both errors are also called 'skill-based errors'. In most cases, they do not lead to road accidents. Unless the driver is too distracted, under the influence or speeding, the error is recognized very quickly and the driver can deal with the new situation in a more conscious way.

[4] Lum, H. & Reagan, J.A. (1995) 'Interactive Highway Safety Design Model: Accident Predictive Module' Public Roads Magazine

[5] Reason, J. ' Human error' Cambridge, University Press 1990

Intended errors

In this case we don't talk about automatic behaviour. It's about tasks that are carried out on a conscious manner[6]. People are well aware of what they are doing but they don't do it the right way.

Of course, the basis for the error could be very different. Is the participant aware that he is making an error, or is he convinced that what he is doing is the right way to act? So Reason makes a distinction between 'mistakes' and 'violations'.

- MISTAKES are errors people make because
    - They didn't have the right idea about what they could do in this situation (knowledge-based); for example: underestimating the speed of an oncoming vehicle when overtaking, braking the wrong way on a slippery road, etc.
    - They incorrectly apply a certain rule, or they apply the wrong rule (ruled-based mistake); for example: getting into the wrong lane when approaching a junction, misinterpretation of a priority rule, etc.

- VIOLATIONS are actions which are known to be wrong or dangerous. These actions can be exceptional (for example: overtaking on the wrong side), or based on a certain routine (for example: speeding), but sometimes they can also be interpreted as a form of sabotage (for example: blocking a car on a crossroad).

The main reasons for these violations, as stated by Raeson, are (1) laziness, (2) thrill and sensation seeking, (3) goal obstruction and (4) defaults in the traffic system. Maybe it is also important to make a difference in more reasoned and more emotional reactions on obstruction. Scheers and Vlaminck[7] (BIVV, 2009) also pay a lot of attention to this matter. If the violation is more based on emotions, it could be more dangerous due to the increase in risk-awareness and inattention caused by the emotion.

The link between errors and accidents

To which degree certain types of errors lead to accidents, is not known. Every error can in certain circumstances lead to a serious accident. In the skill-based mode (lapses and slips), recovery is usually rapid and efficient, because the participant is aware of the expected outcome and will therefore get early feedback. Mistakes and violations tend to be very resistant to feedback. People tend to ignore information that does not support

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http://www.humanreliability.com/articles/Understanding%20Human%20Behaviour%20and%20Error.pdf

7 Scheers, M. & Vlaminck, F. 'Afdwingen van verkeersregels: begin of eindpunt van de normvervaging?' BIVV 2009

their expectations of the situation and their own action. So they can persist in doing the wrong thing.

According to Wegman and Aarts (2005)[8] it is also very difficult to figure out which kind of error could be the cause of a particular accident. In the genesis of an accident, several events play a role. From the point of view of education and enforcement, a lot of studies have tried to establish a link between accidents and certain violations or specific behaviour.

In general, six main causes for serious accidents are recognized in Western societies[9]. The importance of each cause can differ between countries due to the specific circumstances.

Speeding is one of the most important causes, because it is a multi-tiered threat. Speed increases the amount of time necessary to avoid a crash, it increases the risk of crashing and it makes the crash more severe. According to the British police force[10], 24% of fatal accidents in 2010 were caused by inappropriate speed. This means that in the UK, in 2010, 241 people were killed in crashes involving someone exceeding the speed limit and a further 180 people died when someone was travelling too fast for the conditions.

Driving while intoxicated is also an important factor. The NHTSA estimated that in 2004, nearly 17 thousand people were killed in alcohol-related accidents. In 2012, more than 5,000 accidents with injuries were caused by a DWI-offender[11]. We have no exact figures about accidents caused by driving under the influence of illegal drugs.

A third important cause is ***distraction and fatigue***. Bartl[12] indicates this as 'the silent killer'. Almost one third of all accidents are caused by distraction. Distraction or inattention itself is caused by cell phones and other communication devices, slowing dawn to gawk at other events outside the car, fatigue, passengers or children in the car, etc.

Inappropriate driving behaviour in relation to ***the weather*** conditions is also an important cause of accidents. Sometime people are too sure about themselves when it comes to controlling a car, or are not aware of the increased risk on slippery roads.

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[8] Wegman, F & Aarts, L., (eds) 'Door met duurzaam veilig. Nationale verkeersveiligheidverkenning voor de jaren 2005-2020'. Leidschendam, SWOV 2005

[9] http://www.sixwise.com/newsletters/05/07/20/the-6-most-common-causes-of-automobile-crashes.htm

[10] http://assets.dft.gov.uk/statistics/releases/road-accidents-and-safety-annual-report-2010/rrcgb2010-04.pdf

[11] Focant, N. (2013), *ibid*

[12] Bartl, G. (2015) "How to deal in the future with accident cause number one: inattention", presentation on the CIECA-congress May 2015 in Berlin. http://www.ciecacongress2015.eu/dok_view?oid=527596

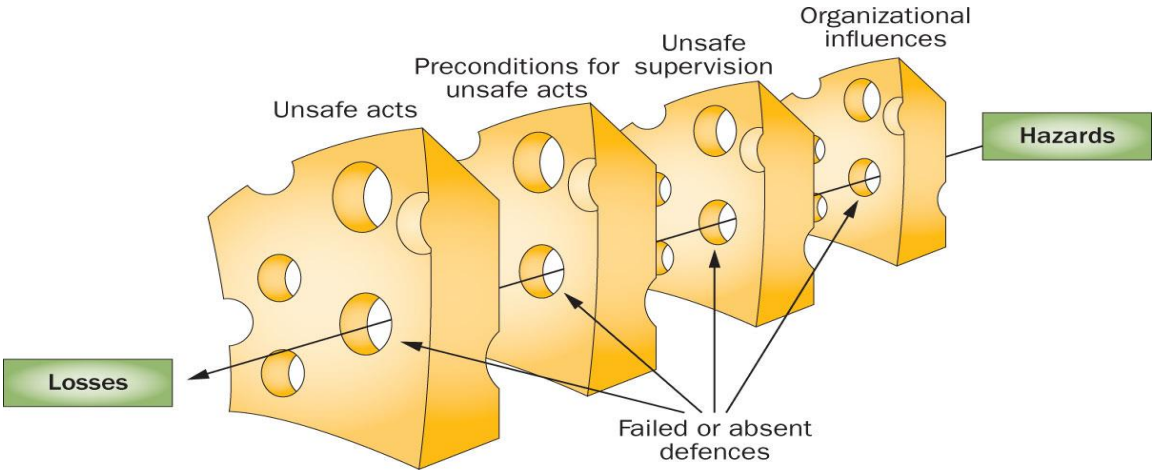
And of course, more ***aggressive driving behaviour*** like tailgating, frequently changing lanes and overtaking other vehicles, mostly in combination with speeding or DWI, causes severe accidents.

These causes are proved on a general, statistical level. For an individual driver, this relationship is not so evident. Gebers and Peck (2003) demonstrated that it is possible to predict the crash involvement of a large group of drivers on the basis of their violation history, but that this is not possible for an individual driver[13]. Zädel (2001) came also to the conclusion that there is a correlation between committing violations and being involved in accidents, but this relation is statistically not that strong[14].

A systematic approach to road safety

Human error problems can be viewed in two ways: in a personal approach and in a systematic approach[15]. In the previous paragraph we focussed on the personal approach and the errors of the individual driver. The main question was: which act was unsafe. Associated countermeasures could be education, law enforcement and moral advice.

In a systematic approach, errors are seen as consequences of a bad system and not as the cause of a malfunction. It concentrates on the condition under which the individual works and tries to build defences to avert errors or mitigate their effects.



Weiser, T. G. et al. (2013) Safety in the operating theatre—a transition to systems-based care Nat. Rev. Urol. doi:10.1038/nrurol.2013.13

[13] Gebers, M.A. & Peck, R.C. (2003) "Using traffic conviction correlates to identify high accident-risk drivers" in Accident Analysis and Prevention, Vol. 35, p. 903-912

[14] Zädel, D.M. (2001) "Non-compliance and accidents" Working paper 3, Work package 2 of the ESCAPE-project, VTI, Finland

[15] Reason, J. (2000) "Human error: models and management" in British medical Journal, March 18; 320(7237), p. 768-770

This systematic approach is adapted for traffic by Wegman & Aarts[16] and is called 'the Swiss cheese model'. The traffic system should be built up with different protective layers. These layers are the road design, quality assurance, principles like forgiving roads, self-explaining roads, but also coping behaviour of drivers and psychological treats of road users. These are called the more latent errors. The specific unsafe driving behaviour in this context is an active failure directly linked to an accident, but not the only reason. These active failures only lead to accidents if there are not enough protective measures in the system. The system must provide defences, barriers and safeguards.

To prevent traffic accidents in general, this systematic approach is very important and must be the leading idea behind all the measures taken by a government. Nevertheless, in this paper we will concentrate more on the individual level to understand human failure in a traffic environment.

[16] Quoted in Horst & Martens (2008).

[2] The specificity of traffic behaviour

Driving a car… a combination of very different types of behaviour!

Driving a car is more than just handling the wheel and pushing pedals. A lot of different kinds of behaviour come together and nearly every part of the brain is involved.

Of course, the basic skills are about technical aspects like controlling the vehicle and staying on the right track. Changing gears, driving into curves, staying in the right direction, many different skills that require a lot of attention at the beginning, but after plenty of practice, they become automatic behaviour.

Driving a vehicle is situated in a very complex environment with a lot of interaction with different aspects (signalization, road layout, weather, density, etc.), but not the least in interaction with other road users. This interaction is, of course, embedded in official, but also informal rules and regulations. Nevertheless, there is no guarantee that road users will comply with these rules and it is certainly not always clear which rule must be applied in the specific situation. For example, the regulations about priority on the road… sometimes there is confusion about different interpretations.

Also, a lot of things that happen in the car itself, and that have no direct link to traffic and driving, could influence our driving behaviour. Passengers can ask for attention (children playing on the back seat), several communication devices can interfere our driving activity with 'important messages'. The driver needs to react to all these stimuli and focus his attention on the real driving tasks.

Finally, during the execution of all these tasks, a lot of cognitive processes are activated that influence behavioural outcome. Drivers could have a different opinion and different views that provide a personal interpretation of situations. Temporary emotions and thoughts can direct his attention to non-relevant issues. Needs, internal norms and intentions have a direct impact on each choice the driver has to make. In short, a lot of typical human processes will guide our traffic behaviour in a certain way.

Stated like this, driving in traffic seems to be an impossible task – too complex for one person. Indeed, in general, driving is usually underestimated in its complexity. People don't realize that driving is a real 'job'. It is considered as something you can do without any effort. And surprisingly, in most cases, we do it without any trouble, it goes automatically. It looks a natural act, comparable to walking. Only when we are

confronted with unexpected or very difficult situations, do we realise the complexity of the task.

How is this possible?
Our magnificent brain helps us automate a lot of behavioural chains. Especially motor skills can become automatic behaviour by forming neuronal circuits. The cerebellum plays an important role in this development (procedural memory).

Automatic behaviour doesn't need any attention and a lot of vehicle manoeuvring tasks become automatic after a lot of experience. Even adapting to slightly changing situations could happen without any attention. In fact, the opposite is true: when we pay a lot of attention to these actions, we lose a little bit of efficiency, speed, etc. We hesitate.

Other driving skills seem also to have the character of automatic behaviour, but they still require a certain attention, as are easily influenced by conflicting processes such as emotions, thoughts, etc. This is kind of semi-automatic behaviour is called 'habit' and examples are: choice of speed, use of seatbelts, using indicators, and so on.

Both automatic behaviour and habits help to simplifying our life. They increase our efficiency and save our energy for more important things. Imagine that you have to think about the best driving behaviour in every bend you passes: at what moment do I have to steer in another direction? How far do I have to steer? Do I have to brake or accelerate? At which moment I steer back to a more neutral position? Driving would be impossible.

For a lot of other driving competences we need our attention in its full capacity. It's about making a decision and adapting our driving style to the actual traffic situation. Can I pass the car or is it too risky? What is the other car going to do? Which lane shall I take? What are the possible risks in this situation?

Although in general, these 'decisions' are quickly taken, a conscious thought is essential. Through a lot of experience, they became faster and more adequate and can lead to more differentiated behaviour.

The table beneath gives us an overview about the function of the three types of behaviour that are involved in driving. Although automatic behaviour and habits are necessary to drive normally in traffic, both can lead us to many mistakes, because the adaption to changing situations is very limited. That's why a critical review of driving behaviour from time to time could be a good idea

Kind of behaviour	Conscious behaviour	Habits	Automatic behaviour
Function	To obtain a certain goal	Increase efficiency	To fulfil a need
Stimulus	Conscious experience	Recurring experience	Perception
Reaction	Think about pro- and cons, choosing between diff. Alternatives	Standard	Automatic behaviour
Change this behaviour?	Discussing the pro and cons, learning alternative behaviour	The alternative behaviour, and the intention must be very strong, or the creation of a compulsory situation	Deconditioning, Limiting certain consequences Removing the stimulus

Goals for driving education.

Knowing all this, we could also analyse the complexity of driving in terms of goals for training and education of a driver.

There are a lot of ***operational skills*** by handling a car. A lot of these skills can become automatic, but are building up on insight and practise.

A lot of choices being made in traffic (pass over, braking or accelerating …) are depending on several characteristics of the situation and of his proper capacity. These skills are sometimes called ***tactical skills***, and they are influencing the operational handlings.

But overall the driver has a certain ***strategy***. What's the purpose of his displacement (urgent, free time …)? Which are his ethical norms about the relation with other road users?

The European project GADGET[17] ("Guarding Automobile Drivers through Guidance Education and Technology") add a fourth level, namely ***'life style'***. This was the result of the work of Keskinen who developed the GDE-matrix (Goals for Driver education).

[17] Siegrist, S (ed.), (1999) "Driver Training, testing and Licensing: towards a theory-based management of young drivers' injury risk in road traffic" BFU, Berne, Switzerland

Last year Keskinen was suggesting a fifth level, referring to the ***cultural background*** of the driver[18].

These five levels have a strong interaction with each other and will influence concrete behaviour, each in its specific way. In the following table we give a short resume.

1	Vehicle manoeuvring *Operational level*	Braking / steering / g-forces / manoeuvring / … Mostly automatic after a lot of experience Self-evaluation: do I have a realistic self-awareness about my skills? / do I have a realistic view on possible risks related to the g-forces, speed…
2	Mastery of traffic situations *Tactical level*	Knowing, understanding and applying rules / selection of (visual) information / predicting behaviour of others / communication / developing a driving style / understanding the risks/ … Mostly habits, but also partly a conscious activity Self-evaluation: pro and cons of own driving style / realistic hazard perception?
3	Goals and context of driving – trip-related *Strategic level*	Planning the trip: route, time and mode of transport / reacting to the influence of passengers / coping with stress and pressure/ … Mostly conscious activity, partly also habits Self-evaluation: awareness of one's capacity – do I know my own 'traps'?
4	Goals for life and skills for living - in general	Values and ethical norms / self-control / meaning of a car, of driving / acceptation of risks / use of drugs / … Habits … Self-evaluation: do I understand the influence of these aspects on my driving? Can I control some of these aspects that have a negative impact on driving?
5	Cultural background	General philosophy about human relations and behaviour that is more a result of the culture in which I live. Habits … Self-evaluation: do I understand the influence of these aspects on my driving? Can I control some of these aspects that have a negative impact on driving, especially when I am driving in another community?

[18] Presentation on the Ceica workshop in Brussels in 2013

[3] Analysing the process of driving

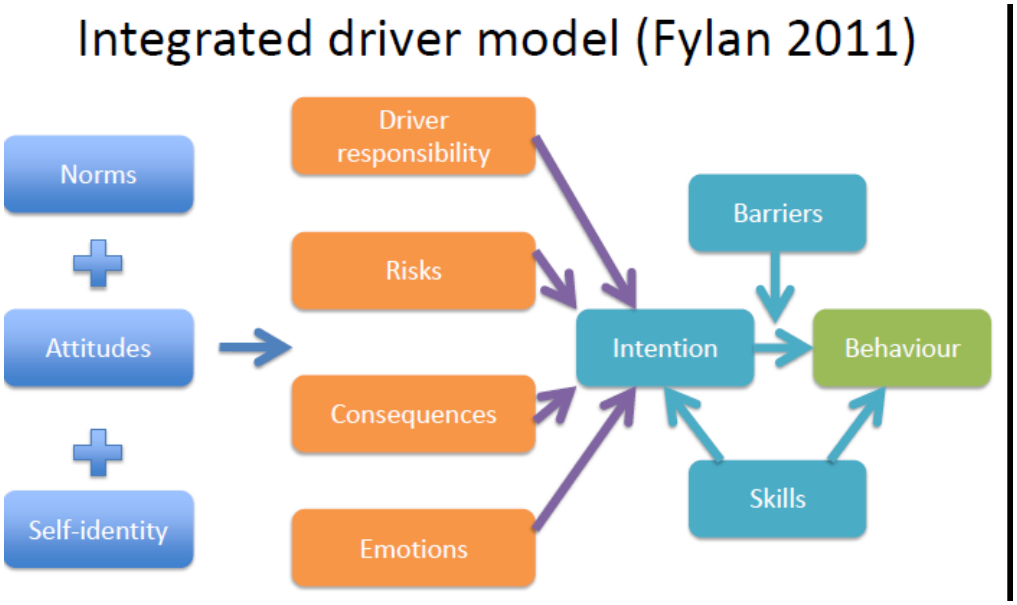
As illustrated in the previous chapter, when driving, the driver has to make a lot of decisions. Such a decision in itself consists of different sequences:

All these sub-functions depend on several underlying factors such as attitudes, standards, emotions, convictions, etc.

When a driver is in a hurry and he has an important meeting, he probably takes the decision to pass another car, to drive faster, etc. Also in this case, he probably doesn't notice a few hazards or his predictions of other users may be less accurate.

Integrated driver model (Fiona Fylan)

Fylan[19] developed a comprehensive model to explain these processes. She adopted different models from health psychology (including the 'Theory of Planned Behaviour').



She and her colleagues use this model to develop programmes for behavioural change. It gives a good idea on which aspect these programmes should focus. For example, this model shows very clearly that only working on driving skills is not enough for developing safe behaviour. As the intention must be taken into account and this is influenced by a

[19] Presentation on the congress 'Behavioral Change' in Wakefield September 2014, Brain Box

lot more psychological processes. Only focusing on vehicle manoeuvring skills could have result in the driver seeing himself as more competent and assured and is probably willing to ignore risks or even to accept more risks.

In this model we see that the intention has a central place, and that is because the model is built up in terms of behavioural change. Even if we recognize that a lot of traffic behaviour consists of more automatic reactions, or habits, intentions play an important role in changing processes.

In 'normal' driving, the intention is not always so important, certainly not when we understand the intention as a conscious function. In a lot of research (for example in the context of the TPB), the correlation between the intention of the driver and his behaviour is rather low. The context of the situation has a much higher impact.

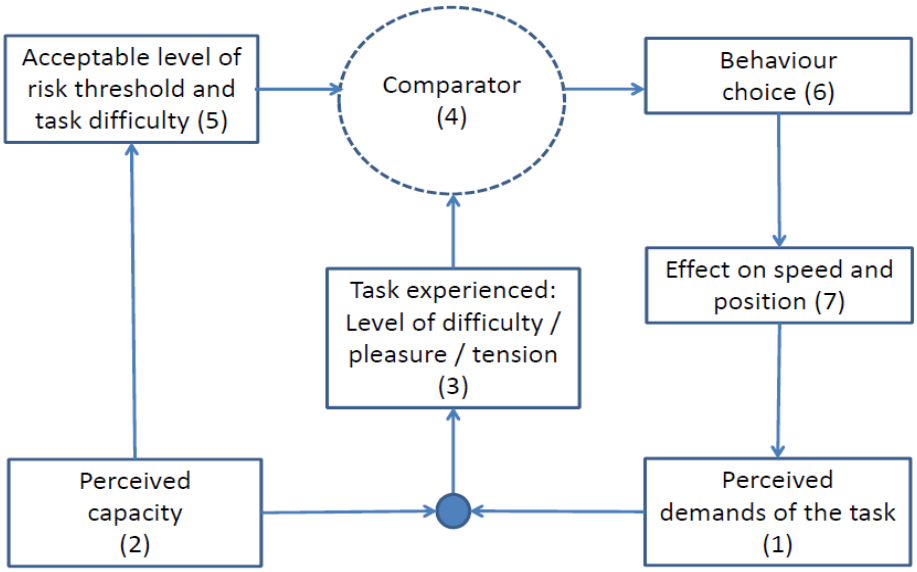
The Task-capability interface model (Ray Fuller)

The Task-capability interface (TCI) model of Ray Fuller (Fuller, 2005) describes the dynamic interaction between the determinants of task demands and driver capacities and therefore provides a good understanding of traffic behaviour.

This model is based on the assumption that drivers will adopt a preferred level of driving difficulty that is the result of the relation between the perceived task demands and the perceived capacity of oneself. The difficulty of the task depends on external factors, such as traffic density, weather conditions, and so on, but can be influenced by the behaviour of the driver himself, especially concerning speed choice, focus and safety margins. The process of balancing the task's demands and one's own capability is also called 'calibration' (Kuiken & Twisk, 2001).

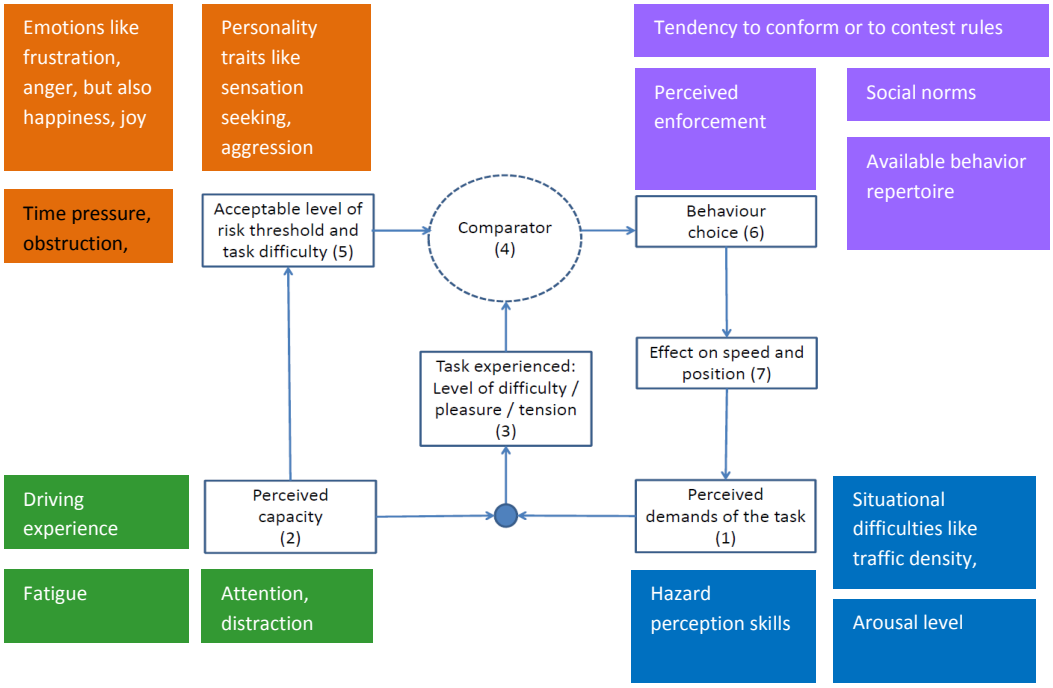
Although this example is one concerning tactical level, the same reasoning can be applied on a more strategic level. People can choose another time or route if they perceive the driving task as too complicated at that moment.

To drive safely, this calibration process is very important but depends on the accuracy of two higher order capacities. On the one hand, one needs capacities to detect and assess hazards (in general terms: risk or hazard perception). On the other hand, one needs a good insight into the general conditions and one's own capacities. Davidse (et al.) (Davidse, Vlakveld, Douwen, & Craen, 2010) speaks of 'self-awareness' versus 'risk awareness'. Self-awareness is defined as the concurrency between the real capacities and the perceived capacities.



Drivers can have different preferences (box 5) concerning the complexity of the driving task. Some people love to be in a challenging situation in which they can prove and exercise all their competences. Others prefer more calm and quiet situations. Everyone has a certain preference, but also a certain limit of what is acceptable. It depends mostly of the personality of the driver (sensation-seeking tendency). But also situational aspects like emotions and time pressure can have an influence on what is acceptable.

In many situations the calibration process will not be optimized. A lot of different aspects have an influence on different sequences of the process. In the next figure, I will give an overview of these aspects with an indication at which level they play an important role. Of course this is more an arbitrary choice. There are probably a lot more factors and their interference on different sequences is possible. Nevertheless, the most important factors mentioned in literature are present.


Emotions like frustration, anger, but also happiness, joy
Personality traits like sensation seeking, aggression
Tendency to conform or to contest rules
Perceived enforcement
Social norms
Available behavior repertoire
Time pressure, obstruction,
Acceptable level of risk threshold and task difficulty (5)
Comparator (4)
Behaviour choice (6)
Effect on speed and position (7)
Task experienced: Level of difficulty / pleasure / tension (3)
Driving experience
Perceived capacity (2)
Perceived demands of the task (1)
Situational difficulties like traffic density,
Fatigue
Attention, distraction
Hazard perception skills
Arousal level

[4] The limits of our brains

The human brain consists of billions of neurons and every neuron is connected with hundreds of other neurons. These connections make it possible to generate new behaviour responses and to quickly adapt to new situations. Although in the past people thought that the brain was fully developed after childhood, recent research has indicated that this was not the case for some more important functions. In general, brains are fully developed at the age of 25. Especially the frontal lobe and the prefrontal cortex are in full expansion between the age of 21 and 25.[20] It is this region that regulates a lot of complex executive functions such as impulse control, inhibition, development of behavioural strategies, planning and sensitivity to feedback. This slower development is often seen as one of the major causes for traffic accidents in young, mainly male drivers[21].

But even with a fully developed and well-functioning brain, there are a lot of limitations in our sensory and cognitive functions. Concerning road user behaviour, these limitations are situated in our perception and our attention competence.

Limits of our perception

Visual perception is very important in traffic. In driver licensing, it is one of the most tested physical conditions. In general, the visual test for 'normal' drivers is limited to an examination of visual acuity. But visual perception is a lot more than acuity alone. It is a complex process of acuity, recognition, depth perception, interpretation and attention. Not everything that occurs on our retina is really perceived by the person. In this chapter we discuss three phenomena that influence our perception, even when our brain and our eyes function normally.

Useful Field of View (UFOV)

You're driving your car in a quiet street and suddenly you see a ball rolling in front of your car. Most likely a child is following this ball. Can you stop on time?

Of course it depends on your speed, but also on the width of your field of vision. In literature this is called the Useful Field of View[22] (UFOV). It means the area in which we can detect and process important information without moving our head and eyes. If we stand still, we have a UFOV of nearly 180°. This means that if something is moving

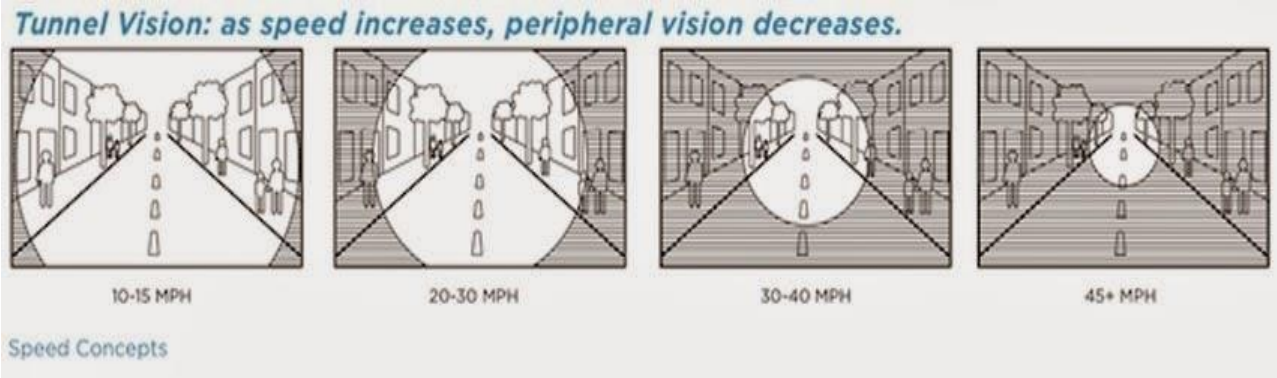
[20] Dupont, E. "Risico's voor jonge bestuurders in het verkeer. Literatuuronderzoek." Brussels, BIVV-KCC 2012.

[21] Vlakveld, W.P. dr., "hersenontwikkeling en ongevalsrisico van jonge bestuurders: een literatuurstudie" SWOV, Den Haag, 2014

[22] Lunsman, M. (et al); (2008); "What predicts Changes in Useful Field of View Test Performance?" in Psychology and Aging, 2008.

beside us, we can detect it and get a first impression of whether it is an import thing or not, even without knowing every detail. When we value it as something important, we will focus on this event for a little while to adapt our behaviour.

When we are moving, our eyes are more focused in the middle of the field of vision. Increasing our movement speed, we focus a lot more ahead and our peripheral vision has not enough time to identify objects. Our UFOV is narrowing. We will not be aware of things that happen beside us. This phenomena is easily recognized by speeding offenders: they didn't see the traffic sign with the speed limit, or the police car who was on the side of the road.



From: http://www.copenhagenize.com/2015/01/is-copenhagen-finally-up-to-speed-on.html

Not only speed has an influence on our UFOV, but also the complexity of the situation, age and experience.

"Unintentional Blindness"

Another phenomenon that causes certain events in our field of vision to go unnoticed, is what Arien Mack and Irvin Rock[23] described in the late eighties as "unintentional Blindness". They used this term for *the event in which an individual fails to recognize an unexpected stimulus that is in plain sight.*

Crucial in this definition is the word 'unexpected'. It's about thing we didn't expect in this situation and we are not focusing on. It looks as if we can't see it, because it doesn't fit in with our concept. A few examples can illustrate this in a broader sense:

- We focus on only a few aspects and things that don't fit in do not attract our attention. (For example a gorilla who walks through a basketball game https://www.youtube.com/watch?v=Ahg6qcgoay4).

[23] Mack, A. & Rock, I. "unintentional Blindness. An overview" http://psyche.cs.monash.edu.au/v5/psyche-5-03-mack.html

- Changes in the situation are not seen, because we are convinced that the situation can't change (for example, changes in the scenery of a film, changes in the clothes of a person in a video: https://www.youtube.com/watch?v=b7LuvAM6XLg)
- Even if the person we are speaking to (for example, a tourist asking for directions and a counter clerk) suddenly changes we do not always notice the difference. , https://www.youtube.com/watch?v=4-HxtKgKrL8)

In traffic, this phenomena is known in accident analysis as the 'looked-but-failed-to-see-accidents'[24].

Camouflage

Different characterises of objects have an influence on our perception: texture, shade, gradation colour and contrast with the background. In darkness, not every object will be noticed and some objects will have a different colour. This is why, for example, the importance of bicycle lights and reflectors get so much attention.

But even in daylight, the differences between two objects can become so small that we don't distinguish both things in the short timespan in which we have to analyse traffic situations. Two-wheelers are most vulnerable to this kind of 'camouflage'. Interesting research was done in the UK concerning the perception of motorcycles[25]. A light pattern in a V- or Y-form helps car drivers to pay attention to motorcyclists, in darkness, but also in daylight.

Limit of attention

A great deal of our perception is controlled by our attention. The phenomenon of 'unintentional blindness' is already a good example. To make a good decision on an operational level, a driver has to analyse all the different cues and hazards in the driving environment. To make this analysis, the driver has to know what the relevant cues to look for are and he must stay focused on the situation in its entirety. Non-relevant cues must be neglected. Fully attention is needed to control our behaviour. This is sometimes called the 'top-down' function of attention.

[24] Langham, M. (et al) "Analysis of 'looked but failed to see' accidents involving parked police vehicles" in Ergonomics, 2002, Vol 45, n°3, p. 167-p. 185

[25] Helman, S., Wear, A., Palmer, M., & Fernandez- Medina, K., „Literature review of interventions to improve the conspicuity of motorcyclists and help avoid ‚looked but failed to see" accidents". Crowthorne, TRL, 20 12

Novice drivers have a lot of difficulty controlling their attention and directing their scanning to the relevant cues. Their visual behaviour is too much focused on the immediate environment of the car, and they scan too little of the peripheral zones. Also the use of mirrors is not frequent enough and, in general, they focus too long on the same and even irrelevant stimuli. Well known is the fact that they stare at an obstacle instead of looking for the escape route. This can lead to a crash, as the hands are following the eyes!

Multitasking

Driving a car is in itself already a combination of different tasks. Luckily, we can develop a lot of automatic behaviour for this motor task. Our attention span has enough possibilities to take care of more important, cognitive tasks. For some people, this automation process makes them think that they can do a lot of other things that have no link to driving: texting, using the cell phone, eating and so on. All these tasks require a certain cognitive effort and at a certain level, this effort becomes too big so some other tasks lose their accuracy.

The most common and well-know effect is that of using a cell phone while driving. In most cases we see that the driver decreases his speed, or that his speed patterns fluctuate more during the call. Sometimes the driver swings over the road, forgets to use his indicators or forgets to put the car in the right gear. They often miss some traffic signs or even traffic lights, pass the right exit on the motorway and do not pay attention to priority rules.

Although using a cell phone is the most well-known source of dangerous multitasking activity while driving (also the easiest thing to regulate and enforce), there are a lot of other situations that distract our attention away from driving. There are different types of driver distraction, which could be classified as follows:

- Visual distraction: the driver looks away from the road; for example: children in the back seat, a specific billboard next to the road, looking for an address etc.
- Cognitive distraction: the driver thinks about other things than driving. For example: the worries about his job, his family, daydreaming or his plans for the day.
- Manual distraction: the driver takes his hands off the wheel – a recent Belgian roadside survey showed that 8% of drivers have something in their hands. For example: eating, putting on a CD, grabbing for something, etc.
- Auditory distraction: the attention of the driver is triggered by sounds which have nothing to do with traffic. For example: radio, GPS signals, passengers yelling or screaming and so on.

Following official accident statistics in recent years, inattention and distraction are contributing factors to 16% of all accidents in Austria[26], to 17-27% in Switzerland[27] and to at least several dozen traffic fatalities in the Netherlands[28].

Automation on a cognitive level?

Because our attention span itself is limited, even information about the traffic situation is too much to handle in all the details. We make a selection based on our experience and knowledge. We also simplify certain complex situations and we focus on the most important or relevant information.

One of the principles with which we make it simpler to handle, is clustering aspects. One example of this, is the global view on road design. When you have a broad and open road, it automatic causes you to increase speed. Traffic signs are not noticed and even then, we get the impression that they are irrelevant to the situation.

Another example is that of clustering all road users who come from the same direction and seeing them as one unity with the same reaction. The truck stops, so we think that the bicycle that drove alongside the truck will also stop.

[26] BMI / Österrichisches Bundesministerium des Innem (2011) Verkehrsangelegenheiten Unfallstatistik 2011. http://www.bmi.gv.at/cms/BMI_Verkehrstatistik/Jahr_2011.aspx

[27] Ewert, U. (2011) Unaufmerksamkeit und Ablenkung. Bern: bfu – Beratungsstekke für Unfallverhütung.

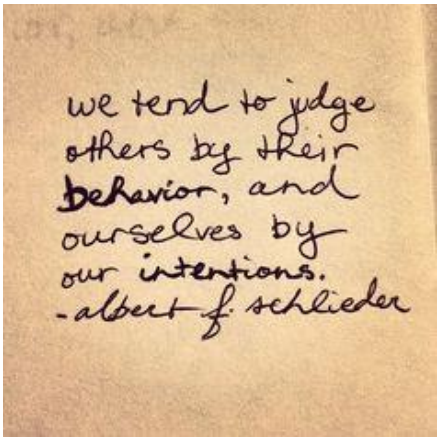
[28] Hagenzieker, M.P. & Stelling, A. (2013) Schatting aantal verkeersdoden door afleiding R-2013-13 Leidschendam, SWOV

[5] Illusions or reality?

In social psychology, a lot of work has been done on cognitive processes like attribution, self-concept and prejudices. How people think about themselves and others, how they judge certain situations, all of this could have an influence on driver behaviour. Baxter[29] introduced the ***attributional biases*** to explain some driving behaviour. Attribution theory deals with how people use information to arrive at causal explanations for events. The fundamental attributional error means that the lapses and slips of other drivers are seen as the result of characteristics of the driver himself (he is stupid, a bad driver and an aggressive person). At the same time, own mistakes are explained by more changeable and temporally circumstances (I was in a hurry, so I didn't pay attention, a bad day, distracted, etc.).

According to Corbett[30], passionate speeders use this fundamental attributional error more often and to the extreme. Even in case of an accident, they will not admit that their driving behaviour and especially speeding was the cause. In fact, in most cases they will blame the other road user.

Nearly every driver has the idea that he is a good driver if not the 'best'… The majority has the feeling of ***being better than most other drivers***. In social psychology[31] this illusion was found in many fields. It is seen as a normal method of self-protection. In traffic, this phenomenon is more pronounced. Possible explanations for this difference are the fact that the other driver stays anonymous. He is not identified as a real person; there is no direct contact, no communication. The awareness of other drivers happens mostly in a disturbing context or in a conflict. Other road users are sometimes seen as rivals instead of colleagues.



Another phenomenon with an important impact in traffic behaviour, illustrated by Frank McKenna[32], is called the ***'illusion of control'***. It means that people have the idea that

[29] Baxter, J.S. et al 'Attributional biases and driver behaviour' in Social Behaviour (1990), 5, p. 185-192

[30] Corbett, C. & Simon, F. 'Unlawful driving behaviour: A criminological perspective' TRL Contractor Report 301, 1992

[31] Dianne Parker 'Road Safety: What has social psychology to offer?' Int. Conf. On Traffic and Transport Psychology, Berne September 2000

[32] McKenna, F.P., 'It won't happen to me; unrealistic optimism or illusion of control?' in British Journal of Psychology (1993), 84 p. 39-50

they can control their own behaviour completely, as well as the situation. They feel safe in every situation and even in dangerous situations they do not adapt their driving behaviour enough, because they think they can handle every situation. Greening and Chandler[33] demonstrate that some drivers believe that the official risk calculation is true for most other drivers, but not for themselves. For them, the risk for being involved in a car crash is much lower. They call this illusion '***unrealistic optimism'***.

Manstead[34] describes the illusion of ***'false consensus'*** which means that people are convinced that their own ideas and behaviour are common for most other people. Speeders always claim that everyone speeds and DUI offenders are convinced that the majority of people from time to time drive while intoxicated.

This idea of not being different from everyone else enforces the feeling of belonging to a group, of being a 'normal' person with 'normal' thoughts and 'normal' behaviour. Being an 'outsider' is a horrifying idea for most people. At the same time, people mostly socialize with others who have the same habits and thoughts. This is implicit proof for them that they are 'right'.

This concept also works in the opposite way. In the USA, a few preventive programs on road safety use the approach of convincing offenders that they are more an exception than 'normality'. They use statistical data, testimonials to illustrate that most people don't make violations and are generally safe drivers. (http://www.si-ocialnorm.org).

[33] Greening, L. & Chandler, G.E., 'Why it can't happen to me: The base rate matters but overestimating skills leads to underestimating risk.' In Journal of Applied Social Psychology (1997), 87 p. 61-79

[34] Manstead, A.S.R et al 'Perceived consensus in estimates of the prevalence of driving errors and violations' In *Journal of Applied Social Psychology*, 22, p. 509-530, 1992

[6] I am not stupid!

People make mistakes… that are human. Based on the fundamental attribution error, most people explain these errors in terms of changeable circumstances or simply by having 'bad luck'. This also means that in most cases they will learn something from this mistake. The next time they can probably 'change' the circumstances by paying more attention, look more carefully at certain cues, adapt their speed a little bit more, and so on. This normal procedure is not easily developed when the outcome of the mistake is more threatening; for example a crash with injuries, a serious violation. Self-defence mechanisms take over and other, more unrealistic explanations can overrule normal interpretations and reactions.

Criminological research has demonstrated these self-defence mechanisms, especially for violent crimes. Matza & Sykes[35] determinate ten different mechanisms, what they called, techniques of neutralization. They assume that most, even severe, offenders have a certain moral code. In general, there is strong solidarity between offenders, with friends, or even in respect to a specific category of people (women, children, etc.) At the same time, there is a certain implicit hierarchy in offences: rape is in general worse than manslaughter.

Also for severe or repeated traffic offenders there is such a moral code. Speeding is not as bad as driving intoxicated; causing an accident with a child is more severe than with an old man, etcetera. On the basis of this moral code and to protect themselves for not admitting their guilt, people use these neutralization techniques for the following:

- Giving themselves a safe conduct for committing a certain act: speeding is not so bad, thus I can do it.
- During the execution of the act, it can overrule feelings of discomfort or certain inconveniences and difficulties: I had to make an emergency brake, not due to my speeding behaviour but due to the stupid behaviour of another person.
- Afterwards, feelings of guilt and shame can be minimised or put aside. I was speeding on this road and it cost me a fine, but it was unjust to punish me.

These ten different techniques are:

1) The denial of responsibility: "*You have be close to the car in front of you, otherwise cars come between and you drive backwards instead of forwards*"

2) The denial of risk or consequences: *"Speeding is not dangerous; you can avoid accidents by being faster!"* or *"The insurance company pays – so what?"*

[35] Matza, D. & Sykes, G. "Techniques of Neutralization: a theory of delinquency", in American Sociological review, Vol.22, 6, Dec. 1957

3) Robin Hood idea (moral justice): *"I take care of the economy: faster driving mean more income, maybe more taxes and fuel consumption – but that's good for the economy". Or "By offending, I give you as a trainer a job!"*

4) Claiming their own rights: *"I already worked very hard that day, so I couldn't pay attention to everything" or "I already do a lot of voluntary work, so I may take certain liberties, can't I?"*

5) Balance idea: *"I always follow traffic rules and never I get a reward and on this exceptional occasion, I get punished!"*

6) Claiming acceptance: *"It was only a few km above the limit, others make more severe offences"*

7) Claiming normality: *"Everyone speeds – so what?" or "if everyone is doing it, than the law must be wrong!" or "what would you do in this situation, probably just the same."*

8) Blaming the victim: *"bicycles provoke such reactions", or "What was a child doing in the street so late?"*

9) Convicting the prosecutors (everybody is picking on me): *"the police likes to catch people and they make traps for people" or "they know me and they're watching!"*

10) Super optimism: "*It won't happen to me"; "I can detect every police car and camera".*

Klandermans & Seydel[36] classified these different techniques in four main categories. This categorisation provides ideas to tackle them. This categorisation is illustrated in the next table.

Each category has a central conviction (row 1) the different neutralization techniques as mentioned above are put in row 2. Row 3 provides a first indication of countermeasures. When the person (offender) is convinced that his violation is not wrong and that there is no harm, it's no use to convince him with the possible risks and danger alone. It is more useful to talk about the meaning of rules.

"There is no crime"	**"It's not my responsibility"**	**"There is no harm"**	**"The other is 'guilty'"**
Robin Hood (3) My right (4) It's normal (7)	you're forced (1) balance (5) acceptability (6)	Super optimism (10) Denial of the consequences (2)	Blaming the victim (8) 'picking on me' (9)
Why installing rules	You can make a choice; increase belief in competences to change	Inventory of all possible consequences	

[36] Klandermans, B. & Seydel, E. "Overtuigen en activeren: publieksbeïnvloeding in theorie en praktijk", Van Gorcum, 2000

Beside more rational self-defences mechanisms, emotional responses play an important role. Driving a car involves a lot of emotions:

- Some people have a strong identification with their car (the car could be viewed as an extension of their body). A lot of characteristics are associated with the kind of car (LADA versus PORSCHE). Also the driving style is seen as a way to manifest the drivers' personality.
- Unexpected events in traffic sometimes have a lot of consequences: no access, too late, obstruction, discomfort, etc. Negative emotions arise very quickly, especially when drivers feel powerless in resolving the situation. When these emotions become very strong, they can lead to dangerous and unlawful behaviour like speeding, tailgating, aggressive driving and so on.
- Driving is a demanding task, especially on secondary roads and in build-up area. Sometimes we don't have enough energy or work capacity to control emotional responses.

While in the past, car manufacturers promoted the power and the comfort of their cars, nowadays, they focus directly on emotional cues. See the billboard of Lexus (a lot of emotion, only a little bit of emission), or Opel with their slogan: 'wir leben autos' (free translation: cars are our passion), or Seat with 'auto-emotion'.

[7] Tomorrow, I'm going to change…

After being confronted with the consequences, some people want to change; others persist in their misbehaviour. Even a large group of the ones who have an intention to change, relapse or find it, after a few trials, impossible to change. In the Netherlands the degree in which traffic offenders are reconvicted for a new traffic offence in two years time, is about 23%[37]. Driving without insurance and/or without a permit are not the most common offences, but the recidivism rate (including all traffic new offences) for them was the highest (more than 60%). DUI has a specific recidivism rate of 37%, and serious speeders reoffend in 26% of cases. In Belgium, the specific recidivism rate for serious traffic offences is estimated at nearly 45% (over a 10 year period)[38]

Changing behaviour is not an easy thing to do, especially when it concerns more automatic behaviour or habits and customary practices. To break this kind of behaviour only a rational intention is in most cases not enough. Health psychologist have been dealing for a long time with behaviour that is reluctant to change, such as smoking, eating, lack of exercise, unprotected sexual behaviour, etc.

In this context, the 'Health Belief Model'[39] (HBM) and/or the Trans-theoretical Model of change by Prochaska and DiClementa[40] are frequently used. The HBM model suggests five important conditions for sustainable behavioural change:

- A strong motivation to attain a certain goal, status, etc. – in traffic it could be safety, conformity to the law, etc.
- The possible risk must be seen as a very serious risk.
- The person must himself feel vulnerable to this serious risk.
- The person has to believe that he can do something to avoid this risk (it is not a question of coincidence or having bad luck).
- The person must feel that he is competent to take the necessary steps to avoid this risk.

[37] Blom, M., Bregman, I.M. & Wartna, B.S.J. (2011) "Gereregistreerde verkeerscriminaliteit in kaart". Den Haag, WODC.

[38] Robert, L., Mine, B. & Maes, E., (2015), "Recidive na een rechterlijke beslissing. De eerste nationale cijfers op basis van het Centraal Strafregister" in Panopticon, 36, (3), p. 173-189

[39] Janz, N.K. &Becker, M.H., (1984)'The health belief' model: a decade later' in Health Education Quarterly, 11, p. 484-501

[40] Prochaska, J.O. & DiClementa, C.C.,(1984) 'The Trans theoretical Approach: Crossing the traditional Bounds of Therapy', Dow Jones-Irwin, Homewood,

With regard to the chapter of illusions and the attribution of errors, our mind is the strongest enemy to conquer before we can start to change. At the same time, reality confronts us more with the positive outcome of offences (we gain time, money, feel good, etc.). Negative outcomes (fines, accidents) are the great exceptions.

The change model of Prochaska and DiClemente[41] emphasises the process of changing. They see different steps a person has to take to develop a new, more adapted pattern of behaviour. It also illustrates that changing takes a lot of time and energy and that there are a lot of possibilities for relapse. It is also important to take these pitfalls into account and prepare people in dealing with them.

Changing habits

Surprisingly, there is not a lot of research on the effects of different approaches to changing habits or more automatic behaviour. It is clear that such behaviour consists of a more or less direct link between S(stimulus) and R(response), without cognitive intervention. This means that intentions, reasoning and conscious attention are not enough to make a change[42].

More complex behaviour, even habits, such as choice of transport mode, speeding choice, DUI, are also reluctant to change, but there are more possibilities to induce processes of chance. We will describe four different approaches that are recommended by most health programs:

1) Increased attention
2) Concretization into clear and achievable behaviour
3) Creation of a support person or group
4) Creation of powerful reminders.

1) Increased attention

A lot of bad behaviour, becoming a habit, can be changed or prevented by changing the situation. This is one of the basic principles of 'Duurzaam Veilig'. Infrastructure has an enormous influence on driving behaviour. By building up a self-explaining road design, we can manage a great deal of inappropriate behaviour. Sometimes very

41 DiClemente, C. & Hughes, S. 'Stages of change profiles in outpatient alcoholism treatment' in Journal of Substance Abuse 1990 - 2: p. 217

[42] Aarts, H. "Gewoontegedrag: de automatische piloot van mens en maatschappij" in Tiemeyer, W.L. (et al) "de menselijke beslisser: over de psychologie van keuze en gedrag" Wet. Raad voor het regeringsbeleid 's Gravenhage 2009

simple interventions can already reduce offences and create a safer environment. As seen in the picture where bicycles are discouraged to take a footpath.

In campaigns and educational programmes different opportunities are present to talk about appropriate behaviour, about risks and side effects of certain 'bad' behaviour. The effects on behaviour, certainly in more general campaigns, are not so promising. According to Wändi Bruine de Bruin[43] several pitfalls cause this lack of effect. Also for trainers and educators, these pitfalls can be very important.

1) The language of the expert is not the same as the language of the target group. For example: Research indicates that the relative risk for novice drivers is somewhat in the range of 4.3[44]. Is there a novice driver who knows what this means? Illustrating how many novice drivers will die in an accident in the school community is clearer.

Promoting helmets by making references to possible brain damage using the official medical terminology is probably less effective than showing an interview with a young victim.

2) What's a risk? For some people, these are challenges rather than risks. It's like the problem of global warming. Heating up is more associated with summer, vacation and travelling and not with the long-term risks such as rising sea level or the expansion of the dessert. This is similar to what traffic safety experts call risk in traffic. Speeding is mostly associated with time gain, with high competences of the vehicle and the driver, with self-affirmation. Young male drivers frequently utters expressions like: "you have to dare something in your life", or "speeding gives me a kind of relaxation". Slovic[45] states that '*positive feelings about a risk may make it seem safer than it is'*. In this context, we have to think about the relative value of certain risks. Of course, no one wants to die in traffic, but is this enough to overrule more the pleasant outcome of dangerous behaviour? The perceived

[43] Bruine de Bruin, W., & Bostrom, A. "How to assess what to address in Science Communication" PNAS, 110, p.14062-14068, 2013

[44] Martenson, H. "@Risk: Analyse van het risico op ernstige en dodelijke verwondingen in het verkeer in functie van de leeftijd en de verplaatsingswijze". BIVV, Brussel, 2014

[45] Slovic, P., Peters, E. & Finucane, M.L., "Affect, Risk and Decision Making" in Health Psychology, Vol 24, N°4, p S35-S40, 2005

possibility of having a crash is far lower than the probability of having a good feeling of performance when speeding. An interesting experiment at the University of Macquarie in Australia[46] demonstrated that young male drivers are more sensitive to losing the respect of peers. Sensibility about having a serious crash or injuries was not a good predictor for behavioural change concerning speeding.

3) Being aware of the possible risks is one thing, being convinced of the fact that you have a real choice is more important. Talking about the risks of driving while intoxicated can lead to a certain agreement, even with offenders. They will admit that there is a certain danger and sometimes they even admit that they themselves are dangerous when they drink. But facing reality, they are very eager to state that 'they have no choice'. There is no other way to get home after the party. There is no other way to deal with friends – you can't refuse a beer! So the biggest challenge to achieve behaviour change is to develop alternative behaviour that is well accepted. What can people do to keep the positive outcome, even when they change their bad habits? Therefore, people must be constantly thinking about all possibilities and accept to develop a real plan in advance. It demands constant energy and attention and it is far from pleasant, because they lose (certainly in the beginning) their spontaneity. Sometimes it is easier to change, when there is a natural and more invasive change in life, like another job, relocation, a period without a driving license, etc.

2) Concretization to clear and achievable behaviour

As mentioned before, it is necessary to provide a way out, by defining in more detail the possible alternatives for a bad habit. In literature this is called 'implementation intention[47]. People need to know WHAT to do and HOW they have to do it. After having examined the different possibilities, it is a good thing to have analyses like…'if I am in situation X, I will do Y'. It's probably more effective to choose only one alternative for a certain situation. This avoids doing the thinking in the situation itself. In more cognitive behavioural terms it means that implementation intentions gives way to new associations between situations and reaction. These associations make it easier to anchor them more solid in our memory.

[46] Plant, B., Irwin, J. & Chekaluk, E. "The threat of losing respect: a comparison of anti-speeding message themes on young male drivers' speeding behaviour" presentation at the ICTTP conference in Groningen 2012

[47] Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. American Psychologist, 54, 493-503

Bruine de Bruin[48] did some research in the USA about the effect of preventive programmes on sexually transmitted diseases and came to the conclusion that young people are well aware of how you can be infected and how you can protect yourself. But the big problem for them was how they can talk about it with their partner and how they have to ask to be protected.

The same kind of result was found in a study in the Netherlands on drug abuse[49]. In different schools different approaches were developed for a drug prevention programme. Risks, neutral information about the different kind of drugs and their effects, discussion on 'why the pupil would or would not use drugs' were highlighted.
The effects were amazing. In every approach there was an increase in drug use, even with 3.6% in school where there was no specific intervention. The biggest increase (+7.3%) was seen in schools where the approach was solely concentrated on fear induction by demonstrating the dangerous effect of drugs addiction. The lowest increase was attained in schools where the discussion about the reasons of using drugs were the main topic.

Kind of approach	**Increase of drug use after 1 year**
No preventive programme	+ 3.6 %
Fear induction	+ 7.3 %
Product information	+ 4.6 %
Discussion about behaviour	+ 2.6 %

3) Creation of a support person or group

Every individual person is embedded in a social structure and is a member of a group of people. Attitudes, beliefs, norms and even specific behaviour are not only a personal matter, but are developed in relation to the group. On the one hand, the individual participates in his surrounding group(s), on the other hand, he can choose his own reference group.

Driver behaviour is also influenced by the attitudes and norms of reference groups. If every one of your friends and colleagues like to drink and don't worry about driving after a few glasses, why should you? If your colleagues show off a lot about their speeding, you seem more like a 'softie' if you don't.

By changing a behavioural pattern, the person must not only fight against his own impulses, but must also resist the influences of his reference group. To strengthen his power and courage, he has to find an ally. It could be an ally in his reference group who

[48] Downs, J.S., Murray, P.J., Bruine de Bruin, W., White, J.P., Palmgren, C. & Fischhoff, B. (2004). Interactive Video Behavioral Intervention to Reduce Adolescent Females' STD Risk: A Randomized Controlled Trial. Social Science & Medicine, 59, 1561-1572.

[49] Quoted in Ashton, M., "The danger of Warnings" on www.drugsandalcoholfindings.org.uk

could support his intention, encourage new strategies and be empathic in difficult times and relapses. This person must be significant (a good friend, a partner, a close relation, etc.). For some people it is easier and more appropriate to look out for a new reference group. This is what the AA (Anonymous Alcoholics) can offer and is their key factor for success.

4) Installing reminders

Strong habits are difficult to change. Even if one has the deliberate intention and clear adaptive ways to handle a situation, old habits slips through before they are noticed. Changing demands a lot of attention, sustaining in time. To focus the attention, some therapists work with reminders. There are clues in our direct environment that let the person think about his intention, the reason for changing or the possible negative outcome of the 'bad' behaviour. A well-known example is the little rubber band on the wrist as an aversion therapy for bad habits, even sexually deviant behaviour[50]. In most cases it is seen as a reminder of pain.

It could also been used as a positive reminder that focuses on the intention and the positive outcome of the 'new' and 'desired' behaviour, or just a warning that you come close to a relapse. Some examples: a simple cue on the dashboard (think of us), a signal when you pass the maximum speed (already installed in most cars and GPS systems), etc.

Of course, using reminders must be a personal choice and the reminder must be well adapted to the person. What could be a good trigger for someone, can mean nothing at all for the other.

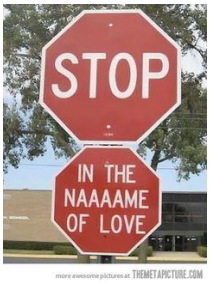
This idea is also used in more general contexts to remind people how to behave in a specific situation. Examples such as warning speed cameras (indicating the speed of cars passing by with a kind of evaluation without being punished), or extra warning signs (like 'look out for our children') are frequently used in Belgium to get the attention of drivers. Two more specific approaches linked with the processes behind 'reminders' are priming and prompting.

Priming is the activation of mental representations by external stimuli which are presented in a passive, subtle and non-forced manner. In fact, most of the time, people are not aware of their influence.

[50] http://study.com/academy/lesson/aversion-therapy-definition-examples-quiz.html

Research at the University of Groningen[51] indicated the subconscious influence of subliminal activation. This experiment was done on a simulator. The Goudappel[52] organisation carried out some experiments in Deventer (the Netherlands) consisting of drawing children's footprints in areas where cars were not allowed to park. In another experiment, they drew hopscotch on the roadside and investigated the speed of cars. In both cases, there was a significant positive effect. Unfortunately, most of the time, the effect of priming is limited in time and space. But it works.

Prompting[53] is another easy intervention that works with extra stimuli. Signals concerning the desired behaviour are emphasised. These signals must be attractive and are mostly associated with happiness, but also negative signals can be used. Some examples:



- A road sign with a humoristic message, seen in Oak Lawn (USA)
- Enclosing a children's drawing when sending a speeding ticket

(Belgium: Antwerp police project on speeding)

- An extra message on traffic lights for pedestrians and bicycles (The Netherlands: Amsterdam). This results in 17% less offenders.

5) Changing a habit is very uncomfortable most of the time

The 'old' habit was developed because it seems the easiest way to gain positive results. It was largely an automated behaviour pattern, so it doesn't demand a lot of energy and attention. It was the natural way of behaving for the participant.

Changing such a habit in fact means changing two things: 1) to inhibit the processes and circuits that were build up by the old habit, and 2) building up new circuits.

[51] Lewis-Evans, B., Waard, D; de, Jolij, J. & Brookhuis, K.A. (2012) What you may not see might slow you down anyway: masked images and driving. In PLoS ONE, Vol. 7, nr.1, p. e29857 / http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0029857

[52] http://www.goudappel.nl/voorbeelden/veiligheidsaanpak-scholen/

[53] Tertoolen, G. & Lankhuijzen, R. (2013) Onbewuste invloeden op gedrag. Beleidsimpul verkeerveiligheid. Utrecht, XTNT – Experts in Traffic and Transport

1) Inhibition of old circuits. A lot of attention is needed to block the 'normal' way of behaving. What is experienced as spontaneous and normal behaviour must be interrupted to give way for another intentional response. This is what people in general call 'willpower'. Certainly, in the beginning of the changing process, this is not a pleasant situation. Without enough encouragement, certainty about the positive outcome, a strong motivation and a kind of reward (even in the form of a (self) compliment) in every step, it's hard to maintain.

2) Building up a new circuit. This new behaviour is not yet automated, so it needs a lot of attention. Practically every step is a new thing to learn, and learning also means failure, less flexibility, slowing down (because you have to think) and so on. DeCaro[54] (et al) has defined this as the 'choking under pressure' phenomenon.

Only after a certain time, when the new behaviour needs less planning and attention, the feelings of discomfort pass, and the new behaviour becomes the more 'natural' way of doing things.

[54] Decaro, M.S., Thomas, R.D., Albert, N.B. & Beilock, S.L., "Choking Under Pressure: multiple Routes to Skill Failure" in Journal of Experimenatl Psychology, Vol 140 No 3, p.390-406, 2011