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Reducing aggressiveness by improving traffic management

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Based on a social psychological concept of aggression which is combined with system-related considerations, four proposals are formulated with the intention of reducing the probability of aggressive interactions in traffic: (I) increasing a homogeneous flow of vehicles, (II) adapting the system's rules to the system's changes, (III) extending the responsibility of individuals to the functioning of the system's segment presently used, (IV) fuzzy definition of criteria for behaviour de-stabilizing the system. It is predicted that the proposals will vary in their potential to be realized. Referring to the problem of "dangerous and aggressive interactions", they intend to produce a change in the behaviour of the system which may be described as a shift from "shoving" to "flowing." It is postulated that by converting the system in this direction, attributes are also prepared which describe "tomorrow's traffic" (increasing steering by telematics and other driving assistants, development of vehicles suited to form clusters).

The contribution intends to bridge the gap between individual-centered and systems-related analyses of road traffic. One relevant basis is our scientific knowledge of individuals' functioning under conditions we meet in road traffic, including circumstances known as being relevant for aggression and conflicts. This contributes in explaining the functioning of relevant elements of the system in question. Since on the other hand, the behaviour of single elements or microsystems (individuals) has an impact on the functioning of road traffic meso-systems (configured from drivers and other actors being temporarily and spatially present) the individual is only partly responsible for, both sides have to be considered in order to formulate suggestions intended to control aggressive and dangerous driving behaviour and hence improve the macro-system (Linneweber, 1997; Linneweber, 2002, 2003a, 2003b).

Psychological explanations of “aggression in road traffic” mostly refer to individual drivers “behaving aggressively”: Stressed, under time stress and other kinds of pressure, he (or she)¹ takes part in road traffic. Here he is hindered, gets annoyed or frustrated and critical events or even an accident happens. Psychologists subsequently have to explain, if there are certain conspicuous driving types (Donovan, Marlatt & Salzberg, 1983; Fernandez-Seara, 1978; Hansen, 1988; Huesmann, Eron, Lefkowitz & Walder, 1984), if there are differences between men and women and how individuals can learn to handle frustrations and stress (Hartley & Hassani, 1994; Novaco, 1991; Selzer & Vinokur, 1974). They also have to figure out, which effects have to be expected from educational actions (Roy & Choudhary, 1985) and “society's aggression level” (Sivak, 1983), as well as which influence car commercials have, if conflicts between generations can be observed in road traffic (Linneweber, 2003a) etc.

Finally, they must – quasi as an encore – explain where to search for the causes. Highly preferred explanations are those implying that road users have motives, which regulate other primates' behaviour, too: seeking for power, striving for dominance, imposing behaviour etc.

Road traffic as system; Driver as system component

The following explanation of the phenomenon deviates from this tradition by combining two aspects:

1. Road traffic is conceived as system, which tries to achieve the regulation (set of road traffic rules and laws) and frictionless cooperation of its single components (individual, vehicle, and traffic context)
 - a) by forming contextual conditions for traffic
 - b) by regulating rules of utilization
2. The behaviour of the driver as single component of the system results from
 - a) general rules of human experience and behaviour
 - b) features and functionalities of the system (physical conditions, rules, regulations, behaviour of other drivers, “traffic situation”)
 - c) system-related regulations of human experience and behaviour.

A comprehensive explanation of the phenomenon “dangerous”, “aggressive”, “risky” motoring (Bösser, 1987, Linneweber, 2002, 2003b) is possible if and only if (1) and (2) are integrated for explanation. Also recommendations based on action research need a simultaneous consideration of the aspects cited above. Despite emphasizing main points (“ad1”; “ad2”), references are always made. The applications respectively mentioned and suggestions are not exhaustive, but meant as examples.

ad 1a and 1b

First of all, those attributes of the system will be discussed, which are dependent for the behaviour of the single system components. It pursues the target to identify “neuralgic parts” of the system and to submit suggestions for their “deactivation”.

¹ Mostly he – this is why we continue using the male form.

Suggestion I: Homogenize the behaviour of the components to reduce system dynamic by

- guidelines of minimum/ maximum velocity and/or
- division of user types (by configuration of traffic context or rules of using).

Regard any interstate section: Two drivers as system components have a common interest: they want to drive from A to B. They differ in reaching the final aim. This difference influences their behaviour: while type I (let's call him "the prudent") tries to reach the final aim with maximal safety precautions in mind, type II (let's call him "the sportive driver") tries to reach the final aim by beating his personal minimum time. It should be obvious that type I and type II will likely get into conflict when meeting in the same system segment.

Suggestion II: Adapting rules to changed "system behaviour"

1. Permit passing in right lane with moderate difference speed

Apart from the fact that decreasing the speed spectrum reduces system immanent frictions, it facilitates as well a "liberalization" of regulations such as the prohibition of passing in the right lane: In case of high volume of traffic the regulation of overtaking only in the left lane (in combination with inhomogeneous vehicle speed) causes evasive lane change even in critical situations. This causes known and unwanted side effects like the "accordion effect", "passively" violating rules concerning safety margins (caused by others changing to the own lane ahead), creating the "disadvantage syndrome" with the result of "actively" reducing the safety margin (to prevent from own disadvantage). These facts mainly contribute to the accrument of critical situations ("skirmish", accidents). To prevent misinterpretations of this suggestion we point to the difference between passing (without changing lanes and only moderately higher speed) and overtaking in the "classical" sense. Our suggestion refers to the former.

2. Simplifying evasive lane changes

Homogeneous speeds allow the modification of current rules to make evasive lane changes less risky.

In case of evasive lane changes with slight speed differences, more responsibility for the avoidance of collisions can be assigned to the backward driver as it takes place in the current system (analogues to the responsibility in case of obvious violations of speed limits). This "diffusion of responsibility" could have a positive influence on the following suggestions (suggestion III and IV). Occasionally observed effects, like tailgating to demonstrate to the up front driver that he acted hindering before (with the known critical effects like escalation, skirmishes etc.), should appear less.

Consequences of more homogeneous flow of traffic: reorientation "from scrambling to flowing"

In the case of limited speed spectrum and less frequent lane changes, a more homogeneous flow of traffic can be anticipated. Referring to the behaviour of single road users, a successive reorientation is expected. The re-orientation can be characterized as "from scrambling to flowing". "Overtaking" in its traditional terms (evasive lane change – overtaking – evasive lane change) happens less frequently; risky driving and indicated signals are superfluous. It sets up a "system behaviour" (and compatible behaviour of individual road users considered as adequate), preparing the "traffic of tomorrow": supported by telematics and driving assistants, thinkable to the approach of vehicles capable for clustering.

Moreover, transfer effects between different traffic situations to be expected may also reduce conflicts: if somebody e.g. experienced a relaxed traffic flow from Hannover to Hamburg (only overtaken by slightly faster cars or overtook slightly slower ones), he will more likely show similar road behaviour in downtown Hamburg (and therefore he contributes less to the development of dangerous situations), than somebody who conceived himself as victim of pushing or – caused by their slowness and blocking the passing lane – hindering road users and therefore arrives in Hamburg totally stressed out.

Without extensively discussing assumptions steering the behaviour of single road users, suggestions for optimization with the help of deliberations due to the system “road traffic” could be made up.

In the following, more detailed processes are considered. They are derived from theories of aggression and conflicts and characterize the experience and behaviour of road users in “critical situations”.

First it should be mentioned, that the suggestions are less exceptional than they might appear: the road traffic system of North American highways can be described as already widely characterized.

Critics of suggestions to transfer some of the characteristics to European or German relations, occasionally mention that conditions in the US and Canada are not comparable to local ones. Sure in a way there are some differences. In my opinion, it is rash to stress these generally in order to decline suggestions of alteration: In the US and Canada, we generally find similar rules everywhere without differentiating them, even though there are extreme different ratios (e.g. megalopolis vs. rural areas). Furthermore, ratios of street and traffic are not static but changing continuously. With regard to increasing traffic density and less growing road network, the adequacy of rules should be discussed continuously. This is moreover indispensable if new road flow regulations are debated (e.g. speed regulations in addition to traffic density, weather conditions etc. or general speed limitation).

Ad 2a and 2b

For a fairly long time psychologists tried to explain why people act “aggressively” (subsumed in Felson & Tedeschi, 1993; Linneweber, 1985; Mummendey, 1981; Tedeschi & Felson, 1994). Some models can be found in daily explanations:

- Impulse theory approaches assume a specific energy, that builds up in daily life and has to be unloaded once in a while (catharsis),
- The frustration-aggression theory assumes that people react aggressively to events which are experienced as frustrating,
- Concepts of learning theory emphasize that observed patterns of behaviour are learned and shown due to rewards,
- Concepts of social psychology emphasize that aggression happens between persons and therefore social psychologists investigate reciprocal behaviour judgements.

A serious attempt to explain contentions in areas like road traffic (Hauber, 1980; further possible areas would be wedlock/relationship, work, neighbourhood) has to take up elements of several concepts; representing such an all-embracing approach would go beyond the scope. Referring to everyday life explanations of individual behaviour and therewith the functioning of the system, the last mentioned social psychological approach is approved (Mummendey, 1984; Tedeschi & Felson, 1994). It assumes that there is no “aggressive behaviour” itself. In social context however, behaviour patterns are defined and classified as “aggressive”. These definitions and classifications determine the further course of a conflict (e.g. the justification of rage and retaliation). Therefore, aggression is neither a concept of characterization nor a concept of judgement (Mummendey, Bornewasser, Löschper & Linneweber, 1982).

Trying to apprehend the behaviour of a car driver acting aggressively has to go along with the envision, that he

- is a component of a system, which affects him,
- perceives, and assesses the affecting system,
- perceives and assesses the behaviour of other system components (including the possible alternatives not occurring) and finally –
- depending on his appraisal of the situation –
 - behaves as a matter of routine or
 - explicitly chooses his own behaviour.

Let's assume that he shows a behaviour, which is concordantly constituted as risky, dangerous, rich in conflicts and aggressive (e.g. tailgating with high speed, inadequately blocking of the overtaking lane, jostling in tight gaps etc.). By the time of acting, the driver will not consider his own behaviour as aggressive at all. In fact he will have always good reasons, because he was hindered, constricted, jeopardized, constrained etc. by other components of the system. Therefore he has to demonstrate to other road users how to drive properly. Or maybe he is just the sportive type of driver. Others, however, meaning other road users, will consider his behaviour as “aggressive”. Now they also have good reasons for what they – at least occasionally – indeed do: re-acting, consequent, paying back etc., just themed: tit for tat. (“negative reciprocity”). From the psychological point of view it is really interesting to notice a rule, which I determine as “disadvantage syndrome”: Whatever actually happens will preferably be recognized as disadvantaging the own person, meaning not getting what is deserved.

If the conditions of experiencing individual disadvantages are reduced, a mitigation of critical traffic situations will be expected. The above conducted suggestions fulfil this function. Other suggestions could be derived from analysis or could be developed in studies.

Ad 2c

Of course there are some unchangeable system characteristics, which encourage the development of hostile contention:

- 1) Studies show that whenever individuals do not face each other vis-à-vis but are masked instead the attendance for hostility increases. To a large extent this is the case in road traffic. (De-individuation).
- 2) Different car types (“the Porsche behind me”) alleviate social categorizations. Stereotypes, which help to legitimate one's own behaviour, are easily available.

The following suggestions are – admittedly – somewhat speculative; with regard to a long term functioning of the system “individual traffic” they might be worthwhile to be discussed as visions of future innovative traffic systems (e.g. for inner cities), which are either developed in science or in industrial research (e.g. Researching traffic systems and the possibilities of their combination, telematics, “vehicles capable for clustering”)

Suggestion III: Expansion of individual responsibility for the functioning of current used system segments

The currently valid flow regulation and the legal system cause an individual responsibility only for the individual behaviour. Someone has to strive for not showing legally cleared behaviour; it does not matter if someone causes “wrong behaviour” (in terms of disturbing the system) in other road users. Outgrowths of this regulation, like consciously caused accidents are well known.

Studies from organizational psychology show that there could be positive effects if all individuals within a team are responsible for the same product.

How could this be accomplished in road traffic? It is conceivable that an interest in the development of a smooth functioning “road traffic” system might develop, if – e.g. in case of accidents (as a massive kind of dysfunctionality) – there is a basic implementation of noticeable joint liability. In case contributory negligence is denied, this has to be proven actively.

As a consequence, it can be expected from human components, that they show a behaviour, which avoids the development of critical situations to avert individual damage.

Suggestion IV: Diffuse definition of criteria of system-destabilising behaviour

Car drivers in conventional systems primarily configure the interaction with other car drivers in a way that juridical illegal behaviour does not happen or is not detectable. Despite enabling traffic monitoring systems to judge road users’ behaviour arbitrarily, a fuzzy definition of “breaches of road traffic regulations” could cause less risky and dangerous behaviour. In parts it has to be defined as “maladjusted behaviour in a traffic situation”. An enlargement and a more frequent use should be considered. Of course, fuzzy criteria of behaviour assessment are extremely problematic for jurisprudence. “Hard facts” could be replaced with several judges (e.g. uninvolved witnesses, traffic monitoring systems) agreeing upon the same identical judgement. It could be expected that an individual driver would not orient his behaviour to avoiding singular irregularities (resp. it’s traceability). Instead, the driver would try not to expose himself to the reproach of system-destabilizing, maladjusted, and “aggressive” behaviour.

Altogether it could be expected that due to a combination of all suggestions the car driver’s perspective would change from “competing conflict” to “frictionless functioning of traffic system” (from scrambling to flowing). Therewith an essential contribution could be achieved, which is important for the preparation of something that we currently anticipate as tomorrow’s road traffic functioning.
