

How Can the Safety Culture Perspective be Applied to Road Traffic?

TOR-OLAV NÆVESTAD AND TORKEL BJØRNSKAU

Institute of Transport Economics, Gaustadalléen 21, Oslo 0349, Norway

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ABSTRACT Recent research suggests that the concept of safety culture, specified as traffic safety culture, may have great potential for improving traffic safety. However, as the safety culture concept has been traditionally applied to an organization and its members, the main aim of this paper is to examine how the concept can be applied to road traffic. This is largely a question of which analytical unit the traffic safety culture concept could be applied to. This paper examines three alternatives: (1) local communities, (2) nations, and (3) peer groups. These alternatives are evaluated against four criteria: (A) Is it well defined? (B) Can it be used to explain traffic safety behaviour? (C) Is it possible to influence? (D) Does it provide new insights into traffic safety problems? This paper concludes that while the local community alternative and national alternative appear too heterogeneous, the peer group alternative provides what seems to be a new and promising basis for targeted traffic safety interventions. The discussion indicates, however, issues that need to be examined in further research.

1. Introduction

Traffic accidents represent a serious public health problem. Recent data show that 1.3 million people die each year as a result of injuries from traffic accidents, while approximately 50 million people are injured (IRTAD, 2010). It has been argued that new approaches are required to reduce the number of road accidents and injuries further, and that the safety culture perspective constitutes a promising approach to tackling the issue of traffic safety (cf. AAA, 2007; Johnston, 2010; Ward et al., 2010).

It is widely recognized that safety culture is important for safety in organizational settings in hazardous industries (Nævestad, 2010a), and the concept is applied to an ever increasing range of sectors and industries. In the last few years, traffic safety scholars have started studying the role that *traffic safety culture* may play in explaining and reducing risks in road transport. Early results suggest that the concept may have great potential for improving traffic safety (AAA, 2007; Ward et al., 2010). The concept of safety climate is closely related to that of safety culture, but it is important to note that the concepts

Correspondence Address: Tor-Olav Nævestad, Institute of Transport Economics, Gaustadalléen 21, Oslo 0349, Norway. Email: ton@toi.no

cannot be used interchangeably. Cox and Flin (1998, 1992) assert that safety climate can be conceived of as “snapshots”, or manifestations of safety culture. Safety culture expresses itself through safety climate, and safety culture is generally measured by means of Safety Climate Questionnaires (SCQs) (Guldenmund, 2000). Nevertheless, SCQs only grasp the superficial and transient expressions of safety culture (e.g. Cox and Flin, 1998; Flin et al., 2000).

The safety culture concept traditionally applies to an organization and its members, although it has yet to be systematically used on the population at large (Wiegman et al., 2007). The safety culture concept cannot be utilized directly to road traffic, as the high-risk organization’s context in which the safety culture concept arose differs in many ways from that of road traffic.

The main aim of this paper is to examine how the safety culture concept can be applied to road traffic. If we are to apply the safety culture concept to the majority of road users, who are non-professionals, we have to find out whether and how the concept can be applied to analytical units other than organizations. This paper examines three such alternative units: (1) local communities, (2) nations, and (3) peer groups. These alternatives are evaluated against four criteria: (A) Is it well defined? (B) Can it be used to explain traffic safety behaviour? (C) Is it possible to influence? (D) Does it provide new insights into traffic safety problems? This paper concludes that while the local community alternative and national alternative appear too heterogeneous, the peer group alternative provides what seems to be a new and promising basis for targeted traffic safety interventions.

Before discussing the three alternatives, we will briefly discuss the use of the organizational safety culture concept in hazardous industries, studies of traffic safety culture, and climate among professional drivers in the transport sector, in addition to the current status of the traffic safety culture perspective.

2. Organizational Safety Culture and Climate in Hazardous Industries

2.1 Background and Current Status

The concept of organizational safety culture is usually traced to the 1986 Chernobyl disaster, which led to a shift of focus in the investigations and studies of safety in organizations. The reason for this is that the International Nuclear Safety Advisory Group (INSAG) reported that an inadequate safety culture at the plant was an important cause of the accident (INSAG, 1991). In the years following the disaster, several major accident investigations have identified safety culture as a major contributing factor, e.g. the Piper Alpha disaster (Cullen, 1990), the loss of the space shuttle Columbia (NASA, 2003), and the BP Texas City refinery disaster (The Report of the BP US Refineries Independent Safety Review Panel, 2007). The most recent example is perhaps the Deep Water Horizon oil spill (National Commission on the BP Deepwater Horizon Oil spill and Offshore Drilling, 2011).

“Safety Science” and “Work & Stress” published special issues on safety culture in 2000 and 1998, respectively. The editorials and other papers in these issues underscore that the field of inquiry is quite young, and that there is yet much to learn when it comes to defining and measuring culture and assessing the consequences of different types of safety cultures (Cox and Flin, 1998; Pidgeon, 1998; Hale, 2000; Guldenmund, 2000; Glendon and Stanton, 2000). The “*Journal of Occupational Health and Safety*” also published a special issue on safety culture and safety climate in 2008 (Vol. 24. No. 3). In his editorial, Glendon (2008) asserts

that safety culture and safety climate are rapidly developing concepts within a number of disciplines.

2.2 What is Organizational Safety Culture?

Organizational safety culture could be defined as “safety-relevant aspects of culture in organizations” (Hale, 2000; Antonsen, 2009; Nævestad, 2010a). These aspects may refer to a range of different cultural phenomena such as: “observed behavioural regularities when people interact (language, customs and traditions, rituals), group norms, espoused values, formal philosophy, rules of the game, climate, embedded skills, habits of thinking, mental models, linguistic paradigms, shared meanings and “root” metaphors or integrating symbols” Schein (1992: 8, in Guldenmund, 2000, 225).

In spite of this diversity in the specifications of safety culture, studies of organizational safety culture often seem to treat safety culture as a shared and safety-relevant way of thinking or acting that is (re)created through the joint negotiation of people in social settings (Nævestad, 2010a). Safety culture provides a frame of reference that guides individuals’ interpretations of actions, hazards, and their identities, and which motivates and legitimizes behaviours that have an impact on safety (Antonsen, 2009, Nævestad, 2010a). Such shared frames of reference are created through interaction within groups (Nævestad, 2010b).

Definitions of organizational safety culture often reflect two different ways of thinking about safety culture (Bate, 1992; Thompson et al., 1996): as something the organization *is*, understood as the beliefs, attitudes, and values of its members regarding the pursuit of safety, and as something the organization *has*, understood as the structures, practices, controls, and policies designed to enhance safety (DfT, 2004). The first way of thinking focuses on informal aspects of organizational safety, while the latter focuses on formal aspects of organizational safety. Although work on organizational safety must address both formal and informal aspects of safety, it may be useful to think of organizational safety culture as the informal aspects of safety in organizations in order to distinguish it from the formal aspects of safety in organizations, specified as rules, procedures, and so forth (Antonsen, 2009).

Organizational safety culture is an important tool that can be used to assess the safety level of organizations. While traditional measures of organizational safety levels use retrospective data on accidents and incidents (“lagging indicators”), safety culture data may provide predictive assessments that enable safety improvements without having to wait for accidents or incidents to happen (“leading indicators”) (Antonsen, 2009).

3. Organizational Safety Culture and Climate Among Professional Drivers in the Transport Sector

Studies of organizational safety culture and safety climate among professional (or work-related) drivers in road transport often combine organizational Safety Culture Questionnaire or SCQ with questionnaires measuring self-reported driving behaviours (e.g. the Driving Behaviour Questionnaire), self-reported accidents, attitudes to various traffic safety interventions targeting risky behaviours, perceptions of risky behaviours, and so forth (e.g. Davey et al., 2006, Bjørnskau and Longva, 2009).

The fact that an aircraft crash will almost always be disastrous led to a political, social, and commercial awareness that aviation safety had to be taken seriously (Hudson, 2003; O'Connor et al., 2011). The aviation industry is considered to have an exemplary high organizational safety culture level because of its well-functioning incident reporting systems, positive attitudes to safety among personnel, clear standards, rigorous requirements, and systematic safety management systems (Reason, 1997; Hudson, 2003). The organizational safety culture concept has also been applied in rail accident investigations (e.g. Hidden, 1989; Hopkins, 2005) and in studies of rail safety culture/climate (Farrington-Darby et al., 2005).

The concepts of safety culture and climate have only recently been applied in studies of professional drivers in road transport (e.g. bus drivers, taxi drivers, van drivers, and truck drivers) (cf. DfT, 2004; Wills et al., 2005; Davey et al., 2006; Bjørnskau and Longva, 2009). Research indicates that professional drivers take more risks in road traffic than non-professional drivers (Forward and Samuelsson, 2008).

The Department for Transport (DfT) commissioned a study to investigate the relationship between organizational safety culture, worker–driver attitudes, and accident risk in Great Britain, focusing on the potential benefits of organizational safety culture improvements (DfT, 2004). This study estimates that up to one-third of all traffic accidents in Great Britain involve people at work. Seven companies of varying business type, size, and vehicle fleet participated in the study ($n = 276$). Organizational safety culture was measured using the following factors: organizational commitment, management commitment, the supervisor's role, personnel's role, work mates' influence, competence, risk-taking behaviour, rules/procedures, and accidents/near misses. The attitude questions comprised the following factors: planning, rules, training, accident feedback, near miss feedback, and tendency to violate. The study concludes that there is a moderate relationship between safety culture and attitudes, and between attitudes and accidents (DfT, 2004).

Wills et al. (2005) use a sample of 321 employees from three separate organizations and industries to examine the factor structure of a modified version of the SCQ. The study used a principal components factor analysis that revealed that the original factor structure was upheld by the sample. The modified SCQ used by the authors comprised the following factors: (1) Communications and procedures, (2) Work pressure, (3) Management commitment (new factor), (4) Relationships, (5) Driver training (new factor), and (6) Safety rules. The study found significant differences between organizations in five of the six safety climate factors included.

Davey et al.'s (2006) study uses the Manchester Driver Behaviour Questionnaire (DBQ), Driver Attitude Questionnaire (DAQ) and SCQ to examine the self-reported crash involvement of a sample of Australian fleet drivers ($n = 4195$). The study includes socio-demographic variables and information on each respondent's driving history, a modified DBQ consisting of 20 items, a 20-item DAQ designed to measure attitudes regarding a range of driving behaviours that are collated to identify four factors: drink driving, close following, dangerous overtaking, and speeding, and a 29-item SCQ. The SCQ questions were modified into five subfactors: fleet safety rules, communication and support, work pressure, adequacy of fleet safety procedure, and management commitment. The study concludes that increased work pressures as well as driving mistakes were predictive of crash involvement, even after controlling for exposure to the road.

Comparing safety culture and safety levels in different transport systems, Bjørnskau and Longva (2009) found that aviation pilots achieved the highest score on the Safety Culture Index used in the study, followed by rail drivers. Bus drivers exhibited the poorest safety culture in their study. The authors suggest that to a large extent these results reflect the different external conditions of the various transport modes (Bjørnskau and Longva, 2009). The study measured safety culture by means of the GAIN-index for safety culture. GAIN is an acronym for “Global Aviation Information Network”. The GAIN-index comprises 25 questions concerning: (1) management’s attitude to and focus on safety, (2) employees’ attitudes to and focus on safety, (3) reporting culture and reactions to incident reporting, (4) safety training and education, and (5) general questions concerning safety in the organization in question.

4. Current Status of the Traffic Safety Culture Perspective

4.1 The Traffic Safety Culture Index

In 2006, the American Automobile Association (AAA) initiated a new research effort and long-term commitment to address traffic safety culture in the USA, which comprises two important lines of inquiry.

First, the AAA issued a publication (AAA, 2007) consisting of more than 20 research articles related to traffic safety culture. The articles focused on questions such as: “What is safety culture?”, “How can we measure it?” and “What can we do to change it?”.

Second, since 2008 the AAA has assessed traffic safety culture in the US population through annual public surveys, also known as the “Traffic Safety Culture Index”. These nationally representative surveys measure knowledge, attitudes, and behaviours relevant to traffic safety, and track them over time. The survey includes questions related to personal experience with crashes, perceptions of safety, attitudes, and behaviours. The latter category includes questions concerning drinking and driving, cell phone use and texting, speeding, red light running, drowsy driving, and seatbelt use.

The survey has been completed three times, in 2008, 2009, and 2010, with each survey covering more than 2000 respondents. Among the major findings from the 2010 survey was that more than half of all drivers said that driving felt less safe than it did five years ago. Nearly half cited some sort of driver distraction as the main reason. The survey also found that speeding on freeways was widespread (45% had driven more than 15 mph over the speed limit on a freeway in the past month). One in three drivers admitted to having driven through a red traffic light in the past month, one in four admitted to having driven while tired in the past month and one in ten admitted that they had driven without wearing their seatbelt fairly often or regularly (AAA, 2010). One of the major findings of the survey is a “don’t do as I do, do as I say” attitude, indicating that respondents say that certain behaviours are totally unacceptable, yet admit to doing so anyway. The AAA refers to this traffic safety cultural trait as a “culture of indifference”.

AAA defines traffic safety culture broadly as:

(...) a social climate in which traffic safety is highly valued and rigorously pursued. (AAA, 2009: abstract)

In addition to drivers, the traffic safety culture survey also covers a relatively small share of non-drivers, as the AAA is concerned about attitudes to traffic safety among all members of society 16 years of age and older. The AAA thereby uses the concept of traffic safety culture in a broad and general sense, defining it as a climate and applying it to society. This general use of the term seems to be more deserving of the label safety climate, focusing on superficial expressions or manifestations of safety culture (Cox and Flin, 1998). Thus, we should probably refer to the AAA survey as a traffic safety climate survey.

4.2 *US White Paper on Traffic Safety Culture*

As part of an effort to develop a US National Strategy on Highway Safety, nine white papers were prepared to highlight key issues. The second white paper was dedicated to traffic safety culture (Ward et al., 2010).¹ Outlining results of different strands of traffic safety culture research, this white paper states that:

Traffic safety culture appears to be an intuitive and powerful concept with which to explain observed differences in international, regional and demographic crash risks, as well as the propensity to commit high risk behaviors. If it is possible to define and apply this concept within a relevant social psychological theory of behavioral choice, it may be possible to develop a new paradigm for traffic safety interventions. (Ward et al., 2010, vii)

The white paper defines traffic safety culture as:

(...) perceptions people have about what behaviors are normal in their peer group and their expectations for how that group react to violations to these behavioral norms. In terms of traffic safety, this definition applies to behaviors that either increase risk (e.g. speeding) or are protective (e.g. wearing seatbelts), as well as behaviors related to acceptance or rejection of traffic safety interventions. (Ward et al., 2010, 5)

This definition focuses on the social unit of peer groups, hypothesizing that people tend to act according to the expected norms of their peer group.

Ward et al. (2010) cite a study examining national traffic safety cultures (Page 2001 in Ward et al., 2010) by comparing predicted accident rates, based on variables known to influence accident rates, with actual accident rates in different countries. The difference was partly inferred to be an effect of national traffic safety culture.

Ward et al. (2010) also cite Rakauskas et al.'s (2009) study of rural traffic safety culture. The point of departure for this study is that the prevailing risk of traffic fatalities is much larger in rural than in urban areas in the USA. Rakauskas et al. (2009) explore the potential contribution of rural drivers' attitudes, examining differences between rural and urban drivers in terms of self-reported risk-taking for driving behaviours associated with fatal crashes and attitudes towards safety interventions using a large-scale survey. The results suggest that rural drivers engage in riskier behaviour, such as not wearing seatbelts, because they perceive the risks associated with such behaviours to be lower. Rural drivers also perceived the utility of government-sponsored traffic safety interventions to be lower than urban drivers. Rakauskas et al.'s (2009) study is pioneering

in the field of traffic safety culture among non-professional drivers, as it documents a relationship between different traffic safety cultures (defined as an interrelated set of traffic safety attitudes, risk perceptions, and traffic safety behaviours) and accident risk among non-professional drivers within groups of rural and urban drivers.

Ward et al. (2010, 9) also apply traffic safety culture to demographic groups, arguing that the comparatively high accident risk of young drivers is suggestive of a subculture encouraging risk engagement and an acceptance of risk-taking. This is indicated by the fact that young novice drivers have the highest rate of seat belt non-compliance, close car following, and speeding-related crashes (Ward et al., 2010: 9). Finally, Ward et al. (2010) successfully relate traffic safety culture to speeding, citing studies showing that drivers' intentions to speed are highly influenced by their perceptions of moral attitudes to and social acceptance of speeding. This illustrates that risky traffic behaviour is a social and cultural activity that is closely related to meaning and identity.

4.3 Research Literature on Traffic Safety Culture and Climate

A literature search was conducted in order to acquire an overview of the current research literature on traffic safety culture. The search included five scientific online libraries: Scienedirect, Ovid, Isi web of knowledge, Trax, and the National Transportation Library. The search included the following terms in "title, abstract and key words": "traffic safety culture", "traffic safety climate", "road safety culture", "road safety climate", "transport safety culture", "transport safety climate", "urban safety culture", "urban safety climate", "rural safety culture", and "rural safety climate". The search resulted in 32 relevant publications. Fourteen of these were published by the AAA, nine were peer-reviewed journal papers, and nine were conference papers. The majority of the publications were from the USA, and a few were from Australia. Other countries represented with one relevant publication were New Zealand, China, and Egypt. The results of the literature search indicate the influence of the AAA initiative on traffic safety culture. For example, the search in the Ovid database generated 17 results for traffic safety culture and 9 results for road safety culture. It seems that the latter concept was mostly used in Australian publications. Finally, the fact that less than one-third of the publications were papers in peer-reviewed scientific journals indicates that the concept of traffic safety culture is not yet a well-founded scientific concept.

5. Which Analytical Unit(s) Can the Traffic Safety Culture Concept Be Applied to?

5.1 Safety Culture Is not Restricted to Organizations

In our view, the safety culture concept has normally been associated with, or viewed as an aspect of organizations, as organizational units can be subject to influence through for instance managerial interventions. Safety culture is a concept that is usually examined with the intention of influencing safety (e.g. Reason, 1997). Edgar Schein asserts that management and culture are two sides of the same coin (Schein, 2004). The safety culture concept has, however, been associated with analytical units other than organizations, e.g. industries, patients,

occupations, and so forth (Hudson, 2003). These units may either be smaller or larger than organizations; they may be subunits within organizations (e.g. occupational groups), or organizations may be subunits within them (e.g. industries). This reminds us that safety culture is not restricted to organizations.

It is therefore not surprising that the concept of safety culture has been applied to communities and societies in recent years. Even so, if we are to apply the safety culture concept to non-professional drivers in the road transport system, we have to examine how the concept can be applied to analytical units other than organizations (Wiegman et al., 2007). The reason for this is that non-professional drivers do not use the road as members of organizations, but as private citizens. Inspired by Ward et al. (2010) and Rakauskas et al. (2009), we understand traffic safety culture as an interrelated set of perceptions of risk related to traffic safety, attitudes to traffic safety measures, and traffic safety behaviours shared by members of particular groups.

Below, we discuss whether the concept of traffic safety culture can be applied to the following analytical units: local communities, nations, and peer groups. These alternatives are evaluated against four criteria: (A) Is it well defined? (B) Can it be used to explain traffic safety behaviour? (C) Is it possible to influence? (D) Does it provide new insights into traffic safety problems? The first criterion was chosen in order to ensure that the traffic safety culture concept is applicable for analytical purposes. Analytical concepts, especially an ambiguous concept such as culture, should be defined as precisely as possible in order to make them easier to identify, to assess their consequences, and if possible to influence them. The second and third criteria were chosen because the utility of an analytical traffic safety concept to a great extent lies in its potential to both explain traffic safety behaviour and provide the basis for traffic safety interventions. The last criterion was chosen in order to assess whether the alternative provides a genuinely new approach, and not just new concepts with which to formulate well-known insights.

5.2 *Traffic Safety Culture Applied to Local Communities*

Wiegman et al. (2007) examine the similarities and differences between communities and organizations. They assert that the application of safety culture to the community or societal level is tenuous since the boundaries of these systems are ill-defined. They nevertheless suggest that many of the elements comprising a good safety culture in an organization may have analogies to the community level (Wiegman et al., 2007, 120).

First, they suggest that communities have an analogy to senior management's commitment to safety, which is the most well-documented feature of a good safety culture:

In the community, the best analogy for "senior management" in regard to traffic safety is the government (city, state and federal). Government decision-makers are responsible for ensuring adequate safety resources, such as well-maintained roads, clear and helpful signage, and sufficient law enforcement personnel. Governments also set policies regarding safety, including training and license programs, as well as laws and ordinances. The true values of federal and community leaders are typically conveyed to the driving public through their actions. (Wiegman et al., 2007, 121)

Second, taking their analogy further, Wiegman et al. (2007, 121) ascribe the police the role of the “primary supervisor” for sanctioning behaviour: “A positive safety culture at this level may best be expressed through consistent and fair monitoring and enforcement of all safety-related behavior” (Wiegman et al., 2007, 121). This insight is closely related to Reason’s (1997) notion of a *just* culture. The purpose of a just culture is to generate a trust in the workforce to make workers report incidents without the fear of being blamed and punished, and to have a fair and just reaction when rules and procedures have been broken.

Third, Wiegman et al. (2007) also discuss the formal and informal safety system in road transport. The former concerns the reporting system that is used to report hazards. A reporting and just culture are two of the most important aspects of a positive (i.e. informed) safety culture (Reason, 1997). Wiegman et al. (2007, 121) state that a community with a strong positive safety culture will also ensure that there are mechanisms for reporting hazards such as: poorly maintained roads and a power outage at a specific traffic light. The informal safety system refers to the unwritten norms or the peer culture regarding safety and whether they promote safe or unsafe behaviour (Wiegman et al., 2007, 121). This represents the greatest challenge to a culture of traffic safety (Wiegman et al., 2007).

5.2.1 Evaluation of the local community alternative. The concept of community is ambiguous. The Cambridge Essential British English Online Dictionary² defines “community” as “the people living in a particular area” (e.g. the local community) and “a group of people with the same interests, religion or nationality” (e.g. the Chinese community in London).

Wiegman et al.’s (2007) reference to the “community” is also ambiguous, as they refer to the community at least at both a local and national level.

These two levels of community should be evaluated separately. In the following, we therefore evaluate the application of traffic safety culture to the local community. In Section 5.3, we discuss the application of the traffic safety culture concept to the national level.

Compared with the organization, which is a relatively small and closed unit, the boundaries of the local community may seem ill-defined. Culture in organizations is created and recreated by the careful selection and repeated socialization of its members (e.g. Schein, 2004). On the other hand, the fairly open nature of the local community is likely to make it more heterogeneous and complex than the organization. Thus, the local community safety culture analogy seems too ill-defined and heterogeneous to be able to be used to explain traffic safety behaviour.

Although local communities may have characteristic traffic safety cultures created through interaction between local road users (cf. Nævestad, 2010b), influencing safety culture in the local community seems to be a fairly difficult and unpredictable task since it is open and its boundaries ill-defined. The mechanisms through which traffic safety culture in the local community could be shaped (e.g. enforcement, education) are largely controlled at the national level. We discuss this below.

5.3 Traffic Safety Culture Applied to Nations

The AAA’s Traffic Safety Culture Index studies traffic safety culture on a national basis. As noted, Page (2001) cited in Ward et al. (2010) compares national traffic safety cultures. Comparisons of national traffic safety culture have also been

made in the large EU-funded research project “SARTRE”, which reported national differences among European car drivers’ attitudes towards road safety (SARTRE, 1994). A recent study found significant differences between Finnish, Swedish, Greek, and Turkish drivers (Warner et al., 2011) by use of the DBQ. Comparisons could also be made on the basis of Hofstede’s (2001) indexes of national culture. A study of 9400 male airline pilots in 19 countries reports of a successful replication of Hofstede’s indexes of national culture, indicating that national culture exerts an influence over cockpit culture and the professional culture of pilots (Merrit, 2000). In spite of the internationalization, the comprehensive regulation and extensive training involved in commercial aviation, we see that national culture influences cockpit behaviour. Hence, perhaps national cultures also influence the safety behaviour of non-professional car drivers. This issue could be examined in future research.

5.3.1 Evaluation of the national alternative. Nations are well defined in the sense that they are usually related to states with well-defined borders and a clear definition of membership. Moreover, several factors that could influence traffic safety culture are national (e.g. traffic rules, the police enforcing the rules, driver licensing, and driver education). For these reasons, we could expect the existence of different national traffic safety cultures.

Is it possible to influence national traffic safety culture? As senior management commitment is the most influential factor shaping organizational safety culture (cf. Flin et al., 2000), it is natural to do as Wiegman et al. (2007) and look for some sort of analogy to management commitment in a non-organizational context. The extent to which national government priorities and policies on road safety shape citizens’ traffic safety culture is an empirical question that could be examined in future research. As noted, road systems, traffic rules, the police who enforces the rules, and the driver education and licensing systems are factors controlled by national authorities.

Police enforcement may shape traffic safety culture on a national level. As noted, Wiegman et al. (2007) focus on the sanctioning role of the police in influencing traffic safety culture. Elvik et al. (2009) discuss 13 different measures in the area of enforcement and sanctions, with many of these leading to considerable changes in behaviour and accident reductions. Nearly all of these enforcement measures are negative sanctions. As a result, it appears that the creation of traffic safety culture is driven by punishment, rather than positive sanctions. This may seem to be a challenge, given that most descriptions of how positive safety cultures come about focus more on positive than negative sanctions (e.g. Schein, 2004). We might need more research in order to identify positive sanctioning measures in creating a positive national traffic safety culture.

Education may shape national traffic safety cultures. The transport system regulates admission, selects members, and shapes culture through the driver training and licensing system, which increases the likelihood that this could influence traffic safety culture. The purpose of formal basic driver training is to shape peoples’ traffic safety knowledge, skills, and risk understanding. Elvik et al. (2009, 791) conclude that formal driver training does not seem to be more effective on drivers’ accident rates than informal driver training. Lastly, driver education efforts such as traffic safety campaigns may also shape traffic safety culture (cf. Forward and Kazemi, 2009).

Does the concept of national traffic safety culture provide new insights into traffic safety problems? Indeed, the documentation of differences between national traffic safety cultures (SARTRE, 1994; Ward et al., 2010; Warner et al., 2011) seems fairly convincing. Research shows, however, that the variations in safety culture manifested through actual risk levels of subgroups of road users within the countries often are much larger than the differences between countries for similar age/gender/road user groups (Bjørnskau, 2009). The national unit may therefore seem less important from a traffic safety cultural perspective than smaller subgroups within nations. Consequently, it seems that we need to apply the traffic safety culture perspective to a more specific analytical unit than a nation. Below, we consider the possibility of applying the traffic safety culture concept to peer groups.

5.4 Traffic Safety Culture Applied to Peer Groups

Road users belong to different informal peer groups that influence their (un)safe traffic behaviour (Ward et al., 2010). Ward et al. stress that:

People generally conform to the social norms of the social groups to which they belong and to the expectations of those with whom they have a shared identity. (Ward et al., 2010, 23)

Ward et al. (2010) do not define peer group, although they treat peer groups as social groups of people sharing an identity. Wikipedia defines a peer group as:

(...) an informal primary group of people who share a similar or equal status and who are usually of roughly the same age, tend to travel around and interact within the social aggregate. Members of a particular peer group often have similar interests and backgrounds, bonded by the premise of sameness."³

How an individual's peer group membership influences their behaviour has been studied in a number of different research fields, e.g. cigarette smoking (Ennet and Bauman, 1994), gender and seriousness of delinquency (Morash, 1986), and adolescent motivation and achievement (Ryan, 2001).

Ward et al.'s (2010) conception of traffic safety culture is influenced by the theory of planned behaviour (TPB) (Ajzen, 1991). In short, TPB predicts that individuals will form intentions to perform a particular behaviour when they perceive the behaviour positively, and the behaviour is endorsed by people's important referents, similar to themselves (Ward et al., 2010). The latter is defined in terms of individuals' *perceived* social pressure to perform or not to perform certain types of behaviour: "subjective norms" (Ajzen, 1991, 188). TPB has been applied to a wide range of traffic safety behaviours, including driving violations such as speeding (Parker et al., 1995; Conner et al., 2007; Elliot and Armitage, 2008), drinking and driving (Marcil et al., 2001) and so forth.

Research shows that particular groups of non-professional drivers have certain driving behaviours, perceptions, and attitudes in common, and that these predict their self-reported accident involvement (e.g. Bjørnskau et al., 2010). Using the analytical framework offered by Ward et al. (2010), we may examine whether such groups can be analysed as peer groups, each with a unique traffic safety

culture guiding members' interpretations of actions, hazards and identities, and motivating and legitimizing behaviours that have an impact on safety.

5.4.1 Evaluation of the peer group alternative. The most important challenge related to applying traffic safety culture to peer groups seems to be in how to determine which peer groups people belong to. This could be solved by either focusing on objective, observable features such as age, sex, and geography, or by focusing on subjective features such as which group drivers feel that they share an identity with. When used objectively, a peer group is well-defined. It seems that although Ward et al. (2010) define safety culture in accordance with subjective features (cf. "expectations of those with whom they have a shared identity"), the examples that they discuss apply the traffic safety culture concept to objective group characteristics such as age, rural–urban, and nationality (Ward et al., 2010, 7–10).

In our view, Ward et al.'s (2010) specification of traffic safety culture is somewhat problematic when applied to demographic factors such as age. It seems unproductive to treat all "young drivers" as members of the same peer group. In our view, it is more sensible to work from the assumption that young drivers comprise many different peer groups, some (e.g. particular groups of young men) with riskier driving behaviours than others. Thus, identifying these peer groups represented by, e.g. specific young male drivers sharing identities is an empirical question.

In short, we are not in a position to assume that non-professional road users sharing objective attributes (age, sex, and place of residence) share identities. For this reason, we should take subjective feelings of peer group membership into account. This may be problematic, given that people may be unaware of what kind of peer groups they belong to. They may belong to several peer groups, and they may not have a clear opinion with regard to which peer group they belong to or which peer group is most important. Moreover, if we use objective criteria such as age or sex, the peer groups may become too general.

In conclusion, the peer group is not necessarily a well-defined analytical unit to apply the concept of traffic safety culture to. As the issue of whether and to what extent non-professional drivers have an opinion regarding which peer group they belong to is crucial for this alternative, more research should be devoted to examining this topic. Perhaps peer group membership is particularly important for some categories of road users (e.g. young drivers) and less important for others (e.g. low-risk, experienced adult drivers). This should be examined in future research. Additionally, it is also possible that peer group membership is more important in societies scoring high on the national culture trait of collectivism than it is in societies scoring high on individualism (cf. Hofstede, 2001).

The key issue in determining which peer groups people belong to seems to be to identify what Ajzen (1991) refers to as people's referent individual. It seems reasonable to treat groups of people who act as referent individuals to each other as members of the same traffic safety culture. This issue, however, requires more research.

As noted in Section 4.2, the peer group approach has been used to explain differences in traffic safety behaviour based on national, regional, and demographic factors (cf. Ward et al., 2010).

As people tend to conform to their perceptions of the social groups to which they belong and to the expectations of those with whom they have a shared identity, a traffic safety culture change approach should attempt to influence

these perceptions and expectations to improve traffic safety (Ward et al., 2010, 23). Ward et al. (2010) give two examples of such efforts.

The first example is provided by the Arizona High School Seat Belt Campaign. Researchers at Montana State University found that the traffic safety culture of teen drivers (measured as perceived and actual peer norms) has a significant influence on adolescent seat belt use (NHTSA, 2008, in Ward et al., 2010, 10). Based on this, a high-intensity social norms campaign was used to increase beliefs in the value of seat belts and perceptions of peer (i.e. high school students) use of seat belts. Results showed that perceptions of peer seat belt use increased dramatically at treatment schools, while misperceptions remained unchanged in control schools.

The second example is provided by a social norms theory approach aimed at drinking and driving in Montana (Linkenbach and Perkins, 2005, in Ward et al., 2010, 11). The intervention targeted young adults aged 21–34. The basis of the campaign was a study that found a considerable incongruence between perceived and actual drinking and driving behaviour among peers. The campaign set out to inform about the actual drinking and driving in the relevant peer group through a 15-month media campaign. The message was: “Most Montana young adults (4 out of 5) don’t drink and drive”. A study comparing the effects of two different levels of exposure to the campaign revealed that the campaign reduced misperceptions, and changed attitudes and behaviour. The campaign also led to an increase in the acceptance of legal restrictions on impaired driving (Ward et al., 2010, 11).

The peer group alternative provides what seems to be a fruitful basis for applying the concept of safety culture to road traffic, although the mechanisms of how to influence safety culture among peer groups is not straightforward. The aforementioned campaigns from Montana seem quite successful. Nonetheless, numerous campaigns are directed towards specific road user groups, especially young drivers, and the results are mixed (Forward and Kazemi, 2009). The new contribution from the peer group approach is the focus on information about actual peer behaviour, to reduce the incongruence between road users’ perception of peers’ traffic safety behaviour, and peers’ actual behaviour.

6. Concluding Remarks

The main aim of this paper was to examine how the safety culture concept can be applied to road traffic, focusing on which analytical unit the traffic safety culture of non-professional road users in the road transport system can be applied to. This paper concludes that while the local community alternative and national alternative appear too heterogeneous, the peer group alternative provides what seems to be a new and promising basis for targeted traffic safety interventions. The discussion indicates, however, that there are issues that need to be examined in future research. It seems crucial to study whether and to what extent non-professional road users have a clear opinion regarding which peer group(s) they belong to and what importance they attribute to this peer group. This is an important question, as the peer group approach postulates that people conform to the expectations of those with whom they have a shared identity. Perhaps peer group membership is particularly important for some categories of road users (e.g. young male drivers) and less important for others (e.g. low-risk, experienced adult drivers). We also suggested that peer group membership may be more

important in societies that can be described as more collectivistic than individualistic. But most of all, we need studies examining how the traffic safety culture approach can be utilized to explain traffic safety behaviour and inspire traffic safety interventions that are sensitive to the socio-cultural context of the behaviour of specific groups of road users.

Notes

1. This white paper is a draft dated 7 July 2010.
2. <http://dictionary.cambridge.org/dictionary/essential-british-english>.
3. http://en.wikipedia.org/wiki/Peer_group.

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