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Cybersecurity and its Capabilities in the Sphere of Preventing Road Traffic Threats. On Anger, Aggression and Road Rage

Abstract

From a very generalised perspective, it can be said that humans are the weakest link regarding road traffic safety. Researchers have focused on their health status, physical, mental and psychological characteristics, gender and age, etc. They have been exploring the question of whether there are persons who are particularly predisposed to becoming the perpetrators or victims of accidents or catastrophes, posing a direct risk of accidents and catastrophes, or causing road traffic hazards. This paper is focused on the issues related to aggression and anger that drivers experience and so-called road rage. The author identifies and analyses the factors determining such conduct, discussing its causes and behaviour prior to such incidents and considering external conditions. Emphasis is placed on the fact that anger, aggression and rage are often followed by a hazard, resulting in an accident or other road incidents mentioned above. Attempts are made to point to yet unexplored spheres of possibly identifying symptoms that indicate aggression or rage, which have been a neglected issue so far and which could be significant for taking anticipative and preventive measures without risk of penalty. The author asserts that the analysis of criminal cases and the evidence collected in the course of such procedures, including tachograph records, event data recorders, video recordings and surveillance cameras, may constitute materials used by an interdisciplinary team of experts to create an algorithm that allows preventive measures to be undertaken before outbursts of aggression, rage and violence take place. Undoubtedly, it is a cybersecurity-related task, which, by no means, may be associated with an excessive surveillance of behaviour on the roads.

Key words: security rules, accidents and other road incidents, hazard, preventive measures

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Introduction

A lot has been said about the health status of road traffic participants in the context of their psychophysical characteristics concerning other factors unrelated to any diseases. The issue was widely discussed in literature and case law¹.

It is possible to state the view about the inclinations of certain individuals to cause road traffic hazards and to commit offences or traffic violations. Scholars have been searching for the factors underlying tendencies for road accidents for years but with little success. A position was put forward that individuals convicted of offences and those found guilty of traffic violations were the ones to cause accidents more often².

In general, it is difficult to share T. Willett's views³ that traffic offenders drive their vehicles the same way as they behave in their daily lives.

At this point, the views expressed by Jan Okoń are worth mentioning. He noted that „the attempts to develop a comprehensive classification of factors that might contribute to the increase in road traffic threats caused by humans, including biological shortcomings or sensorimotor disorders, all the way to personality change, and to expand it by transient and permanent states, have added to the vagueness of the notion and resulted in a certain disorder in terminology. The mechanisms behind the inclination towards accidents are still to be discovered: it is uncertain whether it is a culmination of unfavourable psychophysical conditions, a set of factors related to incorrectly formed personality or another specific, yet still undefined, cause”⁴.

The aforementioned author was right to assert that⁵, if what we should research is not certain, achieving success in this sphere is difficult. It should not be surprising that the studies of inclination for causing accidents, or at least attempts to use the notion, are abandoned.

1 For more details refer to K.J. Pawelec, B. Kozłowski, A. Tarnowski [in:] *Opiniowanie w sprawach przestępstw i wykroczeń drogowych*, eds. K. J. Pawelec, P. Krzemień, Warszawa 2023, p. 104–109 and other references and case law listed herein.

2 A. Gaberle, *Wypadki drogowe. Aspekty kryminologiczne*, Warszawa 1986, p. 129–138 and the references below.

3 T.C. Willett, *Criminal on the road. A study of serious motoring offences and those who commit them*, London 1964, p. 310.

4 J. Okoń, *Psychologia bezpieczeństwa pracy* [in:] *Psychologia przemysłowa*, ed. idem, Warszawa 1977, p. 515–518.

5 *Ibidem*, p. 501.

However, the standpoint cited above should become polarised to a certain extent. Understandably, the absence of specific research may be a cause for concern. Nonetheless, it cannot be stated that their results would not be useful, for instance, during the legislative process, including measures to develop reasonable preventive examinations and propaganda measures. Such studies are worth continuing, as they might ultimately lead to the identification of the causes underlying road crime, and one of their elements might be the analysis of psychophysical characteristics and personalities of perpetrators and victims, which might trigger the introduction of legislative solutions to identify and eliminate threats.

On anger, aggression and road rage

It is not possible to disregard the circumstances where road traffic participants take risky actions or decide not to act, or are unable to take appropriate steps to respond to an emerging threat. Tadeusz Tyszka defines a hazardous situation as a circumstance where a choice is made, but, its outcomes are uncertain as they depend on the factors that are beyond the control of the person that makes the decision. Various factors might determine the identification and recognition as well as risks⁶. According to Maryla Gruszczyńska and Tadeusz Tyszka, the most significant ones include the size and importance of human needs and values being infringed, the direct nature of the negative consequences of threats, the noticeable relative frequency of accidents, the controllability of the consequences of risky behaviour, the ability to imagine the causes and effects of a given incident, threat levels, the willingness to intentionally put oneself at risk and the level of fear.

The willingness to intentionally put oneself at risk belongs to a vital dimension which is taken into account when the riskiness of a choice that has been made or proposed is being assessed, as Bruno Hołyst wrote⁷.

Furthermore, he aptly stressed the significance of carelessness regarding the perpetrator and the victim. As a rule, this was related to the lack of

6 T. Tyszka, *Psychologiczne pułapki oceniania i podejmowania decyzji*, Gdańsk, 1999, p. 285 et seq.; M. Goszczyńska, T. Tyszka, *Jak postrzegamy zagrożenia*, „Przegląd Psychologiczny” 1986, no. 1, p. 39–64.

7 B. Hołyst, *Wiktymologia*, Warszawa 2011, p. 1097.

awareness of consequences. The author also distinguished incidental carelessness, typical of road incidents⁸.

Putting one's life or health at risk happens not only in extreme situations. It also occurs when people are exposed to harmful factors for a long time, often at work, when they are unaware of the consequences that this might cause. Such factors might include being overburdened with work, which might sometimes reach extreme levels, with results that might occur even after long years⁹.

It has been asserted that risky actions or omissions might concern every road traffic participant. The control of the consequences of such behaviours is extremely limited. This is because an accident is an indivisible and unexpected process. Its determinants might also include aggressive actions on the part of perpetrators and victims, which should be the subject matter of a separate analysis. Unfortunately, it is extremely difficult to undertake this kind of research based on judicial practice, as the legal classification adopted on multiple occasions does not concern the acts referred to in Chapter XXI of the Penal Code or Chapter XI of the Code of Petty Offences.

Instances of road traffic aggression are not rare. The media often inform the public about such events in a sensational overtone, highlighting the irrationality of behaviour and its brutality. It fails to explore this complex problem, which has also not been studied in full by scholars.

In general, it can be stated that, notwithstanding the adopted criteria, aggressive behaviour is, as a rule, connected with making risky decisions. It is characterised as unwanted, bothersome, distressful behaviour, causing loss or pain to a victim and taking place as part of human interaction processes¹⁰.

The notion of aggression is often applied, but no generally acceptable definition of the phenomenon has been developed yet. There is a consensus that „it means behaviour aimed at inflicting suffering on another person who has the motivation to avoid such suffering”¹¹.

Currently, the authors propose the notion of „road aggression” as a term that means mild or more severe forms of aggressive response on the road. This can include honking to rush other traffic participants, flashing headlights,

8 For more details refer to *ibidem*, p. 1103–1109 and other references listed herein.

9 For more details refer to *ibidem*, p. 1107, 1109–1125 and other references listed herein.

10 Cf. R.A. Stefański, *Prawo o ruchu drogowym. Komentarz*, Warszawa 2008, p. 578.

11 See B. Wojciszke, *Człowiek w relacji z innymi [in:] Psychologia. Podręcznika akademicki*, vol. 3, *Jednostka w społeczeństwie i elementy psychologii stosowanej*, ed. J. Strelau, Gdańsk 2006, p. 147–148; Cf. B. Hołyst, *Psychologia kryminalistyczna. Diagnoza i praktyka*, Warszawa 2018.

shouting threatening, driving very closely, intentionally cutting up another car, violating the right of way or maliciously blocking an overtaking vehicle. These types of behaviours are perceived by most drivers as aggressive. Yet they take such actions themselves on multiple occasions¹².

It can be said that aggressive driving means driving a vehicle in a way that poses a threat of accident or catastrophe, or causes a direct danger of such occurrence, at least posing a threat to road traffic safety. The characteristic features of such driving include excessive speed, disregard for traffic regulations, performing risky manoeuvres and neglecting other road traffic participants. Research has shown an increasing frequency of the phenomenon, defined as road rage. Road rage is usually defined as a physical attack against another road traffic participant, most often with one's vehicle or another tool. These types of outbursts are most frequently triggered by another person driving slowly along the mid or left lane, overtaking on the wrong side, excessive speed of other drivers, etc.

It is also worth mentioning that road aggression is not only attributed to motor vehicle drivers. The cases of aggression involving cyclists, users of personal mobility devices and pedestrians are increasing. In addition to the predispositions mentioned above, the negative behaviours of the least protected road traffic participants might be aggravated by their insufficient knowledge of road traffic rules because they do not need to hold a specified licence to be road traffic participants. On multiple occasions, a wrongful conviction about an unquestionable right of way causes tension and aggressive reactions.

The phenomenon related to road rage and aggression is so-called anger behind the wheel, which means the occurrence of this type of emotion in a driving situation, no matter what the source of irritation is. Anger includes the probability of risky behaviour on the road and disrupts perceptive skills, attention, information processing and reflexes. The possible reactions following the feeling of anger include a physical attack, verbal aggression, non-verbal hostility, indirect aggression, and suppressed anger. Anger can be demonstrated at an early stage, for example, through tone of voice, facial expressions, abrupt movements, etc¹³.

12 Cf. D. Shinar, *Aggressive driving. The contribution of the drivers and situation*, „Transportation Research” 1982, no. 2, p. 137–160.

13 For more details refer to B. Hołyst, *Przeciwko życiu. Wymiar kryminologiczny i psychologiczny*, vol. 3, Warszawa 2019, p. 631–634.

In attempting to search for factors affecting the escalation of road aggression, emphasis should be placed on both external and individual factors. External factors include road traffic congestion and noticed traffic obstacles, high temperature, and the anonymity of drivers. As regards individual variables potentially affecting the escalation of road aggression, differences in behaviours were noted between men and women, between young and inexperienced drivers and older drivers with extensive experience. Correlations between aggression and personality traits were also identified¹⁴.

Regarding the analysis of relationships between road aggression and personality traits, it was found that the features that are most correlated with road aggression include sensation seeking, impulsiveness, being prone to boredom, and self-perception as a person who is unjustly treated in the workplace, at school or in a family setting, and low self-esteem¹⁵.

At this point, it is worth devoting some space to young drivers aged 18 to 24. According to Police statistics, young drivers cause approximately 20% of accidents. Unfortunately, Police studies provide no information about how many young drivers' traffic violations were related to aggression, inexperience or other factors. It is a well-known fact that young drivers make risky decisions that are usually related to disregarding the speed limit and aggression. Such aggression and road rage may be associated with the psychophysical and mental characteristics of young people. Given the above, it is impossible to ignore the results of studies by Russell A. Poldrack¹⁶ who wrote that, based on the results of psychological research, the ability to control one's mind is hindered in an (average) teenager. Hence, they may not be held accountable for their deeds. The author further cited cases in which U.S. courts noted that the development of psychology and brain sciences continued to demonstrate fundamental differences between the minds of juvenile and adult offenders. For instance, the parts of the brain responsible for behaviour control develop at the final stage of human development. The author cited example rulings of American Courts, which had placed trust in neuroimaging examinations, finding them sufficient to become the basis for decisions on „the life and death”

14 Ibidem, p. 634–636.

15 For more details refer to D.C. Schwebel, J. Severson, K.K. Ba, M. Rizz, *Individual difference factors in risky driving: The roles of anger/hostility, conscientiousness, and sensation seeking*, „Accident Analysis and Prevention” 2006, no. 4, p. 80–81; K. Grunt-Mejer, *Agresja drogowa, jej uwarunkowania i metody pomiaru*, „Psychologia Społeczna” 2011, no. 2, p. 163.

16 R.A. Poldrack, *The new mind readers. What neuroimaging can and cannot reveal about our thoughts*, Stanford 2018, p. 144.

of defendants. Neuroscience provides evidence that the brains of individuals aged 18–24 are not fully developed. Neuroimaging examinations provide results that clearly demonstrate why teenagers behave the way they do, which might significantly affect the assessment of their guilt and potential punitive measures.

To conclude, it is worth devoting some attention to the views expressed by Rob Dunn, who stressed that environmental determinism also affects human communities, both from the economic and behavioural point of view, including increased violence and related aggression¹⁷. It is particularly significant in the climate change we are observing, particularly global warming. Dunn asserted that the increase in temperature and rainfall evokes inclinations towards aggression in many people. There have been justified hypotheses that the bodily consequences of increased temperature may be excessively received by the brain, which is related to decision-making processes, with particular attention to impulse control. It was suggested that the bodily stress resulting from hot weather might cause the brain to function less rationally than it should. Control is taken over by the oldest part of the brain, where fear, rage and impulsive behaviours are located. It might pose a significant challenge for state authorities responsible for road safety, even in the near future.

Conclusions

It might seem an oversimplification to treat the commission of traffic offences for reasons attributable to the state of health, mental or personality characteristics, or other deficiencies as an intentional infringement of safety rules in road traffic. The issues related to surging emotions, emotional reactions, aggression, a surge for anger or even instances of road rage are commonly disregarded. These phenomena have been identified, but their causes are yet to be explored. Scholars suggest that underlying factors of such behaviours might include poor traffic arrangement, monotonous driving, high traffic congestion, and similar causes¹⁸.

17 R.R. Dunn, *A natural history of the future. What the laws of biology tell us about the destiny of the human species*, New York 2023, p. 123–124.

18 For more details refer to K.J. Pawelec, *Bezpieczeństwo i ryzyko w ruchu drogowym*, Warszawa 2020, p. 320–321.

We should be aware that the outcomes of accidents or catastrophes, causing a direct threat of accident or a danger to road traffic safety, are preceded by a hazard. What precedes this hazard? Are we able to identify the symptoms preceding road aggression or rage? It is not possible to answer the question as no research has been conducted in this sphere to date. In the meantime, research materials are within our reach. It is enough to point to the materials collected in the course of penal proceedings in such types of matters. These include opinions of expert witnesses specialising in different fields of study or evidence from tachograph records, car cameras, surveillance cameras, event data recorders or vehicle control units¹⁹.

In particular, the digital traces from surveillance cameras, vehicle control units, and tachographs may constitute invaluable research material for specialists of various backgrounds, including IT specialists, road traffic and car technology experts, physicians, communication psychologists, experts preparing psychotechnical opinions, to identify and describe the symptoms of the possibility of anger, aggression or road rage and to develop an appropriate algorithm allowing state authorities to prepare a relevant early response of a preventive nature, without any repressive measures whatsoever. An expert in communication psychology seems to be important in such measures²⁰.

Developing such an algorithm does not necessarily mean increased surveillance of citizens, which is already excessive. It is intended as a tool to prevent phenomena preceding real danger, which is only a step away from the tragic outcomes of a given incident. It will also allow the development of rational propaganda activities to convince people that only reasonable cooperation in road traffic will improve traffic safety levels. I will not hesitate to say that current measures are characterised by naivety and primitive messages, but this is a very different issue, just like the development of acceptable changes to legal regulations. „We must first see the road we are about to follow”, wrote Tadeusz Kotarbiński²¹.

19 For more details refer to K.J. Pawelec, *Czynności niepowtarzalne w sprawach o wypadki drogowe. Aspekty procesowo-kryminalistyczne i bezpieczeństwa*, Warszawa 2019, p. 177–184 and other references listed herein; P. Krzemień [in:] *Opiniowanie w sprawach przestępstw i wykroczeń drogowych*, eds. K.J. Pawelec, P. Krzemień, Warszawa 2023, p. 368–405 and other references listed herein.

20 B. Głowacki [in:] *Opiniowanie w sprawach...*, p. 536–552 and other references listed herein.

21 For more details refer to K.J. Pawelec, *Bezpieczeństwo i ryzyko...*, p. 321–323, 342–357; T. Kotarbiński, *Traktat o dobrej robocie*, Warszawa 1986, p. 37.

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Cyberbezpieczeństwo i jego możliwości zapobiegania zagrożeniom w ruchu drogowym. Z problematyki gniewu, agresji i furii drogowej

Streszczenie

W pewnym uproszczeniu można przyjąć, że w bezpieczeństwie ruchu drogowego najsłabszym ogniwem jest człowiek. Uwaga badaczy była skupiona na jego stanie zdrowia, właściwościach psychofizycznych, psychologicznych, płci, wieku i in. Zajmowano się problematyką, czy istnieją osoby szczególnie predystynowane do bycia sprawcami lub ofiarami wypadków, katastrof, sprowadzenia ich bezpośredniego niebezpieczeństwa czy spowodowania zagrożenia w ruchu. Autor niniejszej publikacji skupia się na problematyce związanej z agresją, gniewem za kierownicą oraz tzw. furią drogową. Wskazuje i omawia

czynniki determinujące tego rodzaju zachowania, sięga po ich przyczyny, a także zachowania poprzedzające, nie pomija warunków środowiskowych. Eksponuje kwestię, że gniew, agresja oraz furia leżą na przedpolu wywołanego niebezpieczeństwa będącego niejako przyczyną późniejszego wypadku czy innych już wymienionych zdarzeń drogowych. Stara się wskazywać niezbadany obszar, czy można zidentyfikować symptomy wskazujące na agresję czy furie, które to kwestie umykały uwadze, a były niezwykle istotne dla podejmowania wyprzedzających działań profilaktycznych niepołączonych z represyjnością. Wskazuje, że analiza spraw karnych, zgromadzonych w nich dowodów, w tym zapisów tachografów, czarnych skrzynek, sterowników, kamer, monitoringu, mogą stanowić materiał do opracowania przez interdyscyplinarny zespół specjalistów algorytmu pozwalającego na podjęcie działań zapobiegawczych zanim jeszcze nastąpił wybuch agresji, furii czy przemocy. Jest to niewątpliwie zadanie należące do cyberbezpieczeństwa, co absolutnie nie będzie połączone ze zwiększoną inwigilacją zachowań na drogach.

Słowa kluczowe: zasady bezpieczeństwa, wypadki i inne zdarzenia drogowe, niebezpieczeństwo, działania profilaktyczne